GOSH 2018 SHENZHEN

Community Report

Gathering for Open Science Hardware

Outline

GOSH 2018

Website: openhardware.science Twitter hashtag: #GOSH2018
Youtube channel: https://goo.gl/YgmC8a
Flickr: https://www.flickr.com/photos/goshcommunity/
GOSH 2018 Forum: https://forum.openhardware.science/c/gosh-2018

view in 360 VR: http://bit.ly/goshers2018

GOSH 2018 – Summary

Experimental science is typically dependent on hardware tools: equipment, sensors, machines which can be expensive and difficult to access and customise. Open Science Hardware means sharing designs for equipment that anyone can reuse, replicate, build upon or sell, so long as they attribute the developers on whose shoulders they stand. A growing number of initiatives are also sharing chemicals, cell lines and materials with few or no restrictions on use.

The Gathering for Open Science Hardware is an international meeting that brings together a group of the most active individuals and communities who are developing, using or otherwise furthering open science hardware in all its forms. Our third convening took place in October 2018 at the Open Faculty of Innovation, Education, Science, Technology and Art (OpenFIESTA) of Tsinghua University in Shenzhen, China – the "hardware capital of the world." With kind support from PLOS and other sponsors, we gathered a diverse group of over 110 scientists, engineers, entrepreneurs, artists, educators and not-for-profit organisations from 34 countries. GOSH participants met over four days for discussions, workshops and unconferences around the theme "scaling hardware, growing community" with the goal of actioning the Global Open Science Hardware Roadmap to make open science hardware ubiquitous by 2025.

Science tools reaching more people for more purposes

Open Science Hardware is intended to ensure that more and more diverse people in more places can contribute to furthering scientific research, education and culture. During the meeting there were many sessions or practical workshops that represented this diversity, and we are only able to provide a few examples here. In some cases hardware was designed to be low-cost and "hackable" for educational purposes. For example, Oliver Keller led a workshop building DIY particle detectors based on inexpensive silicon diodes to measure radioactivity and discussed their use in education and citizen science. Other hardware is designed to make technology accessible where very few commercial options exist, such as the OpenDrop and DropBot digital microfluidics platforms, which move droplets of liquid with electrostatic forces. These can be adapted for a range of research uses and applications, such as diagnostics.

Microscopes remain a fertile ground for innovation in the GOSH Community and in addition to the latest version of the 3D-printed, high precision OpenFlexure scope we saw the FluoPi from Isaac Nuñez and Tamara Matute, a chamber for imaging fluorescent bacteria that won the 2018 PLOS Open Source Toolkit Channel prize; the FlyPi from Andre Chagas designed for neuroscience experiments including optogenetics and the latest iteration of the Public Lab community microscope for analysing particulate pollution, that was developed for their

community of over 10,000 people and can be used by anyone interested in understanding and improving their environment.

Environmental monitoring and field research is a very active area. GOSH 2018 was introduced to digital naturalism by engineer Andrew Quitmeyer, who led a workshop on the "field labs of the future." A session on water quality monitoring highlighted many efforts in the US, Latin America and China using DIY and open source equipment for both academic and community-based science. All of these examples take advantage of at least some of open science hardware's many potential benefits, for example being adaptable and customisable, locally manufacturable, lower-cost, easier to maintain and repair, increasing autonomy and building capabilities.

Advancing the GOSH Community Roadmap through learning, supporting and growing

Each of the three days of this gathering featured a new topic session on the three themes of the GOSH Roadmap: Learn, Support and Grow. These were continued through community-curated discussions and hands-on workshops. "Learn" took the form of a conversation on the ways in which open science hardware can enrich learning and how we can assess its impact. Initiatives from GOSH community members span from school science clubs and extracurricular activities, like those provided by Karkhana in Nepal and Litchee Lab in Shenzhen, to professional training for early career researchers like the Advanced Labware Workshop held in Cape Town by TReND in Africa. There was recognition that education happens outside of the classroom in complex communities and that open science hardware enables students and citizens to identify and solve real world problems as evidenced by the TECNOx community in Latin America. However, the resulting learning outcomes can be harder to evidence, and educational research is needed to address this issue.

"Support" covered ways in which the community can help each other in our work and gain external support and funding. Leonardo Sehn, based at the Centro de Tecnologia Acadêmica, UFRGS in Brazil (and collaborator from EITCHA!), started the discussion by emphasizing the need for continuous and ongoing documentation in open source hardware development and ongoing technical and social efforts to improve this. Transparency and clarity in documentation helps in attracting Kickstarter funding, as confirmed by their Senior Design & Technology Outreach Lead Clarissa Redwine who also emphasised the importance of mobilising your community. On average, 30% of a Kickstarter project is funded by backers on the platform but 70% is funded by the proposer's network. Finding the right community and ecosystem can therefore be vital. Violet Su next introduced x.factory, the Seeed Studios IoT Hardware enabler space that enables makers to go from idea to product by accessing the Shenzhen hardware ecosystem.

Ecosystem thinking preempted the "Grow" session that examined different routes to scaling. One route being explored by several of the >15 companies represented at GOSH 2018

is commercial manufacturing and distribution, but we also discussed the need to increase the diversity, scale and impact of the OScH community in many ways and with respect to local differences. Chiu Chau of [OpenTrons](#), who manufacture open hardware robots for pipetting liquids in laboratories, shared lessons from his entrepreneurial journey and possible avenues for financial sustainability and growth of open science hardware projects and organisations. He emphasised the need for passion, humility and determination but also community support. Returning to the theme of support for moving projects to scale, Jo-An Ho of the [HAX hardware accelerator](#) described their process of achieving success for their portfolio of companies and how one week of hardware development in Shenzhen is worth a month elsewhere, due to the sheer concentration of goods and services in this vibrant city of technology.

Open Science Hardware in 2019: going global, keeping local

Other themes that emerged during GOSH 2018 included the role of open science hardware in different regions and sectors, for example PLOS specifically supported a session on "Boosting OScH in academic context: opportunities and challenges." Going forward, the GOSH Community is evolving from convening around an annual Gathering and our online forum to a globally distributed network of events, activities, residencies and topic-based working groups and projects. Coming up in 2019 is the second [Africa Open Science and Hardware](#) meeting in Dar es Salaam, Tanzania; a planned North America event; technical residencies in Latin America; further community building in China plus work on 155 actions and pledges to progress openness in research tools and make hardware a recognised and valuable component of open research practices.

We invite anyone to sign the [GOSH manifesto](#), join the [GOSH Forum](#) to share their thoughts and projects, collaborate on the community actions hosted on [Gitlab](#). Together, we aim to take open science hardware global, while fostering local initiatives to ensure that more people have access to vital enabling technologies for science.

Organizers & Documentation Team

Main Organizers
(IN ALPHABETICAL ORDER)

David Li, Shenzhen Open Innovation Lab
Fernán Federici Noe, Pontificia Universidad Católica de Chile
Francois Grey, University of Geneva
Greg Austic, Our-Sci
Jenny Molloy, University of Cambridge
Ji Li, Open FIESTA, Tsinghua University
Julieta Cecilia Arancio, CENIT-CONICET
Marc Dusseiller, Dusjar Labs / Hackteria
Shannon Dosemagen, Public Lab
Vicky Xie, Shenzhen Open Innovation Lab

Documentation Team
(IN ALPHABETICAL ORDER)

Eduardo Padilha Antonio, Scientist and Biohacker / University of São Paulo / São Paulo
Jenny Molloy, University of Cambridge
Juan Manuel Garcia Arcos, Open Science School / Institut Curie / CRI Paris
Julian Stirling, University of Bath
Laura Olalde, Artist, educator and researcher / Buenos Aires / Argentina
Leonardo Sehn, CTA IF UFRGS and EITCHA! / Brasil
Marcela Basch, Journalist and researcher / El Plan C / Bioleft / Buenos Aires, Argentina
Palok Biswas, LEAP, Bangladesh.
Rachel Aronoff, Biologist, Founder of AGiR! (Action for Genomic integrity through Research!) and President of the Association Hackuarium / Switzerland
Saad Chinoy, Geek / Singapore

Sponsors & Local Partners

Advocates	Local Partners	
KICKSTARTER	OpenFIESTA Open Faculty for Innovation, Education, Science, Technology and Art, Tsinghua University	seeed The IoT Hardware Enabler
PLOS	清华大学 Tsinghua University	MakerBay
Ricolab HERBS & TECHNOLOGY	SZOIL SHENZHEN OPEN INNOVATION LAB	STEAMHEAD MAKE. GREAT. THINGS.

Supporters

HardwareX

Major Supporters

Alfred P Sloan Foundation – $50,000
The Alfred P. Sloan Foundation believes that a carefully reasoned and systematic understanding of the forces of nature and society, when applied inventively and wisely, can lead to a better world for all. The GOSH Community are grateful for the ongoing support of the Sloan Foundation, who have been a sponsor since GOSH 2017.

Betty and Gordon Moore Foundation
Gordon and Betty Moore established the foundation to create positive outcomes for future generations.

Advocates

Kickstarter – $1000
Kickstarter is the world's largest funding platform for creative projects and many open science hardware projects have raised funds there. GOSH 2018 was attended by Clarissa Redwine, Kickstarter's Design & Tech Outreach Lead.

[PLOS](#) – $1000

PLOS was founded as a nonprofit Open Access publisher, innovator and advocacy organization with a mission to advance progress in science and medicine by leading a transformation in research communication. They are great supporters of open source in science, including hosting the [Open Source Toolkit Channel](#), edited by GOSH Community members. PLOS supported travel stipends and the "Boosting Open Science Hardware in an academic context: opportunities and challenges" unconference session.

[Ricolab](#) – 2000 CHF

Ricolab is the independent radical innovation laboratory of the Swiss SME Ricola. They build on the heritage of Ricola to prototype new business with a long-term perspective. Ricolab sponsored our public event hosted at x.factory.

Supporters

[HardwareX](#) – $500

HardwareX is an Elsevier open access journal established to promote free and open source designing, building and customizing of scientific infrastructure (hardware). HardwareX aims to recognize researchers for the time and effort in developing scientific infrastructure while providing end-users with sufficient information to replicate and validate the advances presented.

Schedule
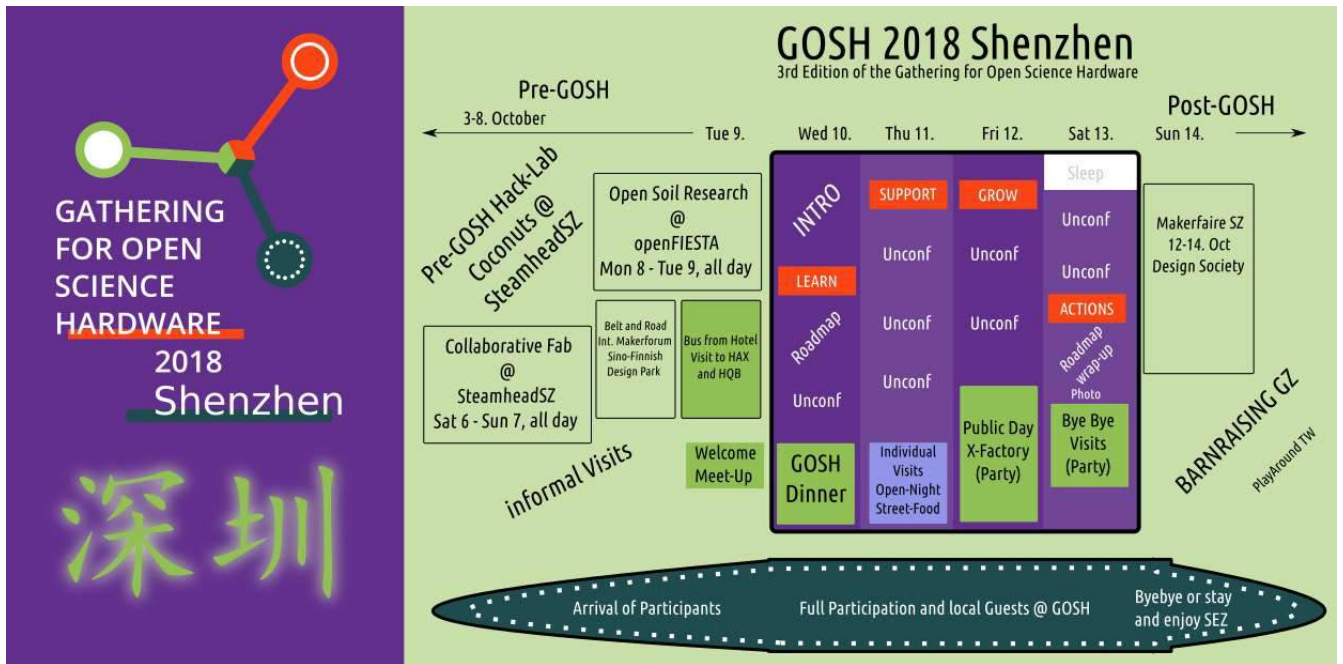
GOSH 2018 SHENZHEN DAY 1

UNOFFICIAL DOCUMENTATION BY @TRASHHUMANIST

INTRO

Tsinghua University
Open FIESTA

HOST ORGANIZATION

GOSH 2018
• 34 COUNTRIES
• THEME: SCALING + MANUFACTURING

JENNY

GROW

J.P HIGHLIGHTS THE DEVELOPMENT OF THE GOSH MANIFESTO + GOSH ROADMAP FROM CHILE 2017.

J.P.

LEARN

PIERRE

ANDRE
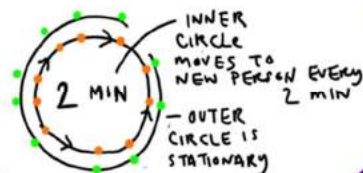
CONTEXTUAL TOOLMAKING FOR OSH

HOW DO WE GET INSTITUTIONS TO ADOPT OSH?

LI

DO ENGINEERS BECOME TEACHERS?

ENGINEER
EDUCATOR

SPEED MEETINGS!

2 MIN

— INNER CIRCLE MOVES TO NEW PERSON EVERY 2 MIN

— OUTER CIRCLE IS STATIONARY
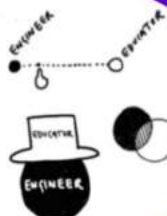
+ 100 PEOPLE

FACILITATION WORKSHOP

ALL PARTICIPANTS ATTEND THE FACILITATION WORKSHOP AS ALL PARTICIPANTS HAVE THE OPPORTUNITY TO FACILITATE A SESSION.

DAY 2 MORNING. SCHEDULE

8:00 - 9:00 - BREAKFAST
9:00 - 10:00 - SUPPORT
10:00 - 12:35 - SESSIONS
12:35 - 13:35 - LUNCH
13:40 - - 17:30 - SESSIONS.

100 PEOPLE WROTE THEIR INTERESTS ON A STICKY NOTE

THEN NOTES WERE CLUSTERED BY SUBJECT, AND TURNED INTO SESSIONS.

WHICH RANGED FROM HARDWARE, AGRICULTURE, AND MEDICINE,

WE THEN CONCLUDED THE FIRST DAY WITH A GIANT MEAL OF DUCK, FROG'S LEGS,

DAY 1 Wednesday (October 10th)

Topic Session I: LEARN

Participants:

Lit Lao (Founder, Litchee Lab), Andre Maia Chagas (researcher educator using open science equipment), Pierre Padilla (builds Open Science Hardware for public health).

Summary:

By **LEARN**, we mean how the GOSH community learns about itself, the contexts in which it currently operates, and the ways in which OScH impacts society.

We started by discussing the difference between makers and educators. The following perspectives were presented:

1. Letting the students identify what they want and facilitate their building it, instead of teaching them a fixed set of things.
2. Learning is hard and we must not try to make it too simple for the learners. Instead, we must enable them to learn on their own, by constantly challenging them.

3. Instead of teaching students, we must help them identify and solve the community's problems. Important skills include empathy, setting goals, finding and working with mentors, etc.
4. We must build open tools to help educators turn into makers and makers into educators to bridge their skill gap.
5. A lot of education happens outside the classroom, in complex communities that we must not forget about while building a product for society.
6. The goal is to eventually make the learner independent, comfortable and motivated to work more and more on open hardware in future.

The next topic discussed was how do we monitor and measure if learning was successful. Following are the five metrics that were proposed –

1. How well the participants repeat what was covered (least favorite).
2. How many times the participants use exactly what they learnt in different situations.
3. How many different original projects they create after the workshop.
4. How many more people they exchange and engage with in their environment.
5. How they engage with a new topic and its people in an open way.

Currently, there is a lot of emphasis on rote learning and examinations in traditional educational systems. We must progress towards more organic, realistic and self-developing methods of education and have focus on metrics aligned with the same.

There was some debate about making teachers out of engineers, with some proposing it is better to keep the two career tracks separate, but Lit thinks people can be both, engineers and teachers. However, all acknowledged that special educators are needed to act as facilitators in order communicate the values of open science to the next generation. To 'Embrace Challenge' was one extra take-home message from this session.

The Journal of Open Hardware [3] is starting a section on Open Hardware Education. Email : tobias.wenzel@embl.de

Unconferences Day 1

Fundraising and financial sustainability for Open Science Hardware

Participants:
Francois, Oliver, Leonardo, Diego, Clarissa, Reddy, Fernando, Ji, Jenny, Shannon, Gregg, Valerian, Lisa, Mohanty, Analia, Marc, Yanick.

Summary:
As our first unconference session trial, we ended up with many open questions because this is a diverse and complex topic. Some participants shared their experiences with funding and financial sustainability in different contexts: Europe, Africa, United States and so on. Some strategies were proposed, like building a common pool of OScH projects to apply for funding, share different demands of projects that could get funded, since we are a diverse background community, and also to have a working group to understand the cases that have

been successful, among other suggestions. This discussion will certainly be followed up in the next days in specific themes, like regional events and business model unconferences.

DocuBricks

Participants:
Tobey (convenor), Julian (note-taker), Harold, Aga, Justin, Marc, Anna , Dorcas.

Summary:
Docubricks is an initiative to make an open standard for documentation, especially in an academic context. As every open hardware project without documentation is very hard to use (and not open in the sense of the OSHWA definition). DocuBricks is designed to give you a good structure so you do not have to start with a blank page, but it will not take all documentation decisions for you, still allowing flexibility and any media and design file types. Its key advantages are a standard format. The user gets to see all the modular documentation content with linked files, rather than plain mess of files and folders. In contrast to simple step-by-step documentation solutions (IKEA style or repair guides), DocuBricks encourages the description of functionality through its modular structure and description fields, which enables others to understand and modify the project. This is the

main purpose of Open Source Hardware documentation in contrast to assembly guides of closed source commercial kits.

DocuBricks is based on XML which can in principle be read and edited with any text editor, but not in a convenient way. For easy and mistake-free editing, it requires a specialised open source editor (download on DocuBricks website).

Some worried about its flexibility and the ease of getting used to filling out what is essentially a form. Others were concerned about if the project gets abandoned, how easy is it to transfer their documentation to another program. Others felt that a one-size fits all solution to open hardware documentation (as desired by some participants) may be too hard and perhaps it is good to concentrate on science hardware (which is what DocuBricks does).

In general everyone agreed on the need for a documentation standard. Some wished for features that DocuBricks does not currently provide, such as a format independent export, a smooth integration in social media networks (currently only given by large scale for profit providers) or integration solutions of DocuBricks in websites of any kind. Some have used DocuBricks successfully and others have developed their own specific ways of documenting that is incompatible with the DocuBricks structure.

Introduction to Low-Cost Microfluidics Workshop

Participants:

Convenor: Urs
Notes: Saad
Attendees: Saad,, Andriy, Minerva, Ananda, Pierre, JP, Julieta, Fernán, Mary, Dulce, Kaspar, Marina

Summary:

Urs Gaudenz of Gaudi labs provided the perfect hands-on experience for newbies to microfluidics at GOSH2018 during the first unconference sessions of the meeting. Microfluidics can be useful for many analyses, for instance of single cells, for making microdroplets and even for some DNA studies. Using a simple acrylic rectangle with 4 small holes, some wide cello-tape and couple of syringes and colored fluids, people got to make channels and explore the world of microfluidics "chips."
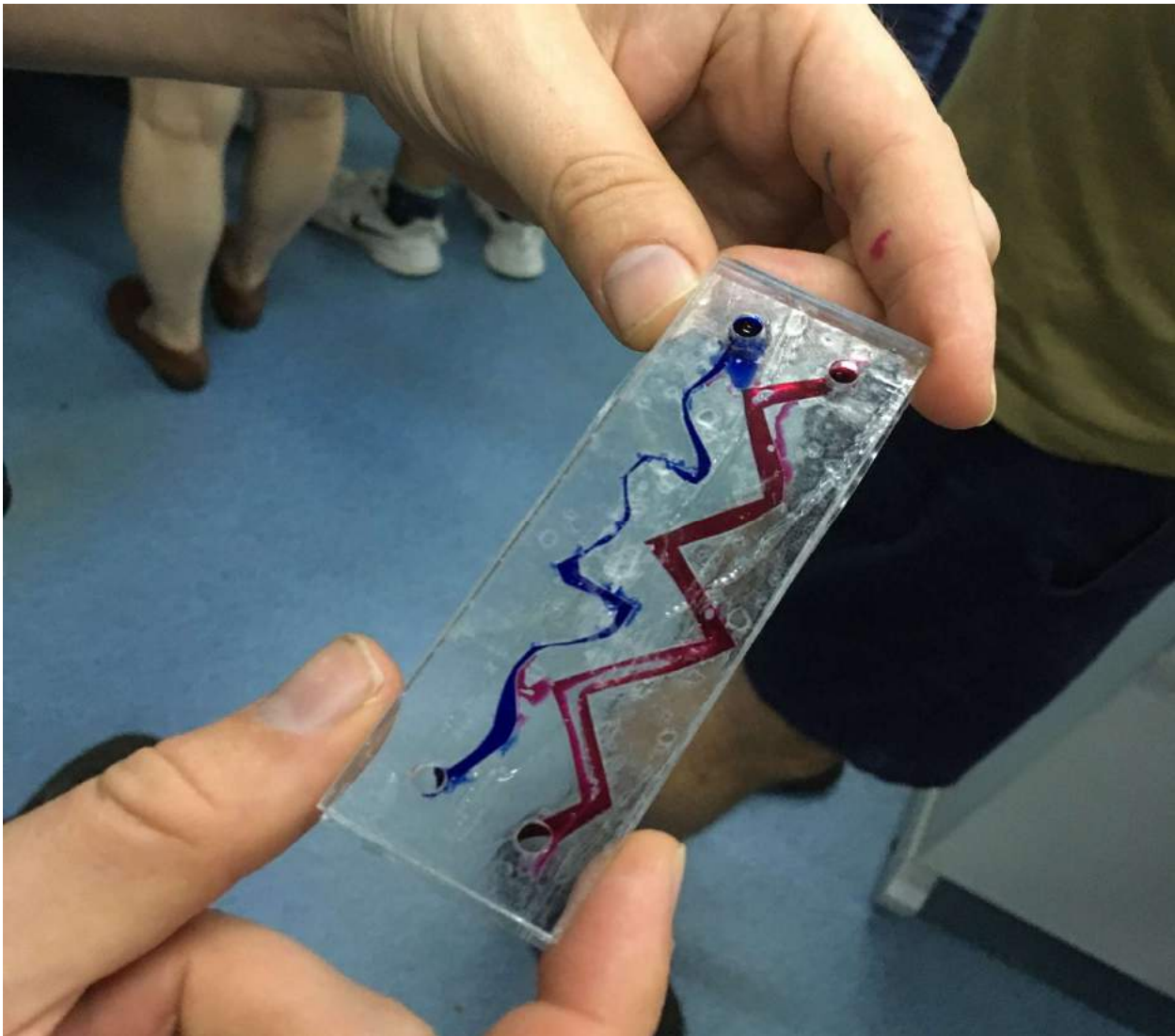
The holes in the acrylic were bored into the material with a laser cutter prior to the workshop and were made the same size as the ends of the syringes. First, protective layers were taken off each side of these rectangles, and on the table, the wide cello tape was put together in two layers and then stuck onto one side of the acrylic piece. Then, people's imaginations and a box cutter were used to carve channels into the tape. Urs advised that one should avoid making these too wide, because, after the channels were cut, a third layer of the wide tape was then used to complete the microfluidic device. If the channel width was too broad, the third piece of tape could cause blockage of the fluidic path. Avoiding bubbles was somewhat tricky, but some simple pressure, pushing the cut tape on the acrylic chip down onto the third layer of tape, rather than vice versa, allowed the final layer of the chip to be constructed. Using syringes loaded with the colored liquids (red and blue), the channels could then be tested. Some gorgeous examples were seen! Making these ultra cheap and easy microfluidic chips was a great experience. Microfluidics will be further investigated tomorrow by Urs tomorrow with participants, using a CNC router to cut channels.

GOSH 2018 SHENZHEN DAY 2

UNOFFICIAL DOCUMENTATION
BY 📷 @TRASHHUMANIST

8-9 : BREAKFAST
9-10 : SUPPORT

10-11

- HOW TO CONNECT OSH WITH PPL WHO NEED IT
- STORYTELLING + COMMUNICATION FOR OSCH
- DESIGN CHALLENGE
- BUILDING COMMUNITIES
- EASY REFLOW SOLDERING

11:25-12:35

- LOW TECH ALTERNATIVES TO HIGH TECH TOOLS
- LATIN AMERICA GOSH DEVELOPMENT
- AI + SOFTWARE COLLABS IN OSH WORLD
- BIOHACKING COLLABORATION SHARING + LICENSING
- BOOSTING OSCH IN AN ACADEMIC CONTEXT

13:35-15:00

- MAKING OPEN SCIENCE HARDWARE MORE ENVIR. SUSTAINABLE
- LET'S DRAW FIELD LABS OF THE FUTURE
- DEBUGGING DIGITAL COMMUNICATION
- BABY WORKSHOP

15:15-17:40

- DOCUMENTATION
- CIRCUIT DESIGN
- DIY MICROSCOPY
- MICROBIAL FUEL CELL DEVELOPMENT
- WATER QUALITY STANDARDS.

EVENING

HOW-TO-EAT-ALMOST-ANYTHING.

SUPPORT
FUNDING - MOTIVATIONS - MANUFACTURING - DOCUMENTATION

LEONARDO TALKS ABOUT THE IMPORTANCE OF GOOD DOCUMENTATION AND HOW MUCH IMPACT INTENT + MOTIVATION HAS IN A PROJECT.

CLARISSA
LEONARDO
VIOLET

CTA + EITCHA

KICKSTARTER

seeed

CLARISSA COVERS PAST PROJECTS IN SCIENCE + OPEN HARDWARE AND HOW THEY FAILED/SUCCEEDED.

VIOLET TALKS ABOUT THE HISTORY OF SEEED AND ITS SERVICES, AS WELL AS XFACTORY'S NEW INITIATIVES IN ENVIRONMENTAL MONITORING.

POST SESSION DEBRIEF

JULI

RECAP SESSIONS?
⊕ WHAT DID YOU DO DURING THEM?
⊕ WHAT WILL YOU DO WITH THIS KNOWLEDGE POST GOSH?

ANDRE

WE NEED TO LEARN ABOUT THE FULL SCOPE OF CROWD FUNDING FOR SCIENCE.

LET'S DEBATE
THE ROLE OF ...

DEVIL'S

DAY 2 Thursday (October 11th)

Topic Session II: SUPPORT

Guest Speakers:

Leonardo Sehn (CTA IF/UFRGS and EITCHA!), Clarissa Redwine (Kickstarter); Violet Su (X.Factory, Seeed)

Leonardo Sehn started the discussion by emphasizing the need for continuous and ongoing documentation in open source hardware development. It helps in receiving funding, support, knowledge sharing and acts as a yardstick of quality. He encouraged us to play with and tweak technology to solve our challenges rather than simply consuming it as an end user. He suggested to make ongoing documentation part of our OSH development workflow.

Clarissa Redwine (Kickstarter) talked about how we can fund science with communities using Kickstarter. She gave details on how to run a Kickstarter campaign, after beginning with an introduction about science and engagement, including Jacques Cousteau and Carl Sagan as examples of scientists that got large public followings. In Kickstarter, communities are building and funding each other, with contributors getting a sense that they are

collaborating in making the project succeed. The 'all or nothing' funding means that needs and risks must be carefully calculated when setting funding goals. Usually, they want to see some tie to culture, and Clarissa provided some tips for gaining momentum with soft launches. It is essential to do outreach before, during and after all campaigns was the last thought she left GOSH participants to consider.

Following are the main things to keep in mind while starting a campaign –

1. Essence – What do you want to make? What is your plan? Why should the community fund you? Show your passion for the thing that you are making. Invite the community to be a part of your journey.
2. 60% donors are repeat backers. Try focusing on that specific audience and its expectations.
3. Most projects are $1000–$10000.
4. On an average, 30% of a project is backed by kickstarter backers and 70% by your community. So, you will be responsible to drive a large part of the traffic and attention to your project.
5. Create something to share with others. Present it honestly and clearly.
6. Its an all-or-nothing campaign.
7.

Ideas to have a more successful campaign/each out to the larger audience –

1. Create a cultural movement.
2. Grow with the community and launch multiple kickstarter projects with multiple products.
3. Show the cool things that backers can do with your project.
4.

Violet Su (X.Factory, Seeed) talked about X.Factory which is an IoT Hardware enabler that enables makers to go from idea to product(deployment). It provides access to Shenzhen's wonderful supply chain, prototyping facilities, manufacturing consultation, collaboration with Chinese industries and meeting local communities. Basically, their successful business is about providing products to help innovative ideas become reality. Makers and industries are brought together for mass entrepreneurship.

It involves the following steps:
1. Hardware idea
2. Fusion
3. Agile manufacturing
4. Mass production
5. Deployment
   More details can be found here : www.chaihuo.org/xfactory/ Github – https://github.com/Seeed-Studio 1

Unconferences DAY 2 Thursday (October 11th)

OScH and the Sustainable Development Goals (SDGs)

Participants:
Convenors: Francois, Dr. N. Sai Bhaskar Reddy
Attendees: Shuli, Marina, Leo, Mary, Louise, Anga, Anna, Moritz, Ryan.

Summary:
This session is about how the OScH movement can address SDGs. From a historical perspective, the Millenium Developments Goals announced in 2000 are a precedent of the SDGs, but they were not very successful. The SDGs announced in 2015 are more ambitious in number, and even though they are not perfect, they are better than nothing. There is a general consensus that OScH can play a part in achieving most/all of these goals, not only by specific projects but also as a general approach to achieve them. There are milestones as how to access money ethically, since there are not global funds, and how to scale, not just growing in terms of number of units, money, etc. but by impact.
As final conclusions some actions are proposed:

- Survey to map out projects/goals and document/analysis about which SDGs are GOSH community projects related to.
- Work on the visualization about different aspects of GOSH.
- Integrate GOSH into Geneva/Tsinghua (e.g., as residency programs).

Story-Telling and Communication for Open Science Hardware

Participants:

Marcela, Agnieszka, Fernando, Diego, Rachel, Tony, Wei Li, Harald Tay, Saad, Laura, Lisa, Analía, Akshai, Greg.

Summary:

Marcela Basch led the storytelling session at GOSH2018. Marcela is a journalist whose perspective on her work is that it is very important to be a translator in order to communicate the importance of others' ideas, and especially the GOSH ideals. About 15 people, including a lawyer, a visual artist, a biologist and a software developer, contributed to the discussion. After an introductory round, when it came out that the majority of the group do not feel like they are great storytellers, Marcela suggested that we split into groups and tackle the open science question first, with everyone saying what is the key issue to co-create a coherent story about the gathering. One group aimed at a general public audience, and the other at the trans-disciplinary open science research group. Imagery and text together were pulled together from the ideas and definitions, leading to a few fun points, for instance, 'Science power, unchained' and 'science power to the people' and "Empowerment through collaboration' – which one participant, Agnieszka, proposed to make into gifs.

How to generate electric power from mud/MFCs – Using The Force!

Participants:

Oliver (Documenter), Take, Hamish, Leslie, Alex & Saad (Conveners)

Summary:

The session was intended to draw attention to and renew interest in the potential of microbial fuel cells (MFC) since it's a rather neglected topic in the face of higher energy density chemical batteries. Conveners explored the uniqueness of the living fuel cell as a source of electricity and its striking similarities to "The Force" in the science-fictional StarWars universe. In spite of its complexity, construction of a working MFC is incredibly simple with common household materials. Participation then turned to a brainstorming

session on how to harvest electric power from bacteria better and more efficiently. The session concluded with everyone conceptualizing and drawing up sketches of a MFC design/layout and its possible applications. Low power sensors and transmission techniques like LoRa could benefit from a living power source, while energy density could be exponentially increased with the use of Graphene for biofilms.

Open hardware for sustainable science and sustainability science

Participants:
Organizers: Jenny and Francois
Attendees: Marina, Lou, Leonardo, Julieta, Pierre, Diego, Anna, Tony, Analia, Violet, Saad, Nakka, Dorcas, Yanick.

Summary:
The aim of this workshop was to discuss the issue of sustainability in science, and how Open Hardware (OH) could contribute towards enhancing environmental (and economic) sustainability. In particular, sustainability was considered in terms of practices of repair and

recycling. It was also recognized that OH could also be instrumental in driving forward research on sustainability, although this topic was not pursued as closely.

The discussion focused around the question: where is openness making a change? Where are pressure points to nudge things along? In order to address this question, the group split into two, one focusing on how to change institutional thinking, and the other focusing on developing community practices that enhance sustainable practices. In relation to the former, it was recognized that a number of different institutions play a key role in thwarting current efforts to enhance sustainability. In particular, these included research institutions, funding bodies, commercial manufacturers and so forth. While it was recognized that these institutions could adapt policy to support sustainable practices, the efficacy of policy changes was also debated. It was suggested that alternative measures – such as engaging market forces – might be more effective alternative.

The community practices group spent time discussing issues such as recycling and waste disposal systems. They suggested that there was a key need for guidelines on green science, and that there were resources in other communities (such as manufacturing) that could be adapted to OH. Together, the group agreed that there was a need for more evidence – both of good practice, but also of the wastage of under-used/non-recycled equipment. A number of actions came out, including a commitment to discussing how to gather evidence about the impact of non-sustainable equipment use.

Designing DNA circuits
Participants:
Organizers: Juanma and Minerva
Attendees: Laura, Shubhi, Harold (notetaker), Joel, (...)Tamara, Isaac, Pierre, Nano, Joel Murphy, Andy Quitmeyer

Summary:
This unconference session, by Juanma and Minerva, and attended by about a dozen people, started with an in-depth description of what DNA does and how it works. Eukaryotes are considerably more difficult to work with for various reasons, compared with bacteria. Bacteria can contain short lengths of foreign DNA in the form of plasmids, in addition to their own genomic DNA. It's relatively easy to introduce these plasmids into bacteria, and when this is done, it will be transcribed into RNA and then translated into the corresponding protein. Gene banks exist from which standard plasmids can be ordered.
The unsession ended with a note that this process is simple enough that the security and bioterrorism implications have not escaped the notice of state security agencies.

Water Quality Hands-On Workshop

Participants:

Conveners/Facilitators: Juanma, VJ pixel, Rockets
Documentation: Nano
Participants: Pollock, M.Mary, Cassie, Andriy, Jessica, Ashkram, Nano, Shan, Felipe

Summary:

The conveners introduced the topic with some examples where it was very clear that water quality monitoring can not be left in the hands of governments or corporations, citizens and communities must step in. The workshop was divided in four main topics related to monitoring and approached by three different groups: (1) OScH for continuous testing; (2) chemical testing; (3) microscopy. In the end we discussed together the experience and shared the results and what we learned from the session.

Latin America

Participants:

Convenor: Leonardo Sehn

Notes: [Minerva](#)

Attendees: Pierre Padilla; Tamara Matute, Isaac Nuñez, VJ pixel, Eduardo Padilha, Laura Olalde, Fernando Daguanno, Julieta Arancio, Fernando Castro, Tobias Wenzel, Marina de Freitas, Analía Aspis, Diego Torres, Marcela Barsch.

Summary:

After introducing ourselves, we started talking about one main movement related to OScH and GOSH in Latin America: [TECNOx](#). Some attendees didn't know it, and organizers from the last edition (Chile) explained how it started as biotechnology competition that with time got more oriented into open source technology. After that, organizers from the next edition (Brasil) explained about the plans of fortifying the unconference format and the code of conduct, much influenced by GOSH. The theme of TECNOx 4.0 was also mentioned: ethics, human rights and free technologies. Some attendees manifested that is always important to connect the aspect of openness and freedom of technologies to the social aspect of it, especially in Latin American regions, where we face profound social problems. We commented that is not possible to bring many people from Latin America to GOSH; so, it's important to communicate in our region that this movement exists and try to fortify our Latin American branch, considering our regional context and demands. One way proposed to achieve that is to organize local events, like TECNOx, and to talk about it in other events with some alignment, like open and citizen science events. It was also said that we need opportunities for deeper interactions between Latin American groups, for example in the residency format that has been discussed by the GOSH Community. More interactions between groups were considered as something important for us to achieve, and even with the consensus that we're not in a good moment to raise funds in our region, participants agreed that we should try to support each other to make it cheaper to visit groups from other countries. One practical action proposed (that did happen!) was to record some reports from Latin American GOSHers during GOSH 2018 to invite others to participate in TECNOx (thanks to [@marbasch](#), [@leosehn](#) and the interviewed folks).

Making GOSH accessible for newbies

Participants:

Convenor: Julieta
Notes : Felipe
Attendees: Analía, Diego, André, Jeff, Justin, Felipe

Summary:

We discussed how to make it easier to engage newcomers. All GOSHers in the session had experienced some kind of difficulty when sharing the available digital materials to people

from outside the community. We acknowledged the diversity of projects makes it difficult to present it to others.

Main problems we detect are:

a) Forum: has a lot of information but organized in a way that isn't easy to understand. Can improve with better label organization, instructions, friendly welcome messages.

b) Website: it's not easy to understand what GOSH is from the website, or to find the projects. Something more visual can help.

We decided that we can start by mapping the labels already configured in the forum, see what needs to be changed, and mockup a landing page that drives users to whatever information they seek.

Printed Circuit Board design for beginners

Participants:

Convenor: Kaspar (giving the workshop)

Attendees: Justin, Krismucha,Fernan, Aga, Ananda, Pollock, Julieta, Pierre, Minerva, JP, Andre, Shubbi.

Summary:

- When designing electronic circuits, start simple. Use parts that are easily available and easy to work with (maybe later they will have to be replaced, but that is ok, since you'll already have a better understanding of your circuit).
- Using a repository to see what parts are available is a good idea, Octopart is one example.
- All electronic parts have a datasheet, and in there you'll find a lot of information about the part. They normally contain information concerning how the parts should be operated (maximum voltage and current, if the part has a polarity, what and how it outputs information). They also contain example circuits of how they should be connected in a circuit (which pin should be connected where, and what other parts need to be placed together for optimal function).
- Digital electronics designs are the most commonly used by makers/hackers because they are simpler to understand and to get started with:
  - Electricity always flows in one direction VCC to GND
  - Circuits usually flow in a certain way: sensor → electronic brain → actuator How to hook up chips to make them do what you want was a practical outcome of this session.

Easy Reflow Soldering Workshop

Participants:

Andriy, JP, Tamara, Isaac
Convenor: Urs, Ryan
Documenters: Dulce and Anne-Pia

Summary:

Reflow soldering was explained. Easy to use, fun to do, doable with kids, newbies and your grandmother.

It's the perfect example of a method that is DIYK (Do In Your Kitchen).

What you need:

- Circuit board you want to solder. We used the Bitbadge, a circuit developed by gaudi labs to practice soldering.
- a stencil matching the pad patterns of the board. you can either do it yourself with a laser or vinyl cutter or order it with your board for an extra 10$
- parts
- solder paste
- something to smear the paste with (we did it with a hotel card)
- something hot (oven, hot plate, fire…)

Essentially, the solder paste, when heated, turns into very nice solder blobs and attaches the components to the circuit board in a very satisfying, non finger-burning way.

How do you use it?

1. attach the board on your working bench
2. dispose the stencil on it
3. spread the solder paste, it will fall from the holes in the stencil to the appropriate parts of the circuit board
4. remove the stencil (do not lick your fingers)
5. place the components where you want them
6. heat the board with a plate, oven, or anything else you have at hand (do NOT use a microwave)
   The temperature you have to heat it to depends on the kind of solder paste you use.
7. congratulations! now you can repeat the same process again and again.

Mapping Demand for Open Science Hardware

Participants:

Convenors: André and Julieta
Attendees: Anna Lowe, Andre Chagas, Louise Bezuidenhout, Marina, Pierre Padilla, Minerva Castellanos, Joel Murphy, Nano Castro, Pollock, Sam Kelly, Leonardo Sehn, Elizabeth Xing, Andy, Felipe Fonseca, Moritz v Buttlar, Cassie Hoffman

Summary:

While the needs and application of Open Hardware (OH) communities around the world are highly varied, there remain similarities between institutions and countries regarding what is needed to establish and conduct OH activities. In many areas, communities who could benefit from OH do not, which raises the question of how best to connect OH experts with the people who need their expertise. This workshop aimed to discuss the potential of mapping demand needs so as to best identify areas in which OH practitioners can work with communities to address their requirements.

In the discussion, it became apparent that developing maps of communities was extremely diverse. While some communities, such as academia, are relatively discrete and potentially more easily "mappable," social communities with extremely diverse needs are more challenging to map. In particular, two key issues need to be confronted – how to engage with the communities in a culturally-sensitive and constructive manner, and how to engage with communities who potentially do not know what equipment would be helpful in their setting. What became clear was that there are many different communities and perspectives that will need different approaches. We even perceived that one good way to start is to map ourselves, the demands of the GOSH Community. T*he only thing found in common is that there is no standard.* It was decided that the best way to proceed would be to identify people who are willing to be initiators and leaders at different points. Later, it will be interesting to pull the data together and try to find a way to build as few common pieces of hardware could be diversified by the communities themselves.

Low-Tech Alternatives to High-Tech in Open Science Hardware

Participants:

Aga, Hamish, Chris Mushi, Dorcas, Felipe Fonseca, Ben, Jenny, Andy, JP, Joel, Lou, Leslie, Reddy, Yanick, Shubhi, Anna, Valerian, Jessica, Moritz.

Summary:

In many settings, high-tech solutions may not be the best solutions, and we often don't NEED things to be high tech – a low-tech solution can sometimes be more effective. Attendees agreed there are many opportunities to use locally available skills and equipment to make things, including artisans / craftspeople and traditional equipment and manufacturing techniques (such as lathes, glassblowing, welding etc rather than laser cutters and 3D printers). There are challenges on both sides with getting the open science hardware community and traditional artisans to work together – but it can benefit both sides if we can make it work. Participants were keen to continue the discussion and will form a working group to move things forward and explore getting funding to convene a gathering specifically on this topic.

Do-It-Together Microscopy

Participants:
Convenors: Rachel Aronoff, Julian Stirling, Valerian Sanga, Urs Gaudenz
Notes : Sam Kelly (Conservation X)
Attendees: Harold Tay, Palok Biswas (Pollock), Tony Yet, Moritz von Buttlar, Eduardo Padilha, Jeff Warren, Andy Quitmeyer

Summary:
For the Do-It-Together Microscopy session, several different DIY microscopes were discussed and demonstrated, and 6 participants made 'oFoldscopes' from the 'old-school' paper design with the 140x spherical ball lens to take home. There was some discussion about what open source really means, with the example of the Foldscope PLOS publication, but subsequent lack of sharing for recent developments. Both GaudiLab and Public Lab DIY scopes based on the inverted webcam lenses were shared, and compared, and the Open Flexure system was admired. An attempt to reproduce the the epifluor results of an already published work (Sung et al 2017 doi: 10.1364/BOE.8.005075) with a phone and 3D printed pieces (thanks to Ji!) was not successful. However, it is possible that too strong a resistor was added in line with the blue LED, or the macro lens used couldn't substitute for what the original paper suggested... Still, the SYBR-safe stained cheek cells were bright on a transilluminator, but not with the test rig on the phone borrowed from one of the workshop participants. Rachel will probably soon try the OpenFlexure scope's epi-fluor build to get cheek cell comet data. - thanks to this session! It is clear that many ways to look at the microscopic world are available to DIT-research teams.

Debugging Digital Communication (Workshop on Oscilloscopes)

Participants:
Convener-Ben Paffhauusen
Notes: Leslie Birch
Attendees: Leslie Birch, Joel Murphy, Minerva , Paula Pin, Jeff, Fernán, André Maia Chagas, Alex Kutschera

Summary:
Ben explained his own journey in learning how to operate an oscilloscope. These scopes are useful for debugging issues in hardware since they show voltage using waves. Typical problems encountered in hardware include power supply, cables, solder points and code. Ben did some demos of the scope with the help of Joel Murphy to show different uses. This

workshop was not intended to be a how-to, but more of a general introduction, to make scopes less intimidating.
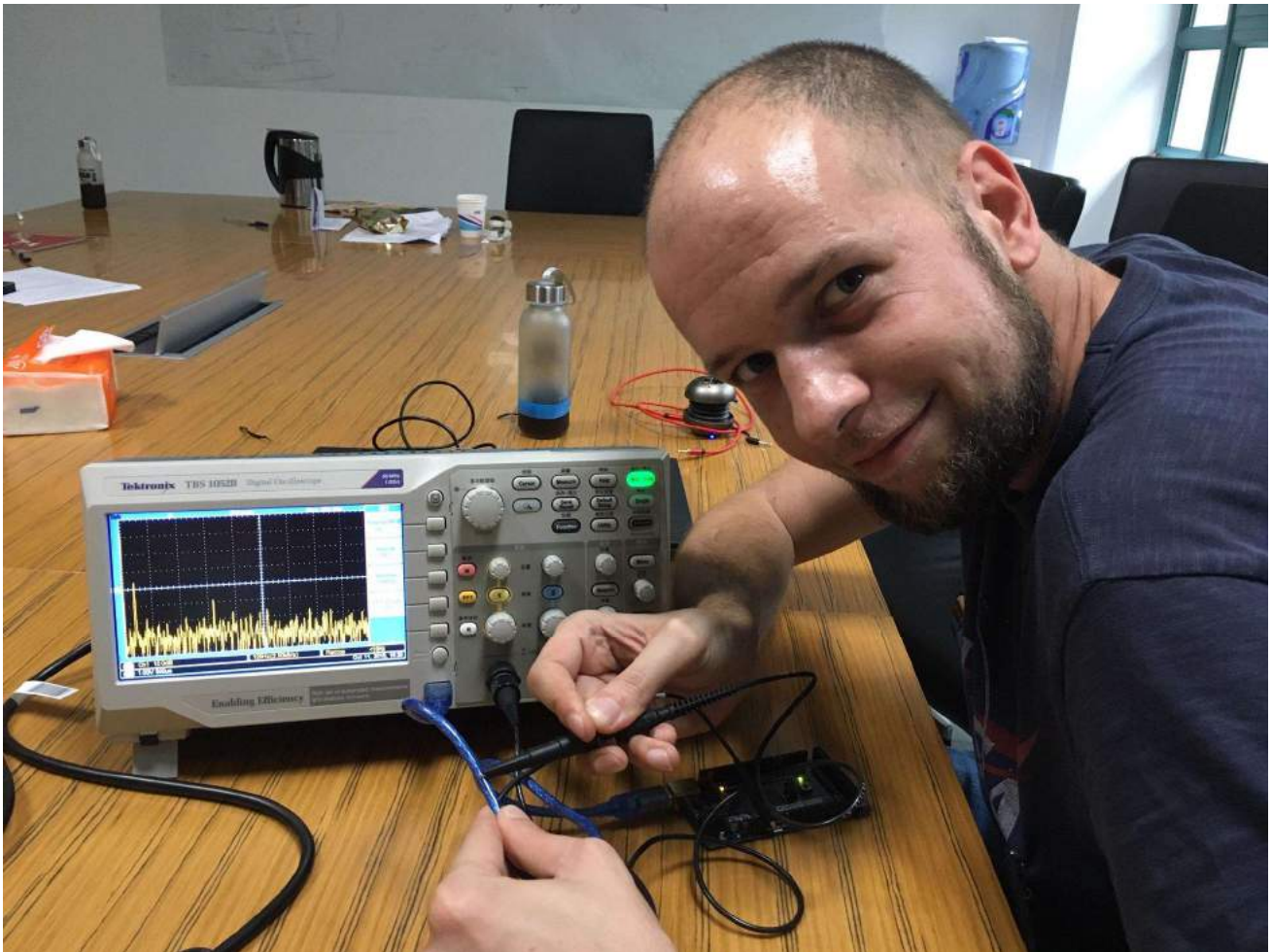
Here's a summary of his points:

Some Basics
*All scopes are basically the same
*Range is marked on front of scope
*Different knobs control pattern
*Grid markings represent values like volts
*Must connect to ground on part/board
*Possible interference from wall outlets-can use battery instead
*Many probes available including some with built-in intelligence

Considerations for Scopes
*Hand held scopes are inexpensive
*BitScope-pocket sized open source board that turns computer into scope
*Larger scopes with knobs are easier to wrangle than software-based smaller versions

Documentation of Open Science Hardware

Participants:
Convenor: Leonardo
Note taker: Analia
Other participants: Maria Frangos, Tobias Wenzel, Joel Murphy, Ji Li, Anna Sera Lowe.

Summary:
The session addressed the main issues related to OSH documentation, challenges and best practices to include in this process. The discussion included different points, which mainly were related to what and when to document, who should be taken into consideration as the audience of our documentation, which tools are available to be used in our documentation process, and what are the next steps to be done. Documentation should be oriented to reuse values and the understanding what we are doing as values. In addition when documenting it should be taken into consideration other themes that are related to technical aspects of the projects but are not technical. We should included the details of the beginning of our project. There are already also tools that are available such as the Open Hardware Journal and OSH certified projects which are already available all together in a database. We conclude that documentation is a process that involves quality, time, context and best practices to be implemented.

Field Labs of the Future: designing ways to move the lab to the field

Participants:
Convenor: Andy Quitmeyer
Attendees: Ananda Gabo, Fernando Daguanno, Agnieszka, María Fragos, Minerva, Paula Pin, Jeff Warren

Summary:
Our workshop was a speculative design workshop about creating laboratories that can move into the field with the practitioners.
We had participants first make drawings of their current workspace while paying attention to their current tools they use, ways these tools are organized, what kinds of power requirements, and what kinds of bodily support and workspaces are in use.
Next, we had them imagine mobile, wearable, or embodied ('naked') versions of these tools and draw and share what their laboratories might look like in the future.

GOSH 2018 SHENZHEN DAY 3

UNOFFICIAL DOCUMENTATION
BY 📷 @TRASHHUMANIST

8-9 : BREAKFAST
9-10 : SUPPORT

10-11

- OPEN AGRICULTURE AGRO+OSH
- DECENTRALIZING DATA + POWER
- DESIGN
- BUILD YOUR OWN PARTICLE DETECTOR
- DOCUMENTATION DIVERSITY
- DASHCAM MICROSCOPE WORKSHOP
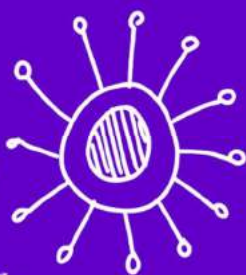
11:25-12:35

- MAKING GOSH ACCESSIBLE FOR NEWBIES
- HOW DOES TECHNOLOGICAL EVOLUTION IMPACT THE SOCIAL WELLBEING AND JOB MARKET
- FUTURE OF 3D PRINTING
- SDG's OSH
- HANDS ON MOTION SENSING

13:35-15:00

- SPECULUM ON USE + CONVURT / TRANS FEMINIST SCIENCE + TECH
- SUSTAINABLE LOCAL/ DISTRIBUTED MANUFACTURING
- DIY MICROFLUIDICS
- KICAD CIRCUIT DESIGN
- HOW TO DESIGN DNA CIRCUITS

15:15-17:40

- SMALL BUSINESS
- SOIL CHROMATOGRAPHY
- BEST PRACTICES IN GROWING COMMUNITIES
- SUSTAINABLE FUNDING MODELS

EVENING

- TRIP TO XFACTORY

MANUFACTURING

CHIU CHAU TALKED ABOUT HIS ENTREPRENEURIAL JOURNEY.
- ASK QUESTIONS!
- BE HUMBLE!
- MAKE MISTAKES

opentrons

CHIU CHAU

JO-AN HO

HAX

HAX IS A HARDWARE ACCELERATOR. AREAS OF INVESTMENT:
- consumer
- Health
- enterprise
- industrial

x factory
EVENING EVENT
- TABLING PROJECTS
- TALKS
- DANCE PARTY

ERIC PAN

FOUNDER OF SEEED STUDIO

CITIZEN SCIENTIST

FRANCOIS GREY

STIC LAB

JENNY MOLLOY

RESEARCHER UNIVERSITY OF CAMBRIDGE

VALERIAN SANGA

CHRIS MUSHI

TWENDE INNOVATION CENTER

DAY 3 Friday (October 12th)
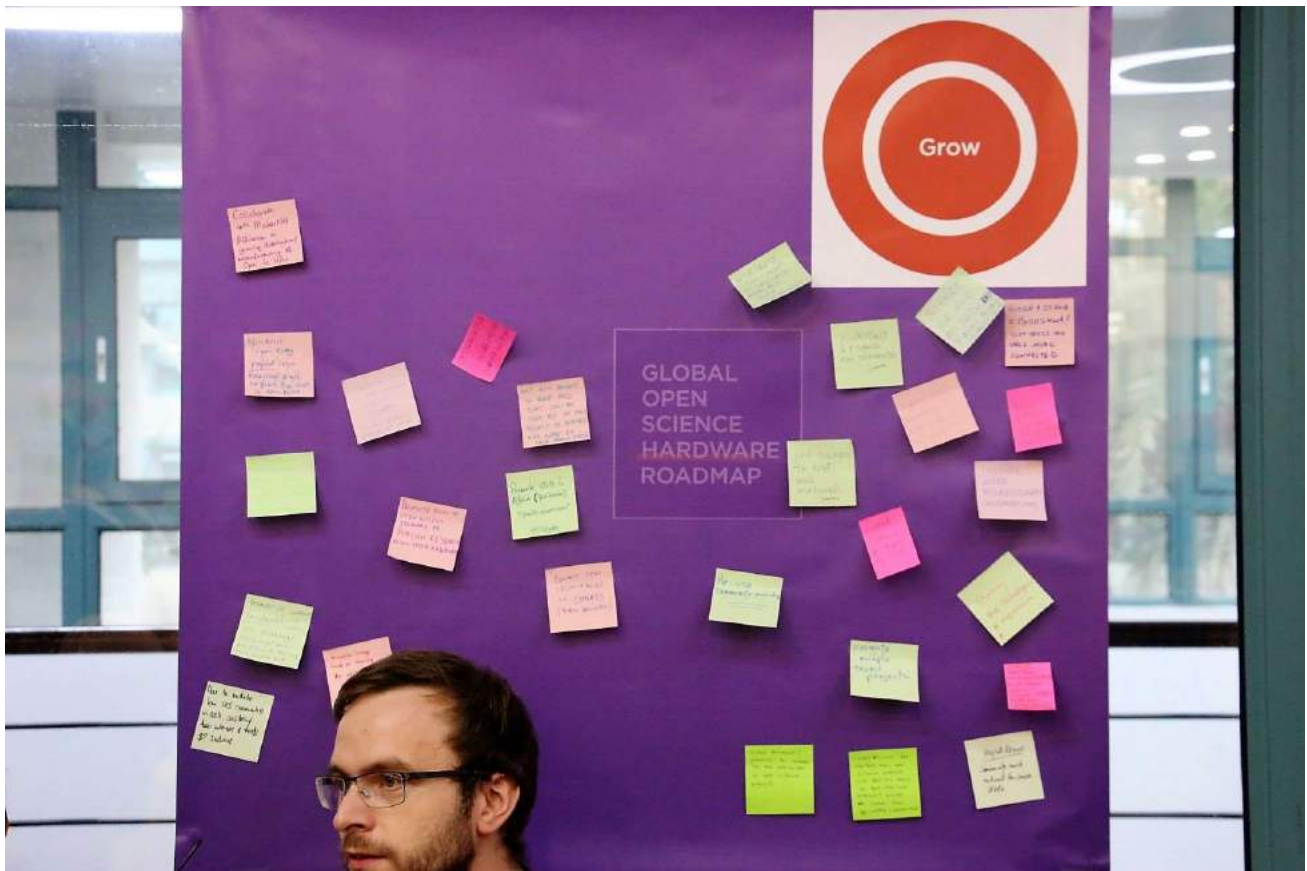
Topic Session III: GROW

Guest Speakers

Chiu Chao (OpenTrons) and Jo-an Ho (HAX).

By **GROW**, we mean that we must aim to grow with respect to local differences, increasing the diversity, scale and impact of the OScH community. In the topic session, we focused on possible avenues for financial sustainability and growth of GOSH as a community.

Chao started the discussion by sharing lessons from his entrepreneurial journey in a talk titled DIY Hobby to Products. Good things take time and you need to have passion, humility and determination. Community support (like GOSH) becomes crucial for entrepreneurs and initiators when they are trying to build their product. Also, he suggested makers to not be shy or act like a caveman and shut ourselves down to negative feedback. We must ask

questions, learn skills, be humble and make mistakes, in order to learn from them. Asking questions is the key to innovation.

Jo-an talked about [HAX](#) as a hardware accelerator and the possibilities of collaboration between Open Hardware community and HAX. Following are the key points –

1. Keys areas of investment for HAX – Consumer, Health, Enterprise and Industrial.
2. Consumer
    1. Hits are difficult to predict and involve a lot of market and social media research.
    2. Consumer hardware funding is on a 4-year low.
    3. Main reasons for failure - delay in shipping and burning through seed money.
    4. Pivoting their business model (through partnerships or mergers and acquisitions) has proved to be useful.
3. Health
    1. Fastest growing portfolio as chronic diseases are on the rise
    2. Due to lifestyle choices
    3. Products around decentralizing diagnostic devices, remote sensing and data study are on a rise.
    4. Some popular fields - surgical robots, patient data, urine sampling ('urine is the new blood'), fertility control, female health monitors, etc.

Key points from open discussion –

1. Does one have to be a unicorn to be successful?
2. Is VC funding (or even startup in the traditional sense) the right model to seek financial sustainability in the open source world?
3. We should not only think of growth in terms of money but also community outreach, knowledge sharing, etc.
4. A model like that of Public Lab seems to be viable as they are financially sustainable while being open to the community.

Report on Hardware Trends by HAX – https://hax.co/hardware-trends/

DAY 3 Unconferences

Understanding user profiles: documenting open science hardware

Participants:

Tobey Wenzel
Anna Lowe
Maria Frangos (facilitator and notetaker)

Summary

This workshop was created in response to some of the key points raised during the Documentation session on Day 2, namely that in order to improve access and minimise barriers, we need to consider the different user* profiles who use, make and modify open science hardware, when making decisions on how to document our work.

The primary goal of the workshop was to identify different user profiles of open science hardware and work towards building empathy for them so as to better understand their needs. The secondary goal was to transfer knowledge about how to run the workshop activity itself, and provide access to assets so that others can use them.

The activity itself was broken down into a number of steps:

- List different user profiles
- Using an 'empathy map canvas' for each profile, identify who the user is; their tasks; what they see, feel, think, say and do, their motivations and influences; their pain points; and overall goals
- Read through each of the profiles

Following the activity, I took photos of each empathy map, and input the text into a Google sheets document. This is a work-in-progress and a starting point for the next steps.

Here is the link to the Google Slides presentation (with annotations on how to run the activity), the Google Sheets doc, photos of the outputs as well as a template of the empathy map once I get back home].

Actions:

Near future: Gather insights on the different profiles:

- Create an open-ended survey and distribute it to different communities within the open science movement to gain more insights
- Collect and analyse responses and, from there, create more detailed descriptions of who the users are, how they use open science hardware and what their needs are in terms of documentation.

Over the next 18 months: Create a guidebook for best practices.

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Sustainable & Local Manufacturing

Participants:

Notes: Anna Sera

Attendees: Anna Sera Lowe, Felipe Fonseca

, @juul ?, Clarissa Redwine, Louise Bezuidenhout,Julian Stirling, Yanick Kemayou, Analia Aspis

Summary

Sustainability discussions are extensive and sometimes difficult. Sourcing raw materials and tools and better sharing about needs are challenges for local environments. As an example, for sustainable local manufacturing, it could be as simple as using certain shipping tools, but the group also considers taking on challenges important. There are commonalities in many countries in the Global South, and we need to link Global South OSHers to discuss commonalities and to share ideas and learning experiences to overcome these issues. To set up a GOSH Global South forum to share challenges and be a resource for interested people (both southerners and northerners that want to help) would be a great plan, and also a place to share what is needed – not just advice, but practical solutions. Sometimes solutions do not come from money, but by sharing. Clearly, local authorities are not generally in line with efforts to enhance sustainability, which also impacts OH for sustainability when authorities are not supportive of innovative activities that do things in a different way from what they are used to doing… Also, there can be important problems from local people/manufacturers not understanding the impact of manufacturing locally – enabling understanding will be a long-term plan

ACTIONS:

o   List   missing   technologies   needed   for   enabling
o Identify useful enabling designs and test build-ability by GOSHers around the world
o Start Global South OSH forum – discuss challenges and ideas, also highlight issues of sustainability
o Inventory manager for sharing – Bionet

-

How to build a small business based on OSH

Participants:
Facilitator: Yanick
Notes : Analia
Attendees: Anna Sera, Louise Bezuidenhout

Summary

The main discussion related to three main topics. Firstly, how ethics in small businesses using open source relate to openness, free cost and transparency. Secondly, how can we build sustainable businesses, and which are the codes of conduct to take into consideration, and also the barriers that arise when starting a business. Thirdly, we realised that it would be interesting to take action on mapping existing models, and for that we suggest the creation of a questionnaire to better understand the state of the art.

Build your own particle detector – discover natural radioactivity

Participants:

Convener: Oliver:

Saad, Alex, Pollock, JP, Dorcas, Chris, Hamish, Andrew, Ben, Valerian

Summary

This workshop was focused on DIY soldering a silicon diode-based particle detector (as in radioactivity; not related to air quality) consisting of a few through-hole parts and analog operational amplifier circuit. 9 detectors have been built, 7 using the well working BPW 34 diode and 2 using a larger 6x6 mm diode from the electronic markets in Shenzhen. The protective glass cover of the latter was removed forcefully, which is why those should be sensitive to alpha particles (to be examined further). We spent up to 2 hours with soldering and getting to know the parts. The basics of this solid state detector design have been explained in a short walk through. In summary: Ionising radiation – like electrons from beta decays – interacting within the sensitive volume of the silicon PIN diode produces a tiny current pulse which is amplified into a voltage pulse to be measured by an oscilloscope or using a computer sound input/headset port. The Processing.org sketch for using a simple computer audio connector instead of an oscilloscope can be found here: https://github.com/ozel/WaveWatch

Balloons charged with static electricity were used to collect radon progeny on dust, following   this   paper.

This picture and the next two are from Oliver's radiation detector workshop (collected radon on the statically charged balloons).

Workshop on CNC use for microfluidics

Participants:

Convenor: Sam
Notes : Rachel
Attendees: Moritz, Sam from Seattle, Bengt Sjölén, Jean Pierre, Dulce, Rachel, Tobey, Wei, Emmanuel

Summary

Sam presented the use of his new CNC for making microfluidics 'chips' and the magic of sticking the pieces together. There was great interest from many in getting the same machine. We also discussed the collection of Open Microfluidics (for research/application) in a GitHub repository. Tobey Wenzel started collecting material and invites contributions. We discussed the advantages of milling over laser-cutting, because of the more rectangular

edges that enable better bonding of substrates (see [here](#)) and the bonding method of PMMA (Acrylic) sheets by Ethanol-activated surface bonding in an oven (from [here](#)).

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KiCAD PCB Designing Work

Participants:
Convenor: Kaspar
Notes : Akshai
Attendees: Isaac, Tamara, Pollock, Carmen, Tony Yet, Akshai M

Summary
KiCad is the most popular and feature-rich free and open source electronics design automation (EDA) suite for printed circuit board (PCB) design in the world. EDA PCB software is used to design circuits and lay them out on a model of a physical board resulting in design files that allow PCBs to be manufactured. KiCad runs on Linux, Mac OS and Windows and receives development effort from a large group of volunteers as well as a handful of paid developers working for CERN.

Using free and open source software for open source hardware designs is important as it helps ensure people can make use of, study and re-purpose your designs without encountering restrictions such as licensing costs or fear of copyright infringement.
Steps Involved :

1. Make a new project.
2. Think of a circuit, LED Circuit.
3. Select Eeschema.
4. Place components. Use shortcuts "A" to do placing. "R" to rotate. "M" to move.
5. Place wires.
6. Mark the values using "E"
7. Annotate and do CvPCB to do footprint assignment. Generate Netlist
8. Open PCB editor and load netlist route components.
9. To use 3d viewer use Alt + 3.
10. Add GOSH 2018 Badge !
11. File >> Plot >> Gerbers. Share the gerbers to PCB Manufacturer.
12. Use tracespace.io to view the PCB files.

Hacking a dashboard camera into a microscope

Participants:
Convenor: Urs
Notes : Dulce

Attendees: Jean Pierre Tincopa (Peru), Isaac Nuñez (Chile), Fernán Federici (Chile), Bengt Sjölén

Summary

This workshop provided a hands on experience on how to dismantle a car camera to build your own microscope.

A dashboard camera was used in this workshop. The first thing is to turn the camera on making sure it works, changing the settings such as increasing resolution and turning on motion capture; features that might be of use on our final microscope.

Then, we proceed to open the camera, taking the screws out carefully, saving them, and being cautious on not to touch the camera chip. It is very helpful to recognize the parts of the camera in front of us.

After the camera is completely open, we turn it on again to verify we did not destroy it in the opening process.

The lens is the part we will now work on, the important thing is to put the camera lens at a distance from the chip, in this way we will magnify it. There are many ways to achieve it, in the workshop we used putty, you can also glue it carefully, be creative!

Now we need a structure for the camera. For this we use a slide with a sample to measure the exact distance the objective needs to be from the sample, once we have the measurement, we can proceed to design and build the outer structure, there is design worked out by Bengt for laser cutting that will be soon available for all to download, or you can use the own camera structure to build a scaffold, we also used cardboard to make the structure.

This is how to build a microscope from a dashboard cam, since they are cheap, it is a nice hacking exercise.

Decentralization and horizontal structures for organizations session

Participants:

Convener: Decentralized
Notes: Analia
Attendees: Analía, Leo, Moritz, Agnieszka, Leslie , Jeff Warren, Felipe Fonseca, Marcela

Summary

Participants shared their interest and concerns about the need of balance between decentralization and centralization. Also data storage and which role ethics plays and what stop open data movement. We decided to pick one of the topics related to how we are forced from childhood to use private products, in order to start the discussion. Sometimes people

think that google is open because it is free of charge. However, there are open alternatives to achieve the same objectives. This challenges the social construction to use some software. Returning to children and education, we asked ourselves why there is no mandatory rule to use linux at schools, for example, as a way to impact children from the very beginning of their education. Share GOSH values at schools (google does this already). We can think about strategies for the future to impact this sector of society (children and youth). One option would be to propose OSH projects at schools.

Finally, there is still a challenge to make OSH communities to be more connected with each other, since we know that they are "there" but are still not really connected enough.

Open Source Hardware for Agriculture and environmental data collection

Participants:

Convenor: Greg and Nano
Notes : Cassie
Attendees: Marc, Ananda, Rachel, Elizabeth, Andriy, Ryan, Marcela, Anne-Pia, Harald Tay, Diego

Summary

Soil is one of the most biodiverse places on Earth. Soil analysis has primarily been focused on helping farmers manage soil for food production. There are a large range of tests that can be performed to measure soil health (soil chromatography, spectral analysis to determine total organic carbon, monitoring soil respiration with a CO_2 sensor, etc.) with different costs and required inputs, but ultimately it depends on what resources are readily available and how to make those results actionable – usually for farmers. There is a growing toolkit and javascript library for the Our Sci platform and more discussion on http://forum.goatech.org/2

This session was crowded and split in two: one more practical, referred to different kinds of open hardware for agriculture, and one more theoretical, referred to the concept of open agriculture. Nano described the Chroma tests, using circular chromatography to assess soil 'health' in a qualitative way, while Greg and Marc discussed tools to measure aspects of this quantitatively (i.e. CO_2 from soil respiration, nitrate levels, organic carbon). In the second one, we discussed if we can talk about "open agriculture" as a field, what would that name and which would it genealogy be. We tried to elaborate some kind of conceptual map and lists of things it would be ideal to measure (toxins, water for automatic irrigation tools).

The use of the speculum in a practical way – Transfeminist Hard Lab

DIWO bio.electro.chemical experiments on Noise, Body and Ecology autonomy.

Participants:

Convener: Paula Pin

Marina, Agnieszka, Diego,

Summary:

"The main hardware is the body."

The proposal of the session was to discuss the transHackfeminism context and the intersection with OSH. There were two workshops proposed by Paula Pin: Coñurt (making yougurt with the vaginal lacto bacilus) and the easy vinegar test for HPV. The session was based on a extended introduction about how transfeminist are having more autonomy on ecology and gynecology to focus later on the body itself. We decided to go into exploratory inner body, offering the participants speculums, the device that gynecologist use to check the cervix, and then run an easy fat test to check for weird growth of cervical cells. The test is calling acid acetic or more commonly known as the Vinegar test.

The test consists in sweeping vinegar onto the cervix, wait 1 minute. To have access to the cervix, the speculum is used. The cells that don't grow well get white with the vinegar, which can be checked optically with the help of the flashlight, mirror or/and webcam. If there are many white cells, a follow-up with a gynecologist for a pap smear is recommended.

We made a private space in the director's office, and we ran the experiment on a few participants. If the test is performed solo, a mirror or a webcam connected to a computer are needed. If performed with other people, this material is not dispensed with, since the person tested should also see her results.

We also did proto-cytology and checked vaginal cells on the DIWO microscopes from pechblenda Hackteria and other models at the meeting.

The sessions were separated in two parts: discussion and practice, and included very intense moments of shared intimacy about how many of us feel about restrictions or problems in traditional health institutions.

Open licences

Participants:

Facilitator: Moritz R

Convener: Kaspar

Notes: Julian

Attendees: Kevin, Anna, Marcela

Summary:

Copyright and licences are different things. Thinking about licences copyright for hardware refers to the design file ,but doesn't extend into hardware. But as things get more digital, copyright becomes more relevant. Looking at plans which are copyrighted and then building the thing is not a violation. Copying the plans is the violation. Patents are another way to protect these things. A patent is different as you formally register an idea which you 'own' for some number of years.

There was a general discussion over the pros and cons of different licences such as licences designed for software like GPL and MIT, to more hardware specific ones such as CERN OHL and TAPR.

In the closing of the meeting, we decided that we need a 101 document to dispel confusion, and perhaps to update the wikipedia page on open hardware licenses. We also could do with lawyers in GOSH and a public body to defend open licences in the hardware space.

Public Event @ X-factory

Schedule
18:30 GOSH Open Floor: project showcase and art/science exhibition
19:30 GOSH Talks: Introduction of GOSH and key project presentations
21:00 GOSH Night: Performances and music

活动日程

18:30 对公众开放，项目展示及艺术/科学项目展

19:30 演讲：介绍开放科学硬件以及亮点项目展示

21:00 音乐&表演

Location
Our event partner x.factory, has invited us to co-organise this public event. x.factory is operated by Chaihuo Maker Space, Shenzhen's first and leading maker space since 2011, and partnered with Seeed Studio, an open source hardware company that has been serving the global maker community since 2008.

我们的活动合作伙伴柴火造物中心（x.factory），邀请我们共同组织这次公共活动。柴火造物中心由柴火创客空间运营，柴火制造空间是深圳自**2011年以来第一家也是最**领先的创客空间，由为全球创客社区提供服务的开源硬件公司Seeed Studio**支持**。详见更多信息，请在文章底部查看地图。

Showcase GOSH Open Floor

List of participants

- Community Microscope and other DIY Science Kits – Public Lab, Jeff Warren (USA)
- FluoPi – PUC, Isaac Nuñez, Tamara Matute (Chile)
- OpenFlexure Microscope – University Of Bath, Julian Stirling (UK) and STICLab, Valerian Sanga (Tanzania)
- OpenBCI, EEG & Biosensing – Joel Murphy (USA)
- CO2 Respiration Chamber – HUMUS.Sapiens / Hackteria, Marc Dusseiller (Switzerland)
- Showcase Projects from Twende Innovation Center – Christonsia Mushi (Tanzania)
- Dropbot – sci-bots, Ryan Fobel (Canada)
- Generic Lab and OpenDrop – GaudiLabs / Hackteria, Urs Gaudenz (Switzerland)
- Frugal Innovation for Biology – Makerlab by CRI, b (France)
- Artificial Flower – Benjamin Pfaffhausen (Germany)
- Salvilodia School Bell's Schield – Centro de Tecnologia Academica (Brazil)
- Open-sourcing DNA damage detection for genomic integrity and citizen science – Rachel Aronoff, Hackuarium (Switzerland)
- DIY microfluidics – Sam Sulaimanov, Octanis (Switzerland)
- Alquimetricos – Fernando Daguanno (Brazil)
- dilambda – Openscience school, Juanma Gacia (Spain/France)
- Mae d'Agua Water monitoring kit – Rede InfoAmazonia, VJ Pixel (Brazil)
- low-cost particle detectors – Oliver Keller (Switzerland)
- BioTransLab – Paula Pin (Spain)
- Soil Circular Chromatographs – Nano Castro (Argentina)
- MIDI Funifier – Tuomo Tamenpää (Finland)
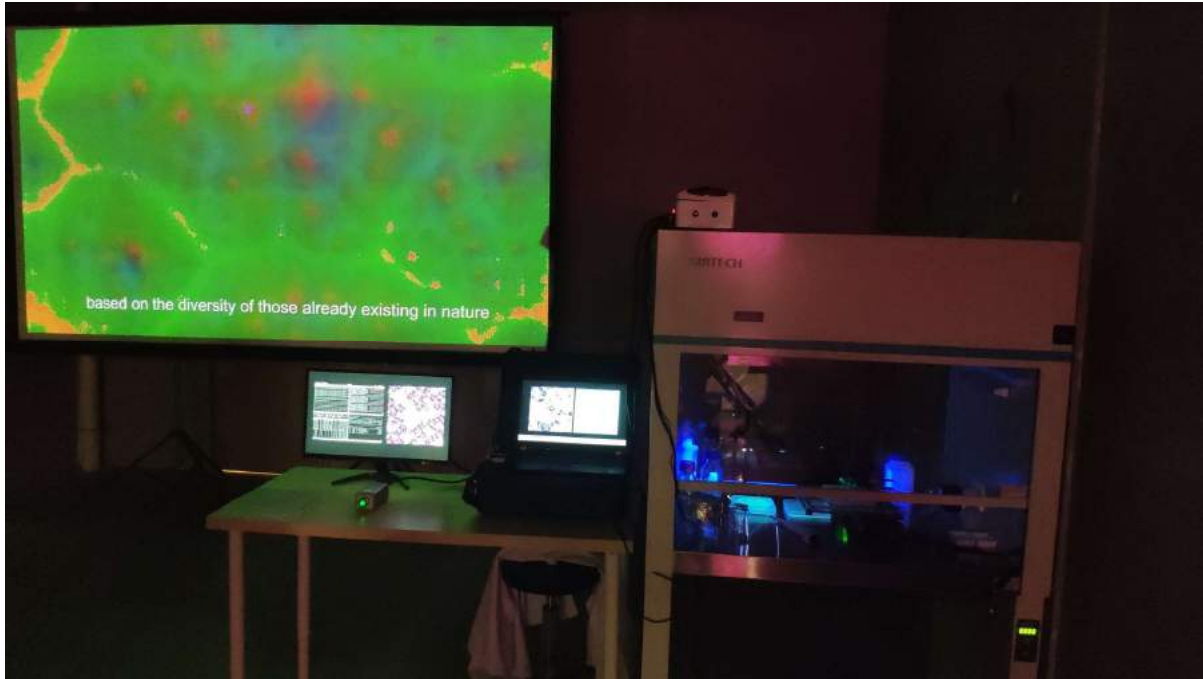- MoZaic Beat – Aravinth Panch (Sri Lanka)

GOSH Art/Science Exhibition: MetabolA.I.

Ippolit Markelov – art group "18 apples", Russia

Art group "18 apples": Art direction, concept, hardware: Ippolit Markelov; concept, wetware: Lucy Ojomoko; soft: Rodion Kadyrov. Local support: "Vivi" Chen Zi Wei, Li Yu, Marc Dusseiller, x-factory team

The Cake

GOSH 2018 SHENZHEN DAY 4

UNOFFICIAL DOCUMENTATION BY 📷 @TRASHHUMANIST

~ 8AM-9AM: BREAKFAST

9AM-10AM:
+ RUNNING GOSH
+ CREATE SENSOR BASED APPLICATIONS THAT RUN ON 59R BATTERY
+ LASER CUTTING WORKSHOP
+ AIR QUALITY STANDARDS
+ VALIDATION & CALIBRATION

10:15-11:35:
+ BOOSTING OSCH IN AN ACADEMIC CONTEXT
+ AFRICA GOSH
+ FABRICATION
+ COMMUNITY CITIZEN/OPEN COMMONS
+ EDUCATION

11:50AM-1PM:
+ TECHNOLOGY & INNOVATION FOR CONSERVATION
+ OPEN SC HDW MAP
+ DROP BOT POST MORTEM
+ OPEN LICENSE
+ BIOTECH
+ FUTURE GOSH ACTIVITIES

~ 1PM-2PM: LUNCH.

| 2PM-3PM | ACTIONS

| 4:30PM-5PM | ROADMAP PLANNING

| 5PM-5:30PM | DISCUSSION + WRAP UP

the GOSH roadmap

100+ PARTICIPANTS WROTE DOWN THEIR DESIRED VISIONS, INITIATIVES, AND PLANS OF ACTION ON STICKY NOTES AND PLACED THEM ON A WALL UNDER VARIOUS CATEGORIES SUGGESTED BY THE COMMUNITY.

TYPES OF ACTIVITIES:
DOCUMENTARIES, PODCAST, RESIDENCIES, HAVING GOSH IN OTHER COMMUNITIES, THEMATIC ACTIVITIES, TRAINING/WEBINARS, GOSH COMMUNITIES ON THE FORUM, GUSH DAY (?), GLOBAL RESIDENCY FOR LOCAL OPEN SCIENCE HARDWARE, ACADEMIC CONFERENCES, HIGH POLICY MEETINGS.

LEARN:
+ SETTING A COLLABORATIVE RESEARCH AGENDA
+ QUALITY MONITORING AND EVALUATION
+ OPEN HARDWARE LICENSING

GROW:
+ INCREASING THE SIZE AND DIVERSITY OF THE OSCH COMMUNITY
+ INCREASING OSCH DISTRIBUTION
+ ADVOCACY FOR OSCH

SUPPORT:
+ INSTITUTIONAL SUPPORT
+ SUPPORT FROM FUNDERS
+ COMMUNITY SUPPORT FOR OSCH PROJECTS

NEXT STEPS:
GOSH COLLAB IN HYDRABAD
INDIA GOSH
SUMMER 2019 GOSH
AECD
GLOBAL HACKATERIA RESIDENCY PROGRAM
RANDELAB
BIOART + SCIENCE MEXICO
TROPIXEL
CCC
FUNDRAISING EVENTS
FOSS ASIA
OSHWA
GLOBAL SUMMIT INFORMATION SESSION
CRI RESIDENCY
OPEN FIESTA/SEEED COLLAB
IAT MUMBAI RESIDENCY
SZOIL RESIDENCY
DINACON PANAMA
KARKHANA MELA (MAKERFEST)
BHAVISHYA (NATIONWIDE STEM CHALLENGE)
LIVEPATCH RESIDENCIES.

IF YOU WOULD LIKE TO BE INVOLVED OR WOULD LIKE TO SUPPORT OUR COMMUNITY, JOIN US AT: FORUM.OPENHARDWARE.SCIENCE

DAY 4 Saturday (October 13th)

Unconferences

Air Quality Monitoring

Participants:
Facilitator: Julieta
Convenor: Nano
Notes: Emmanuel
Attendees: Moritz, Jeff, JP, Andriy

Summary:
The aim of the session was to gather all the GOSHers working on air quality monitors, with the idea of sharing experiences and drafting some standards. We discussed the 'problem' of the diversity of components and designs for air quality monitors, how it's not possible to have one golden design as technology changes fast and each group has its own needs. Most GOSHers measure particulate matter as a general indicator of environmental pollution, others measure combustion gases and ozone. Variations include if the device transmits data via wifi or stores it (e.g. in SD cards), if it's mobile or fixed. Two of the most complicated issues are calibration and the quest of making the data 'legitimate', and the lack of standards for data, which make it difficult to collaborate with other projects. More information can be found in this [post](#) by Fernando Castro.

Citizen Science Session

Participants:
Shannon, Diego, Mary, Marcela, Rachel, Harold

Summary:
The group talking about citizen science and open science hardware thinks primarily that considering the needs and goals of community participants is key for valuable citizen science. While data collection and analysis is important for influencing policy decisions, if motivation and education is the main aim, data may sometimes be secondary... Watching out for exploitation by large institutions was also discussed.
A suggestion that open science hardware tools could be evaluated in terms of their reliability and use-ability, also in comparison to cheap off the shelf tools, was brought up by Diego, with some considerable support.

Organizing GOSH, facilitating Collaborative Meetings

Participants:

Convenor: Greg
Notes: Saad
Attendees: Saad, María, Ryan, Anna, Marina, Diego, Lara Toby, Agnieszka, Analía, Leo, Marina

Summary:

We started with the idea of discussing Collaborative meetings or GOSH -like events and quickly ended up discussing the GOSH 2018 structure itself, comparing it with previous gatherings to see what improved and what should inspire us for next moves. The first part of the unconference session was a more flexible conversation and in the last 20 minutes we tried to summarize the best practical ideas. We all agreed that the documentation culture during the gatherings is improving, but we still have a long path to reach solid culture in practice. One example given was the Documentation Unconference Session, that didn't have many attendees. One well-accepted idea was to give a superstar treatment to documenters of the event. A buddy system was suggested to reinforce the culture that we take care of each other and welcome newcomers. We had a discussion about the structured and non-structured design for the event. We agreed that a little bit of structure for the unconference sessions could be good, like grouping the themes based on the 3 axes of the Roadmap. We also thought about methods to heat up everybody during the moments that are more structured than unconference sessions; and some suggestion were given, like conversations that start in pairs and step by step end up in the big group. Nothing is perfect, however. It is nice to try out different formats, keep learning and being flexible. In the end, the general feeling was positive and energized.

Validation and Calibration session

Participants:

Convenor: Julian
Notes: Andre
Attendees: Fernan, Clarissa, Pierre, Harold, Prayush, Joel, Ben, Harold, Valerian , Ananda.

Summary:

People normally use approximations to estimate quantities. At some point a standard for those quantities became necessary and currently those standards are, or are being shifted to, fundamental properties (speed of light, atomic frequency, etc). Two different ways to calibrate equipment: using fundamental quantities (which is far away since we don't have

the tools to do that yet), or to calibrate things against a certain tool/device (which is what is normally done, i.e. to generate a 'standard curve' based on measurements of samples at known quantities in the measurement device of interest). Reliable measurements should generally stay within the linear range of the empirically obtained standard curve.

From the session we discussed how calibration should be done often, so that users know a) how the calibration (or the measurement device) may 'drift' over time, b) they can trust their data, c) they demonstrate the reliability of their data to people who might not trust something that is not coming out of "traditional" contexts. It would be good to have standard protocols for calibration, that should accompany hardware blueprints. It would be useful if those would be easy enough, to the point that they could be done before each use.

Africa OSH & Other Regions

Participants:
Convener & Facilitator: Yanick
Attendees: Marc, Analia, Julian, Felipe, Valerian, Chris, Jorge, Justin, Leo, Aga, Dorcas, Marc Juul, Harry, Agnieszka, Fernando. Notes: Anna

Summary

Originally this was going to be a session only about Africa OSH, but we realised in a session on Day 3 that there is a need to include other regions, so we can have learning across the Global South. As well as many people from Africa OSH, there were several attendees from LatAm. Sadly not from Asia. The discussion covered ways to make AfricaOSH in particular and OSH events in the Global South in general more inclusive and relevant to the wider population. Topics included how to let more people know what OScH is, how to get academics interested in participating, the usefulness of including international participants as well as regional ones, how to ensure events are accessible to the local population, including issues of language, and what we can do between events. A list of the concrete suggestions made for the forthcoming AfricaOSH (Tanzania, April 2019) is pulled out at the bottom from the notes taken.

Concrete suggestions for next AfricaOSH:

- Co-hosting workshops (local expertise as well as international)
- Residencies
- Feed back more on GOSH forum (from AfricaOSH)
- Involve more universities in Africa OSH – e.g. by emphasizing link to internationally respected institutions like Cambridge.
- Make the benefits of AfricaOSH very clear so that some Africans who can afford it will want to pay their own expenses
- Make short video clips explaining what Open Science and GOSH are in many African languages
- Have pre-events before next Africa OSH to target particular audiences to know about Open Science

Biotechnology and open science hardware

Participants:

Facilitator: Tobey Wenzel
Documentation: Jenny Molloy
Attending: Marc Juul, Harry Akligoh, Eduardo Padilha, Marina de Freitas

Summary:

Discussions centred around open hardware for biotechnology research. DNA and reagents ("wetware") are included in hardware as functionally they have many similar issues. We discussed the phenomenon of community biolabs, access to equipment and projects in a global context. In general there is interest in the GOSH Community in setting up a pipeline to get biotechnology equipment from resource-abundant to resource-poor areas. The current plan to achieve this is to source information about importation guidelines for both equipment and biological material, through previously collected data and an experiment

within the GOSH community. Ongoing work on surveying molecular biologists will also be useful to inform how best to improve access, whether through policy changes, better legal tools or other routes. The group is committed to ensuring that biology and biotechnology are on the agenda at regional OScH events.

Alquimetricos Making Toys Workshop

Participants:
Facilitator: Fernando Daguanno
Attendees:Andy Quitmeyer, Kaspar, Take, Laura Olalde

Summary:
Alquimétricos is a collection of ecotechnological toys. A set of educational content linked to STEAM (Science, Technology, Engineering, Arts, Maths). An open and collaborative project with focus in economic and environmental sustainability. Through a simple set of interconnected pieces, they build both simple geometrical structures and complex geodesic domes. Those building blocks can be crafted by hand tools or designed and fabricated with digital manufacturing tools, such as 3D printer, laser cutting, plotter and CNC router. During this workshop the GOSH participants got hands on making their own toys!

Soil Chromatography Workshop

Participants:

Conveners/Facilitators: Nano/Tamara/Rachel
Notes:
Attendees: Greg, Andriy, Saad, Oliver and almost all the temporary inhabitants of Open Fiesta Lab.

Summary

Soil chromatography (Pfeiffer Chroma-Test) is a qualitative method used in biodynamic agriculture to assess soil, biofertilizers and crops' quality/health. For the workshop, we took soil samples around the Tsinghua University Campus, and we analyzed them with this method. During the workshop we covered the basics of the soil chromatography method and afterward, we discussed how to get information from the chromas. We ended the workshop outlining the feasibility to apply machine learning on the chromas to correlate with standard lab soil tests (ie. carbon content, nutrients). Clearly, many more samples and replicates and controls would be necessary for this sort of analysis.

Special thanks to @leandro.mastrantonio who showed Nano this method and gave him all material to do the workshop!

Digital Microfluidics session & DropBot Post Mortem Autopsy Party

Participants:

Ryan Fobel, Fernan Federici, Dulce Alarcón, Jean Pierre Tincopa, Joel Murphy

Summary

During the Conference, Ryan Fobel's DropBot caught fire, briefly. There was no outward indication of why this happened, so the Digital Microfluidics Session became the DropBot Post Mortem Autopsy.
In the session we lift the lid on the broken system to see if we could figure out where the problem originated. This device is able to manipulate discrete droplets on a surface of electrodes covered by a hydrophobic layer. The device uses 110V but is powered from 12V. Ryan explained the basic circuitry that allows the 12V—>110V conversion by using a chip and a special transistor to ramp up the voltage. He also explained the use of some transistors with very low resistance (micro-ohms) that guarantee less heat generation from high currents. He also described the use of a teensy for logic control (e.g. temperature

monitoring inside the whole device) and the use of reversible fuses (PTC) for over-current protection.

Ryan started the session by speculating where the problem occurred. His best guess was that it happened somewhere in the circuit that generates the high voltage necessary to drive the electrodes that move the droplets around. Upon opening the case, the first thing that we noticed was the insulation over the wiring from the 12V power source was almost completely burned off. Clearly, this was the primary source of the smoke that was emitted by the DropBot.

Ryan then removed the PCB card that has the voltage amplification circuit, and upon inspection we discovered that a power mosfet that is critical for this amplification was blackened, and had lifted off of its SMT pad. This was the best indication that we were able to find for the source of the problem. The mosfet in question is used by an integrated circuit to 'pump' up the voltage. Essentially, the IC sends a square wave to the gate of the mosfet at 10KHz and voltage is amplified by the following circuitry. The theory is that somehow, the device was 'stuck on' or otherwise forced to allow more current that it was rated to handle.

This theory has an issue, in that a part of the circuit is fed back into the IC, which monitors the actual current that is going through the mosfet. If the current through the mosfet is greater than a reasonable threshold, the system shuts itself off. In other words, this mosfet should not have failed because there is a fail-safe built into the circuit. The IC in question showed no signs of burning or other damage from visual inspection. The only other possible explanation for this is that the same point in the circuit which is sensed by the amplifying IC is also attached to one of the pins on the microcontroller that is driving the dropbot logic. This additional connection was made by Ryan as a redundant check on this point in the circuit as an additional safeguard. Could the connection of another device to this point in the circuit have   compromised   the   sensing   ability   of   the   IC?

LoRa workshop (Akshai and Marc)

Participants:
Convenors: Akshai and Marc
Attendees: Dulce Alarcón , Jean Pierre Tincopa, Isaac Nuñez , Tamara Mature

Summary:
The purpose of this workshop was to present LoRa -a wireless communication technology- and the benefits of its use. This technology leverages the license-free radio frequency bands for data transmission, it may vary between countries. LoRa needs two layers to work, the first layer is LoRa modem and the second is LoRaWAN. LoRaWAN are nodes (in the

workshop Arduino modules that already incorporated LoRa transceivers were used). The nodes can be arranged in several ways, such as the star topology. The modem needs to work at the same frequency as the nodes. An advantage of LoRaWAN is the possibility of programming them for ultra-low energy consumption, where only small data packages are sent within a limited time frame (for example, once a day), this is really helpful for environmental monitoring.

Suggested reading:

Matt Knight, Reverse engineering the LoRa PHY. PoC||GFTO. https://archive.org/details/pocorgtfo13/page/n47

Laser cutting workshop

Participants:

Convener: Urs

Facilitator: Fernando D

Attendees: Eduardo Padilha, Pollock, Take

Summary:

The purpose of this session was to introduce participants to the use and manipulation of a laser cutter machine and its software. In order to cut some samples we used the laser cutter

of Open FIESTA and the more experienced ones shared their knowledge with the newbies. As we started quite late, we did a very basic intro to the laser cutting world:

- machine basics, parts, security issues
- Usage calibration and testing
- Cutting a GOSH keyring (one was given to Rachel, who gave it to someone else!)

It was so improvised, we didn't take notes or photos or even a participants list. Still, we had some good maker fun.

Creating Solutions for Conservation of Species -- ConservationX Labs

Participants:
Facilitators: Cassie Hoffman and Sam Kelly from ConservationX Labs
Documentation: Leslie Birch
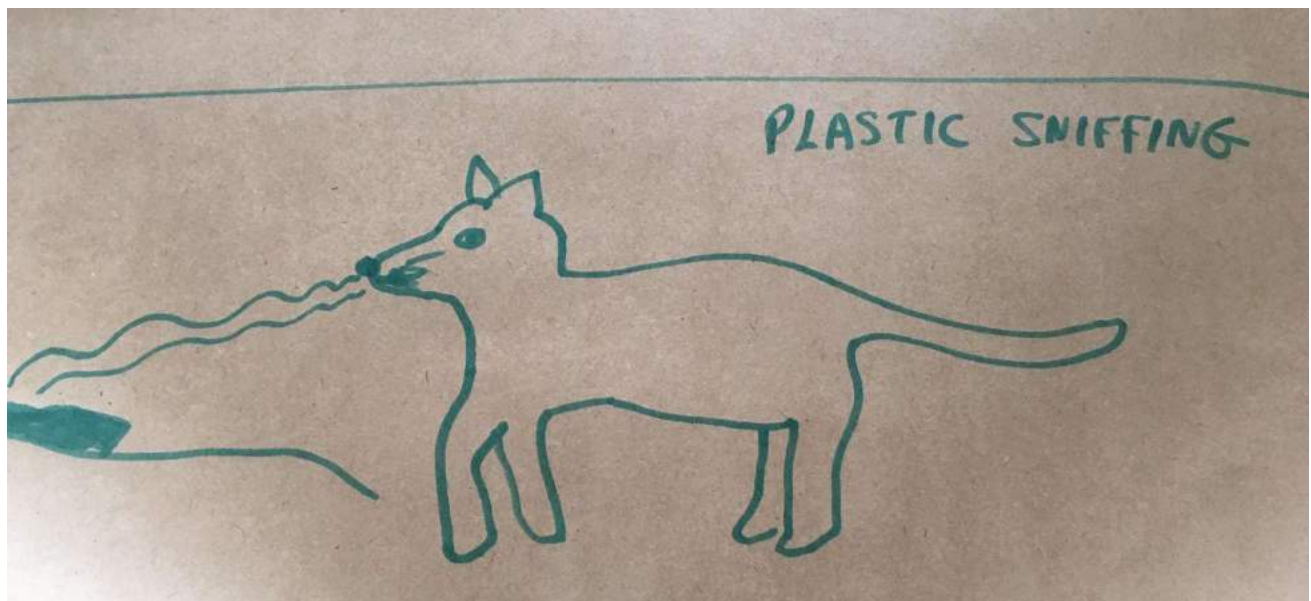
Summary:
This was a hands-on session to understand the work of ConservationX. Cassie and Sam explained the mission of the organization to use innovation to stop the species extinction crisis. They also introduced their online Digital Makerspace which allows creators to come together around the world to form project teams. One of their success stories was a project using small LED lights on fishing nets to keep turtles from becoming ensnared. After the intro, Cassie divided the group into two teams to work on projects using creative problem-solving techniques. Each team drew a challenge and an object from a set of written cards. Then they had to come up with an idea and sketch. One challenge was plastic pollution on beaches and the object was a cat. Two ideas suggested were to train the cat to sniff different

plastics for sorting and another was to attach sticky pads to the bottom of the cat's paws to collect the debris.

47.   OurSci Platform (Greg)
48.   Education (nobody listed)
49.   Fabrication (nobody listed)

Boosting Open Science Hardware in an academic context: opportunities and challenges

Participants:
Facilitator: JP
Documentation: Eduardo Padilha
Attendees: André Chagas, Moritz, Jenny, Eduardo Padilha, Tobey, Anne-Pia, Jenny Minerva, Pierre, Marina

Summary:
Academia has a lot to contribute to and gain from open science hardware. In this session students and researchers gathered to discuss the specific opportunities and challenges for OScH in academia and to form a working group to address them. We discussed the issues of institutional buy-in, particularly where many universities are conservative about approaches to intellectual property. Opportunities were highlighted to leverage the GOSH Community and network to produce guidance and case studies for universities and other stakeholders, put OScH on the agenda at large multidisciplinary conference and publicise in mainstream academic channels. In teaching, many examples were put forward of student projects and informal initiatives from 3D-printing clubs to innovation labs and challenges. A major challenge is scaling these efforts to grow new communities, which requires significant time commitment from members of the community within their own institutions to take the initiative, experiment with ideas and be an example.

Future of GOSH session

Participants:
Convenor : Francois
Facilitator : Greg (Documentation) : Juanma and Francois
Attendees: Marc Dusseiller, Nakka Sai Bhaskar Reddy, Juan P Maestre, ,Fernando Castro, Laura Olalde , Mary Maggic, Analia Aspis , Shubhi Saxena, Alex Kutschera , Pierre Padilla, Minerva Castellanos, Agnieszka Pokrywka, Anne-Pia Marty, Fernando Daguanno, Jessica Leete, Ji Li, Diego Torres, Leonardo Sehn, Felipe Fonseca.

Summary:

We discussed a number of possible GOSH ACTIVITIES that would help move the GOSH agenda and Roadmap forward, and listed them in broad categories. Several participants then proposed or committed to do various activities. The activities range from global to regional GOSH events, educational and promotional activities, and also ideas for fundraising. In the Global GOSH topic, organizers suggested a gap of 18 months for the next global edition and clarified some points to address in order to organize a global GOSH. With that in mind, 2019 would be a year to fortify the regional movements, and also thematic movements. The participants listed many different events in that sense to which they were committed. Residencies were also something recognized by the participants as an important next step and that we should focus on that for fundraising. Outreach activities suggested range from making a documentary to a podcast, including maps about GOSH Community. Educational activities, like training events and webinars were also considered an important issue to be addressed to advance with the Roadmap.

Topic Session IV: Actions / GOSH Roadmap

Pre GOSH and Post GOSH activities

PCB – Design Sprint @ SteaheadSZ

The Maker Week

For GOSH participants in the Forum it started like this with Jenny's message: (https://forum.openhardware.science/t/speaking-presenting-opportunities-at-shenzhen-maker-fair-maker-week/1358). Early the last morning of some people's stay in China, they were taken in a minibus to a high-rise area, where a great experience welcomed then. Finally, it was an amazing program presented about GOSH and its future, and about particular open science projects people are moving forward through their work! We were advised by Jenny for the project presentations, to be aware that they could be about 'your open hardware project, it could be a collaboration you're engaged in through gosh, or something else. … Audience is general public so make it fun, engaging, and inspiring! Having hardware or props is a big plus.' Ji Li, Open FIESTA, Tsinghua University was the master of ceremonies for the afternoon, doing wonders with the audience and speakers, with the added excitement of two simultaneous translators small booths in the back of the hall, allowing questions from the audience also to be passed on to the panel of GOSHers.

Jenny was first up, presenting GOSH and the need for Open Science Hardware to a mixed audience, primarily young adults and some others. Shubhi was super inspiring to the audience; and Rachel Aronoff, AGiR! and Hackuarium President, found it very inspiring to have a journalist ask where she could obtain a 'cheek cell chip' to join in the citizen science

efforts. (she was also impressed by the gorgeous lunch offered in the highrise, before she had to head off for the airport...)

Appendix 1: Participants and affiliation

- ### Agnieszka Pokrywka – Pixelache | Finland

My name is Agnieszka Pokrywka. I come originally from Poland, but I now live in Helsinki, Finland. My education includes two Master's degrees: Computer simulations applied in Physics, and Fine Arts. Over the past few years I have been working in the spirit of decentralization, participation, and horizontal structures; exploring various ways in which people can come together on equal terms. I have applied these interests in rethinking standardized structures of cultural production, with a special focus on social justice, data privacy, and open source. Since 2014 I am a member of Pixelache https://pixelache.ac/, where I have recently co-organized a conference on decentralized organizing http://socialtools.us/. I am also a founding member of Super Eclectic, a creative team that utilizes different media to channel ideas for not-for-profit initiatives.

- ### Akshai M – ICFOSS / MicroHOPE Foundation | India

I am Akshai, a researcher working for ICFOSS from India. I am really happy to be a part of GOSH 2018. GOSH 2017 was a great experience for me, I hope to meet old friends and make new ones this time.

- ### Alexander Kutschera – Technical University of Munich | Germany

I'm Alex (@alexwastooshort on Twitter) and I'm a PhD student (Microbiology/Plant Immunity) at the Technical University of Munich. I love tinkering around with 3D printing, electronics and software. I try to (re)build and (re)invent scientific instruments in a low-cost way. My latest/current project is all about bacterial motility and imaging their different macroscopic shapes (Forum post, GitHub repository) and building a flow-through photometer for the Biomaker Challenge DIY bioreactor (Github repository).

- ### Alexander Mennu Flomo – Leading The Future – LEAF|Liberia

This is Alexander M. Flomo from Liberia. I am a Senior student studying Information Technology at the Starz College of Science and Technology in Liberia. And also, I AM THE COORDINATOR OF LEAF (LEADING THE FUTURE). A community based science and technology oriented non-profitable club that is highly geared towards enhancing the potentials of young leaders, and also creating them the meaningful platforms to share positive and essential ideas.

I have coordinated most self-funded voluntary projects implemented by our organization (LEAF) using open source platforms that are relative to growing a wider community of science and technology in our country (Liberia) and Africa at large. Including the just ended

plan of establishing a Liberian chapter of the Gathering of Open Science,Hardware and Technology; after my return from the Gathering for Open Science and Hardware (GOSH) Summit 2018 held in Shenzhen, China.

It has been an exciting and motivating experience for me, forming a part of GOSH. It is indeed very powerful for me to find a wide group of people that share similar political imaginations in regard to the diverse work done with technology. I have found my place, I meet my values, and I feel: the meeting is where I have to be to implement this agenda of my organization.

- ● Analia Aspis – Weiba Foundation and University of Buenos Aires|Argentina

My name is Analía Aspis, I am researcher and lawyer specialized on ICT for the past 16 years and recently founder of Weiba Foundation (one year and a bit more old), an NGO based in Argentina (Buenos Aires) which promotes projects and persons that wants to make people lives better through technology. (www.fundacionweiba.org/en and www.fundacionweiba.org/zh).
This is my first GOSH and I more than excited to learn from you, to discuss how we can implement your ideas for social development and to create networks to link Argentinean scientists with all your projects and organizations.
I am really seeking to find opportunities that involve great impact on communities!

- ● Ananda Gabo Mark – Independent|Canada

I'm a designer with a non-technical background (industrial design, food activism and community kitchens), but have been reading about DIY open source tech culture long enough that now I would like to look for opportunities to co-design with farmers, engineers and scientists for agriculture.
I was working at a domestic robotics factory in Suzhou two years ago with the CMF (color materials and finishes team), EE, and mechatronics teams (as purely as a non technical designer) with a focus on optimizing designs for production (so I organized factory tours for interns and conducted robot teardowns!). I also have spent a lot of time in Shenzhen in 2015 + 2016 with various manufacturing tours for electronics manufacturing and injection moulding but would really like to be around those in the context of open source science hardware!!!
I also spent the summer foraging in Finland, and helping out on my friends farm in Japan (they focused on open source ag hardware). And am currently couch surfing in NYC while working out of a community bio lab to learn more about engineering plants, and reaching out to farmers for tool design opportunities.
I'm very much new to contributing to any open source movement, but I'm hoping this will bring a lot of research and insight into producing something within the next year.

Andre Maia Chagas – Univ. of Sussex, Trend in Africa, Prometheus Science, Open Neuroscience|United Kingdom

My name is Andre, and I'm currently based in Brighton, UK. I've been trying to make (together with many other cool people) Open Source tools the norm in Academia. More specifically, I would like to see OS Hardware become the common place inside universities, as I believe this can have an incredible impact in societies around the globe.

In practical terms this means that I've been developing OS tools for lab use and organizing workshops in collaboration with [Trend in Africa](#), where we try to exchange with researchers/graduate students the benefits of building their own tools in an open setting (on the last event all projects went live on [GitHub 1](#)) (side note: Really happy to see that some of the participants of the workshops are active in the GOSH community and that we will get to meet again in China!)

Recently I was lucky enough to be selected for the Mozilla Science Fellowship to work on a project around Open Source Hardware! In it, I will gather information about the needs of academic researchers, curious people, DIYers, in terms of Scientific equipment and try to engage people to build OS Instruments to fulfill those needs.

● Andrew Quitmeyer – Digital Naturalism Laboratories, Gamboa, Panama (formerly: National University of Singapore|Singapore)

Dr. Andrew Quitmeyer is a hacker adventurer studying intersections between wild animals and computational devices. He left his job as a tenure track professor at the National University of Singapore to start his own Field Station Makerspace in Gamboa Panama: Digital Naturalism Laboratories (dinalab.net). Here he blends biological fieldwork and DIY digital crafting with a community of scientists, artists, designers, and engineers from around the world. He runs mobile workshops called "Hiking Hacks" where participants build interactive technology in outdoor, natural contexts. The Digital Naturalism Conference (dinacon.org) is his research's largest event, pulling in over 100 participants annually from all fields to collaborate on finding new ways of interacting with nature. His research also inspired a silly spin-off international television series he starred in for Discovery Networks called "Hacking the Wild."

- Andriy Herts – Ternopil Volodymyr Hnatiuk National Pedagogical University / NGO «Galician ecological association»|Ukraine

My name is Andriy Herts. I am Associate Professor, Department of General Biology and Teaching Methodology for Natural Sciences, Ternopil Volodymyr Hnatiuk National Pedagogical University, Ukraine. Author of more than 40 scientific and methodical works.
I am exploring the influence of light-related parameters on the development, growth, productivity, and biochemical composition of plants in order to understand the influence of artificial lights (LED lights, for example) and ultimately improve growth strategies based on that knowledge. Now, I have started the investigation of photosynthesis of plants growing in-vitro to compare with in-vivo, ex-vitro, in-situ.
As the member of NGO, I started the project "Ternopil Citizen Eco-Monitoring" with the involvement of people of my city to the realization idea - air quality. We use a prototype that based open technology using "Teensy" microcontrollers, open source IoT platform device - NodeMCU and intelligent sensors (on GitHub).

- Angelo Moscozo Silveira, aka VJ pixel – InfoAmazonia|Brazil

I'm pixel and I'm an artist and project manager from Brazil.
I coordinate Rede InfoAmazonia, an water quality initiative that created Mãe d'Água (MD), an OScH to monitor water parameters. The project started as a community science research in 2014 and was funded by a prize from the Google Impact Challenge Brazil until 2016. After that, five universities in Brazil got involved in the network. More about Rede InfoAmazonia in this video   and   text.

Also, I got involved in DustDuino, an OScH to monitor particles in the air. A video from an action   we   made   in   Brazil.

I'm on GitHub, Twitter and Instagram.

Anirudh Goel – Independent|India

Anirudh is a software developer and he is currently working in a Data Science based startup, in India.
He likes to code to create interesting stuff. Anirudh is just getting started with his career journey and unlike most of the people in this forum, he doesn't have a long list of achievements. Though, there are a few things that he feels happy to tell about-
CERN Summer Student 2017
been associated with Mozilla's Open Web initiative for more than 3 years
been to several different hackathons and won some of them
an open source contributor

He loves learning and working on different technologies, and makes small projects on them to have hands-on experience. You can find those projects, along with more information about him, on his portfolio website - https://anirudhgoel.me

Contact him anytime to talk about technology, finance, Sherlock or the latest Apple hardware/software updates, and ofcourse for a Coffee.

Anna Sera Lowe - MakerNet Alliance & Manufacturing Change|United Kingdom

I'm Anna, from the UK. I'm working on how to make manufacturing (of all kinds of things) more local, especially in the Global South where global supply chains don't work well. I see Open Hardware as a key part of that.

I'm also a co-founder of Kumasi Hive in Ghana, and was at AfricaOSH there in April this year. I also met a few GOSHers at the pre-GOSH summit at CERN last year. I'm keen to talk to people interested in documentation standards for open hardware, as under the MakerNet Alliance (www.makernetaliance.org 1) we're starting up a working group on that. Ask me if you'd like to know more!

● Anne-Pia Marty - UNIGE/Geneva-Tsinghua Initiative|Switzerland/China

My name is Anne-Pia, I am a master student from the University of Geneva doing an exchange in Tsinghua, Beijing. I did my bachelor's degree in the CRI doing various things relating to biology. Now I study "Innovation, Human Development and Sustainability", essentially trying to solve the big challenges of the world (albeit a small ambition). I do a project about a simple device to monitor and map air pollution, and play around with open microfluidics in one of Tsinghua's labs to make it accessible even to children.

● Bengt Sjölén - Independent|Sweden

Independent hacker, artist and (almost) biochemist/molecular biologist. His primary tool is code, be it parametric designs of physical objects to be machined, circuit board designs or code generating code for data processing, and parts for bio-lab equipment. He collaborates through many different networks: Weise7 (his studio in Berlin), Critical Engineering Working Group, Aether Architecture, Hackteria for non-commercial and artistic projects, Teenage Engineering, Moodelizer and Automata for commercial projects.

● Benjamin Hans Paffhausen - Freie Universität Berlin|Germany

Benjamin Paffhausen is a post-doc in neurobiology at the FU Berlin and is interested in collaborations and reuse of hard-to-acquire data. He examines the brain activity of naturally behaving honeybees, either by relating the brain activity to intrinsically motivated behavior in the hive while running freely or by recording action potentials of bees flying in the air on a quad-copter. Such ethological approaches may shed new light on the insects' brain. Such intricate experiments demand expertise in hardware, software, analysis and biology; so working with people in many different fields makes open science irreplaceable.

Open-access research makes his work much faster and more efficient, and he is happy to be part of the GOSH community

- ● Besar Zasella – SZOIL|UK/China

My name is Besar Zasella. I am currently interning at SZOIL and I am also part of the GOSH 2018 Committee. I have a deep interest in open-source, and for my personal research, I am exploring the ways in which Shenzhen's unique ecosystem facilitates both innovation and collaboration in hardware and IoT, in both local and international circles, and how this potentially fits into the wider narrative of the Belt and Road Initiative.

- ● Bin Liu – Independent|China

- ● Brian Tang – Young Makers & ChangeMakers|Hong Kong

- ● Carlos Fernando Daguanno – Independent|Argentina

I'm Fernando, from Buenos Aires, Argentina, based in Rio de Janeiro and São Paulo, Brazil. I develop open source DIY didactic toys, building blocks systems mainly focused in tensegrity and geodesic structures. We try to develop affordable systems to help teaching tech and science in vulnerable communities. Project is called Alquimétricos and Alquibots (the techy version).

- ● Cassie Ann Hoffman – Conservation X Labs|US

Cassie Hoffman is currently the Platform Manager of the Digital Makerspace and manages the development and community development around the Digital Makerspace, supporting market research for conservation innovations, and aiding company operations and field programming. She is a social scientist with expertise in market mechanisms for conservation, community development, and social marketing and behavior change. She has field experience promoting alternative financing mechanisms for conservation in the Nevado de Colima National Park in Mexico and social marketing programs promoting water and energy conservation in Jordan. She is an advanced Spanish speaker and holds a Masters of Environmental Management from Duke University, with a focus in environmental economics and policy, and a certificate in International Development Policy.

- ● Christonsia Mushi – Twende Innovation Centre|Tanzania

- ● Clarissa Redwine – Kickstarter|US

- David Li – Shenzhen Open Innovation Lab|China

David Li has been contributing to open source software since 1990. He is a member of Free Software Foundation, committer to Apache projects and board director of ObjectWeb. Over the past 20 years, David has started several open source software projects and contributed to many others. In 2010, he co-founded XinCheJian, the first hackerspace in China to promote hacker/maker culture and open source hardware. In 2011, he co-founded Hacked Matter, a think tank on makers and open innovation. He In the past two years, he has become interested in urban farming and is an enthusiastic proponent of aquaponics, which brings the spirit of open source to farming and gardening. In 2015, he co-founded Maker Collider, a platform to develop next-generation IoT from Maker community. He is also the director of Shenzhen Open Innovation Lab.

- Diego Torres – Cientopolis, LIFIA, Facultad de Informática, Universidad Nacional de La Plata|Argentina

My name is Diego. I'm from Argentina. I'm a PhD in computer science but leading a project in Citizen and Open Science called Cientopolis (cientopolis.org). Unfortunately, it is only in Spanish. I am working in different challenges in these topics, from mobile apps to discussing open policies.

- Dorcas Adhiambo Owinoh – LakeHub|Kenya

Dorcas Adhiambo Owinoh is the director and a founding member of the LakeHub Foundation, a technology and social innovation hub that aims to decentralize access to technology, growing entrepreneurship, and social innovation. Through LakeHub, Dorcas has created an open and supportive space where young and talented developers, creatives, entrepreneurs and social innovators in western Kenya meet to network, learn from each other, brainstorm, and find solutions to societal challenges. As a leader in the technology community, Dorcas leads the Village Code Project, a program that aims to bridge the digital divide among youths in Western Kenya by teaching children in villages problem ideation, conceptualization, design, computer programming, and entrepreneurial skills. Her work and mentorship on this program has empowered 300 young girls to successfully build mobile apps aimed at providing solutions to health, equality, education, gender, and environment issues. In the future, Dorcas plans to start an innovation academy to continue teaching digital and design skills to African youth.

- Dulce Esperanza Alarcón Yaquetto – Universidad Peruana Cayetano Heredia (UPCH)|Peru

My name is Dulce, I am a biologist from Peru. I do research in health of high altitude populations, and my interest in open source hardware came from noticing how licensed hardware hampered the development of science in resource limited settings. This is why

(alongside with @jptincopa), we are starting an open hardware development group in our University (UPCH) focusing in the development of low-cost lab equipment. In Shenzhen, I look forward to discuss new ways to promote OSH in the scientific community.

- ### Eduardo Padilha Antonio – University of São Paulo (USP)|Synthetic Biology Club Brazil (Synbio Brasil)|Brazil

I am Eduardo Padilha, from Brazil. I study Biochemical Pharmacy at the University of São Paulo and have been doing research in Molecular Genetics since I was 13 in the same university. I coordinated the I Biohack Academy by Waag Society in Brazil and have since been involved with Open Hardware and DIY Biology while also exploring the intersections between art, design and science. I have delivered lectures and workshops on OSH in Brazil, Chile and the USA and endeavour to strengthen the Open Science and Bioart movements in Brazil.

- ### Emmanuel Kellner – University of Geneva, Geneva-Tsinghua Initiative|Switzerland

I'm Emmanuel from Switzerland. I studied microtechnical engineering (think MEMS, but also assays on cells), and am now one year away from the end of a master degree in Innovation, Human Development and Sustainability, in which I try to enable more people to access affordable science. As an exchange program, I'm going to spend one semester in Tsinghua University, Beijing, and will then already be in China before GOSH. On the side, I'm trying to network pollution monitoring devices and also find a way to help kids test their parents' diabetes.

- ### Felipe Fonseca – Ciência Aberta Ubatuba; UbaLab; inc.ubalab; OptDyn|Brazil

I'm Felipe Fonseca, from Ubatuba, in Brazil. I've been working with open source culture for more than 15 years in many projects. Recently I was part of the team of Ubatuba Open Science, part of the OCSDNet. I'm currently community manager of the Subutai Platform and one of the coordinators of inc.ubalab (collaborative incubator of socio-ecological innovation) and ninho (a co-working space and center of science and culture in Ubatuba).

- ### Francois Grey – Université de Genève|Switzerland

你好！My name is Francois Grey and I'm based at University of Geneva. I also hang out a lot in Beijing and Shenzhen with the Geneva Tsinghua Initiative that we launched in 2016, together with Tsinghua University. The GTI is all about challenge-based learning for the Sustainable Development Goals (SDGs), which often leads students to open source hardware solutions. I was around when GOSH got started, just two short years ago at CERN IdeaSquare. I missed Santiago, so I'm excited to see how the community has grown and what people are working on these days, and keen to help the Roadmap evolve. A bientôt!

- Fernando Castro – Universidad Nacional de Cuyo | Argentina

My name is Fernando Castro but everyone calls me Nano. I work at the Universidad Tecnológica in Mendoza (Argentina) as a physics teacher and also as responsible of LabFD 1, a small digital fabrication lab were we work on developing and adapting/replicating open source tools, scientific and non. We are currently working in educational instruments for basic mechanics and also on MACA, another air quality monitor. I'm also part of Ayllù, a cooperative were we produce small quantities of wine, fruit juices, beer and processed food. Particularly I'm interested on the mapping, integration and development of tools/resources to inquire about the quality/health of air, water, soil/plants and food just to make OScH more available and relevant for communities that need to defend/transform/improve their environment, practices and territories.

- Fernando Daguanno – Alquimétricos|Brazil

I'm Fernando, from Buenos Aires, Argentina, based in Rio de Janeiro and São Paulo, Brazil. I develop open source DIY didactic toys, building blocks systems mainly focused in tensegrity and geodesic structures. We try to develop affordable systems to help teaching tech and science in vulnerable communities. Project is called Alquimétricos and Alquibots (the techy version).
Thank you all for this opportunity to learn and share

- Fernan Federici – Pontificia Universidad Católica de Chile|Chile

I am Fernan, from Mendoza, Argentina. I studied a little bit of agricultural engineering and have a bachelor's degree in molecular biology. I worked for one year at UNAM (Mexico) and worked/studied almost 8 in the UK, where I learnt about open technologies. Currently, I work as a researcher and lecturer in Chile. We aim to understand multicellular organization in bacteria and work a lot on the development of educational resources that combine OSH and low cost genetics/biology (e.g. uLOOP, OS fluorescence imaging system). We also like workshops and training sessions. For this, we try to learn from other initiatives such as TReND in Africa, Hakteria, Biomaker Challenge, etc; who are experts on getting people together and running workshop. The hands-on sessions at GOSH were an important part for our group. Our aim is to promote and develop free/libre and open source technology in Latin America through initiatives such as TECNOx.

- Freda Yamorti Gbande – Independent|Ghana

I am Freda Yamorti Gbande from Ghana. I have a degree in biochemistry, cell and molecular biology from the University of Ghana. I am passionate about science and technology and how it can be exploited to solve problems in Africa. I currently work with the Amrahia Dairy Farms (Ministry of food and Agriculture) where we assist locals to start and maintain their own farms. I'm really overwhelmed and after reading through the replies in the forum. I'm sure GOSH2018 is going to a great experience of learning and sharing new information.

- ## Greg Austic – Our Sci|US

I'm Greg. I have been involved in open technology since the mid 2000's developing processes and equipment for small scale biodiesel manufacturing. Then cofounded PhotosynQ and build equipment for measuring photosynthesis in the field and a platform for sharing / analyzing the data. I loved the work, but found the limitation on photosynthesis (and university setting) frustrating. So, I cofounded Our Sci 1 with Manuel and Dan. Our focus is to support communities who want answer their own hard questions that require scientific rigor through software (for collaboration, knowledge sharing, and analysis of data), hardware (to improve the comparability and quality of data collected), and training (to help everyone effectively contribute to the scientific process). Currently, we work with communities interested in soil health and food quality. We run a food and soil testing lab, and make handheld reflectance spectrometers which are currently in the beta phase of manufacturing (100s not 1000s).

- ## Harold Tay – National University of Singapore|Singapore

I'm an engineer and I'll be bringing a small autonomous underwater vehicle (a micro AUV) that I've been working on. (It will be for demo, not planning to actually launch it). I'm interested in technologies, equipment, and techniques that make science and exploration more available to more people.

- ## Harry Sefoga Akligoh – Kumasi Hive|Ghana

My name is Harry Akligoh (@harryakligoh) from Ghana. I work with Kumasi Hive and the Open Bioeconomy Lab as a researcher. I study as part of my research, challenges within the bioeconomy of low resource countries and leveraging open tools that can be used for local biomanufacturing of molecular biology enzymes as a way of overcoming the reagent supply chain challenges faced by scientists and researchers.

- ### Helene Steiner – Cell-Free Tech|United Kingdom

Helene Steiner is a designer and engineer who works at the interface between technology and science. She co-founded Open Cell with the mission to provide affordable lab space to early stage startups innovating at the intersection of design and biology. She is the co-founder of a biotech company, Cell-Free Technology, where she develops computational and biological design tools for proteins and materials and leads the biomaterial platform at the fashion department at the Royal College of Art. She was previously a postdoc research fellow in Microsoft Research Cambridge where she developed biological interfaces. She has been hosted as a visiting research fellow in the Tangible Research group of the MIT Media Lab. She holds a MDes from the Bauhaus University, MA from the Royal College of Art and an MSc from Imperial College London. She has been awarded a Frontier of Science, Kavli Fellowship by the National Academy of Sciences.

- ## Ippolit Markelov – Science art group "18 apples"|Russia

My name is Ippolit Markelov, I`m a science artist from Russia.

Since completing my PhD in biology in 2012, I becoming an independent Art & Science researcher. At 2014 I founded the [Science Art Group 18 apples](#) as a collaboration between an artist, a molecular biologist and an IT specialist. Our artistic works have been shown at exhibitions and festivals at leading Russian and international venues of Modern Art, such as Moscow Museum of Modern Art, Garage, Polytechnic Museum, 4th Ural Industrial Biennial of Contemporary Art, Ars Electronica (Austria, 2017).

I'll show our artistic project "[MetabolA.I.](#)" at GOSH Public Event @ X-Factory.

In addition, we works with our colleagues from Lomonosov Moscow State University on an Open Source Projects for Science such as *"Installation for animal spontaneous activity monitoring"* (ASPAM): Video; Github.

- ## Isaac Núñez – Pontificia Universidad Católica de Chile| Chile

I am a biological engineer from Chile. Currently I am doing my PhD research at PUC Chile, which is related to the use of synthetic biology and open source hardware to study and instruct the behavior of cell organizations. I am involved in the organization of TECNOx community because I am deeply interested in the use of open approaches to technology development and its value for knowledge democratization. Specifically, it could have an enormous impact on the empowerment over biological technologies which are generally unknown and expensive and restricted to access. At the same line, I am part of RED FUNGI open source organization, which is focused on exploring fungal biodiversity and applications in technology. You can find some of my projects in Github: https://github.com/Prosimio.

- ## Jan Stöckel – Independent Filmmaker| UK

London-based freelance visual anthropologist and filmmaker, working in video ethnography, documentaries, research, promotional and event videography.

- ## Jean Pierre Tincopa Flores – Universidad Peruana Cayetano Heredia (UPCH)| Peru

I'm an electronic engineer from Perú and I'm currently studying a master's degree in biomedical informatics, I've been using and promoting open source software and hardware since I was an undergrad student. This year I was in Chile at TECNOx presenting open source centrifuges using 3D printing and recycled electronic components. I'm thinking in bringing along with me a couple of my designs to GOSH. The designs are part of a project aimed to having a complete set of basic OSH lab equipment. This project (developed alongside @DulceYaquetto) is new and I believe it will be nourished from my experience at GOSH this October.If you want to take a look at my designs, here is my thingiverse: https://www.thingiverse.com/JpTincopa/designs

- ## Jeff Warren – Public Lab | US

I'm Jeff Warren, coming from Providence, Rhode Island, in the US.

I work with Public Lab, and I'm particularly involved in our Kits initiative ([https://publiclab.org/kits 3](https://publiclab.org/kits)), where we help people with project ideas to launch affordable Do-It-Yourself kits to build a community around their open hardware projects. I'm happy to share what we know about sourcing parts, designing documentation, hosting and facilitating community around a project and it's goals and challenges.

We've been helping lots of folks to launch projects measuring environmental problems that affect people, and I'm especially interested to offer support and also a platform (at PublicLab.org) for you to get the word out about your work, and to form alliances with other projects that have similar aims.

- ## Jenny Molloy – University of Cambridge | United Kingdom | @jenny_molloy | @jcm80

I'm a biologist based at the University of Cambridge (UK), where I'm Shuttleworth Fellow setting up an interdisciplinary research group called the Open Bioeconomy Lab. We research open technologies in the bioeconomy and make open source biological research tools to increase accessibility of biology and biotechnology research globally. I've been a GOSH organiser since 2016 and also run a not-for-profit community lab in Cambridge called Biomakespace.

- ## Jessica Leete – Boston-Studio|US

Jessica Leete is a designer, artist and educator interested in getting the tools for environmental testing in the hands of students and citizens for help monitoring before and after conditions of large scale open space and infrastructure projects and for micro scale urban conditions. She is an internationally networked landscape architect and urban designer with experience on projects ranging from public open space and commercial developments to campuses and eco-communities in Asia, the Middle East, Mexico, and the United States. She has received design awards for the urbanism of a railyard in Taiwan, watershed planning in a coal town in northern China, and an innovative redevelopment strategy for Gowanus Canal, a superfund site in New York City.

bostonstudio.org

- ## Ji Li – Open FIESTA, Tsinghua University|China

I have a biology (animal genetics) background, and now I'm working on innovative education and interdisciplinary subjects in Tsinghua Open FIESTA (Open Faculty for Innovation, Education, Science, Technology and Art) in Shenzhen. I'm the coordinator and lab engineer in Open FIESTA and in charge of innovation activities and managing the lab. I'm passionate about education and new technologies. I designed the creative space in Open FIESTA to facilitate innovation, and explore new ways of learning, and organising SDGs workshops.

- Joel Murphy – www.openbci.com www.pulsesensor.com www.tympan.org www.openhak.com |US

He has a couple of Open Source Hardware startups: www.pulsesensor.com that is an optical heart rate monitor, and www.openbci.com that is an EEG/EMG/ECG amplifier. He is part of a team that is working on a government-funded project to create open-source tools for designing hearing aids www.tympan.org. With a background is in visual arts, he has made kinetic sculptures www.joelmurphy.net and also taught Physical Computing at Parsons from 2006 to 2014.

- Jorge Appiah – Kumasi Hive|Ghana

Jorge Appiah is the co-lead for the Kumasi Hive Biotech Lab which provide an enhanced avenue and platform to drive innovation and scale-up the utilization of biotechnology using entrepreneurship in Ghanaian/African local context for sustainable development purpose for the community.
He is passionate about youth employment and impact innovations, which causes him to focus on accelerating the adoption of the 4th industrial age technologies in solving crucial challenges and creating jobs in Africa through Human Capacity building.
Jorge is the Co-founder/CEO of Kumasi Hive; a Tech innovation Hub for rapid prototyping of ideas, budding local innovations, impact start-up support and promoting youth entrepreneurship as a way of addressing critical social economic and developmental challenges.
He is also the co-organiser and community lead for Africa Open Science and Hardware (AfricaOSH) which seeks to create the platform for the promotion of Open Science and hardware practice and utilization by African makers, scientists, academia, artists and engineers.
Jorge is a Technoprenuer and Africa Tech-Policy Expert with a background in Electrical/Electronic Engineering (BSc), Business Administration (MBA) and Renewable energy (MSc).

- Juan Manuel Garcia – NGO: Open science school|France

I am Juanma Garcia, Spanish, bioengineer and teacher, and currently PhD student in Biophysics in the CRI (center for research and interdisciplinarity of Paris) and the Institut Curie (Paris). My research is focused in microfluidics and microscopy. I am studying how cancer cells move and deform.
Apart from this main job, I am coordinating an open science group in Paris called Open Science School 1. There, we have done a few open hardware projects - among them maybe the most successful, an open hardware spectrophotometer, for which I am looking now for partner to help me produce it and use it.

Mainly I have done lot of teaching materials, courses, and activities for high schools and university students in a lot of different subjects related to life sciences. Ping me if you are interested in citizen science, open science, alternative ways of doing research, or in teaching, and let me know if you think I can help you out with something or the other way around.

- ### Juan P Maestre – University of Texas at Austin|Spain

Environmental scientist working on citizen science projects. Currently interested on instruments that can help citizen science and in their CS projects interested in water quality but also in indoor environmental quality. They also pursue representation of geospatial data to inform citizens and any help in this sense too is welcome.

- ### Julian Stirling – University of Bath|United Kingdom

I am Julian Stirling. I am a Post-Doc in the Physics Department the University of Bath. I have worked in a number of physics subfields generally doing instrumentation; from building scanning probe microscopes and optomechanical sensors for radiation pressure experiments, to improving equipment for precision mass metrology and for measuring the universal constant of Gravitation. As a committed open-source software zealot, I had always wanted to move into open hardware. I moved to January in Bath to work on the open science hardware including the 3D-printed OpenFlexure microscope. I work closely with STICLab in Tanzania developing both the OpenFlexure microscope and measurement tools for testing the mechanical properties of printed objects.

- ### Julieta Cecilia Arancio – CENIT-CONICET|Argentina

I'm a PhD student from Buenos Aires, Argentina, working at Centro de Investigaciones para la Transformación (CENIT-CONICET). I have a background in Environmental Science, but am now pursuing a PhD in Social Studies of Science & Technology, and my object of study is, oh well, GOSH! I study how open hardware is contributing to making science & technology more democratic by empowering people and visibilizing different voices. Besides, I'm always interested in environmental-related projects and part of ETER, an air quality monitoring project which was born in R'lyeh, a hacklab in Buenos Aires. I'm interested in working on standardisation and not re-inventing the wheel everytime we start a new project, community-generated metrics, evaluation methods and open hardware "good practices", how to make GOSH friendly to newcomers and help it grow.

- Justin Sègbédji Ahinon – Association for the Promotion of Open Science in Haiti and Francophone Africa (APSOHA)|Bénin

I am a final year undergraduate student in statistics applied to economics. I am particularly interested in how scientific/academic content is accessed in Africa and more specifically in French-speaking Africa. (Twitter: Justin Ahinon 2)

Last June, I co-founded with Jo Havemann, AfricArxiv, a free preprint platform for African scientists. I am also particularly involved in the development of digital literacy among children, especially girls. I am therefore working on Hack Her, a digital discovery programme to facilitate the feminisation of the sector in my country, Benin. I am also co-leader of the Keoubougou Pi project, a programme to facilitate digital skills acquisition among young school children using Raspberry Pi as their main working tools. I'm also a big fan of arduino, RPI and embedded computing.

- Kaspar – Kitspace|United Kingdom

I am Kaspar. My preferred pronouns are they/them or he/him.

I am a computer and electronics geek, and I work as a freelancer for various hardware startups in Bristol, UK. I created, maintain and continue to develop kitspace.org 4 which is for documenting and sharing electronics designs. Kitspace is a place to share ready-to-order open hardware electronics projects. You can order the the circuit board and all components for a project with just a few clicks.

I first attended GOSH in 2017 and am looking forward to catching up with everyone and helping people put projects up, sharing other skills, and getting ideas for how to make the site more useful to people working on scientific hardware.

- Kevin Lhoste – CRI – Center for Research and Interdisciplinarity|France

- Laura Olalde – Independent|Argentina

I am a visual artist and educator, working across disciplines on Art, Science and Technology. Since 2013 I am part of PROTEUS, a *sci-art* collective formed together with molecular biologists and social scientists. I am also part of WATS 2019 Program, organized by *Clubes de Ciencia México* and TRES.

Some years ago I incorporated living matter processes in my artistic practice and I started my research on biomaterials; and I found it necessary to appropriate emergent open technologies to design, make, use and share open scientific hardware for continuing my practices. Then I got involved with the Global Open Science Hardware (GOSH) community, as a key party for equitable access to scientific research, communitarian science and constructive learning processes across disciplines.

I am an enthusiastic practitioner of creating aesthetic experiences that reveal the sublime beauty beneath the submicroscopic world.

I am based in Buenos Aires, Argentina.

- Leonardo Sehn – CTA and EITCHA!|Brazil

I am from Porto Alegre, south of Brasil. Since 2012 I collaborate in [CTA](#), a center/laboratory/community to promote new paradigms of production and dissemination of knowledge through free and open source technologies, citizen science, open science and with focus on scientific instrumentation. In CTA, I am responsible for the [Estações Meteorológica Modulares](#) (EMM) project, which is a project to promote collaborative/community/citizen monitoring of the environment mainly based on school communities. Recently, I launched a [Community Guide](#) to the EMM project, to facilitate formation of this collaborative monitoring network by individuals and communities. I am also responsible for and collaborator at [EITCHA!](#), the Escola Itinerante de Tecnologia Cidadã Hacker (or Itinerant School of Citizen Hacker Technology), an initiative to promote technological emancipation and the hacker culture in schools, through activities/workshops about free and open source technologies. This initiative was awarded in the first round of the [Mozilla Minigrants](#) in 2017, a global award to support projects to advance open science and a healthier internet.

- Leslie Birch – Volunteer Community Organizer–Public Lab, Freelance Designer– Adafruit|US

I'm @zengirl2, an Arduino and Raspberry Pi lover currently volunteering for Public Lab. I'm hoping to merge my passion for environment and hardware into a job. At GOSH I'm hoping to meet others that have an interest in helping those experiencing environmental problems and figuring out how we may form Environmental Emergency Response Teams (working title) around the world that can come to the aid of communities in the form of scientists, sociologists, doctors, artists and whoever else is needed.

- Li Yu – Independent|China

I am an interdisciplinary researcher, speculative designer, and new media artist. In my freetime, I also do emerging science and technology monitoring and forecasting, write sci-fi novels and draw comics.

In Design, I research the burgeoning areas of advanced science technology and speculative design, and their fascinating intersection where our unlimited imagination meets the fast pacing science technology development. I use design as a method of investigation, while implementing emerging technologies, aimed at expanding our imagination, breaking the sense of normality and bringing thought experiments into tangible forms that explore possible future scenarios. My works have been exposed at the Lausanne contemporary art museum, V&A museum in Shenzhen, Milan Image fair, Flux laboratory in Geneva and Zurich...etc.

In citizen science and diplomacy, I collaborate with scientists and engineers from various fields, including biotechnology, aerospace, artificial intelligence and computer science in different institutions and research facilities.

I also work for a corporate, venture capital firm for technology scouting between Shenzhen and Silicon Valley.

- Lit Liao – Litchee Lab|China

- Louise Bezuidenhout – University of Oxford and University of the Witwatersrand|UK/South Africa

I'm South African, but am currently based in Oxford, UK. I'm a sociologist who is interested in Open Science, and particularly in its potential for building research capacity in Africa. I recently hosted an event in Zimbabwe (hopefully the first of many) to encourage undergraduate students to design and make low-cost versions of lab equipment that is lacking in their teaching labs (https://labhackathon.wordpress.com/).

- Marc Dusseiller – Hackteria|Switzerland

Dr. Marc R. Dusseiller is a transdisciplinary scholar, lecturer for micro- and nanotechnology, cultural facilitator and artist. He performs DIY (do-it-yourself) workshops in lo-fi electronics and synths, hardware hacking for citizen science and DIY microscopy. He was co-organizing Dock18, Room for Mediacultures, diy* festival (Zürich, Switzerland), KIBLIX 2011 (Maribor, Slovenia), workshops for artists, schools and children as the former president (2008-12) of the Swiss Mechatronic Art Society, SGMK. He has worked as guest faculty and mentor at various schools, Srishti Institute of Art, Design and Technology (IN), UCSB (USA) and in Switzerland, FHNW, HEAD, ETHZ. In collaboration with Kapelica Gallery, he has started the BioTehna Lab in Ljubljana (2012 – 2013), an open platform for interdisciplinary and artistic research on life sciences. Currently, he is developing means to perform bio- and nanotechnology research and dissemination, Hackteria | Open Source Biological Art, in a DIY / DIWO fashion in kitchens, ateliers and in the Majority World. He was the co-organizer of the different editions of HackteriaLab 2010 – 2017 in Zürich, Romainmotier, Klöntal, Bangalore and Yogyakarta, and collaborated on the organisation of the Gathering for Open Science Hardware, GOSH! 2016 & 2018, and the BioFabbing Convergence, 2017, in Geneva. He lives and works in Zürich, Yogyakarta and Taipei. He also loves synthesizers and coconuts.

- ● Marc Juul – disaster.radio|USA/Denmark

Based out of Oakland, California Marc Juul hacks on software, hardware and wetware. He has co-founded four (bio)hackerspaces on two continents and is active in the realms of community mesh networking, synbio cheese, e-reader hacking and open science hardware.

- ● Marcela Basch – Independent|Argentina

I'm a journalist from Buenos Aires, Argentina, who fell in love with the whole idea of collaborative, free, p2p and open ways of living, producing, consuming and learning some years ago. Since 2013 I have been running a website about that called El plan C (in Spanish; C is for collaboration). Since 2014 I have helped co-organise the Collaborative Economy Week, a kind of decentralized p2p festival in Latin America. Since 2016 I also co-organise Comunes, an annual international conference about collaborative economies, free culture and the commons. Since 2018 I'm working with Bioleft.org, a project developing an open source system for seeds, as a communications person.

- ● Maria Frangos – Breathing Games|Canada

I am a user experience designer with over twenty years experience, specializing in IoT (Internet of Things). Holding a Bachelor of Fine Arts in Design and a Masters of Design in Industrial Design, I engage in both practice-based work and design research. Over the last few years, I have presented at numerous international design conferences on participatory design and peer-to-peer approaches to innovation and have led design skills workshops, most recently at the Gathering of Open Science Hardware in Shenzhen, China.

I am committed to open and collaborative processes that promote the creation of freely accessible technologies and knowledge. My practice is concerned with facilitating design processes, translating stakeholder needs and transferring / sharing knowledge. I believe that through these efforts, designers can play an important role in empowering individuals in the co-creation process. I am currently working in the private sector but am also a core member of an open source project called Breathing Games, where I contribute to both design and research initiatives.

- ● Marina de Freitas – CTA – UFRGS|Brazil

I came from the south of Brazil (Porto Alegre). I work at CTA, a lab that develops and research osch at the university UFRGS. I've being working with education and also with calibration of osch (mostly for meteorology). In GOSH, I'm looking forward to get to know you all and learn through your experiences. I'm most interested in strategies to expand osch, open science and citizen/community science. I'm also very interested in decolonizing knowledge and technologies, to share the value of traditional/ancient knowledge.

- Mary Maggic – Hackteria|US/Austria

My name is Mary Maggic, my preferred pronoun is they/them, I'm from LA and now based in Vienna where I'm chilling with my new baby, Lola (who is coming with me to GOSH!). My background is in Biology and Art, and I got into the diy scene as a documentary filmmaker back in 2013 (www.diysect.com 1). Then, I entered the Hackteria network in Jogja 2014 and my life changed drastically after that… Now, my artistic research practice centers on hormones, biopolitics, environmental toxicity, and gender-hacking. I also work in collaborations to emancipate the technologies and protocols that are associated with hormone hacking, such as diy extraction techniques and yeast biosensors for detecting xenoestrogens. Last year I finished my masters thesis titled "Open Source Estrogen." (http://maggic.ooo 4) and this year I will be moving to Jogja for one year to continue researching on hormone hacking and molecular queering.

- Masato Takemura – Independent|Japan

My name is Masato Takemura (aka 'Take'). I have taught PC skills at elementary school, and my background is as a mechanical engineer. Now, I'm managing a hackerspace in Hamamatsu, Japan, which is known as a manufacturing city, after having established the TAKE-SPACE FABLAB in July, 2014. I'm teaching not only technical skills, but also communication. Most recently I have been researching food, and organised a night session: "How to eat (almost) anything," HTEAA. I bought some insect dishes at the Shenzhen food market; and we ate tarantula, dragon fish, snake, worms, cricket, scorpion… We enjoyed it and screened a lot for our study.

If you know some weird food in your country, let me know! I was so inspired by GOSH!

- Moritz Riede – Department of Physics, University of Oxford|United Kingdom

I am a German physicist who lives and works in the UK, researching renewable energies, in particular emerging solar cell technologies. If we manage to get our solar cells to work well in the British weather, then they should work anywhere;-). Starting a new group and laboratory from scratch came with some challenges, but also with opportunities. One of the opportunities we are trying to implement from the start is building our laboratory around the concepts of "Open Science" as much as it is possible. We are an experimental physics lab, and we need lots of equipment, both for the fabrication and the characterisation of our solar cells. For example, Grey Christoforo, a former PostDoc in my group, built a spray coater for our research, based on the popular open source RepRap 3D printer

(http://afmd.github.io/LANDS), which came in at a fraction of the cost of the commercially available system we had found. The current focus of our open science work is on open hardware for the characterisation of solar cells, from simple current–voltage characteristics to more sophisticated optoelectronic measurements, hoping that many groups around the world working on renewable energies can benefit from this. I am really excited to participate in GOSH this year!

More information on our research is on https://www2.physics.ox.ac.uk/research/afmd-group 1

- ## Moritz v. Buttlar – LabLab UG|Germany

Hi, my name is Moritz von Buttlar, and I'm a physicist from Leipzig, Germany. My involvement in open science hardware started 15 years ago when I participated in the OpenEEG project to develop a low-cost device to measure brain waves. After studying physics, environmental ethics and public policy and working at the university in different fields (plasma physics, acoustic microscopy of cells and bioreactors) as well as in a startup, I decided to start a small electronics company focused on GOSH measurement equipment.

The first project is a potentiostat for electrochemical (bio)sensors. At the conference I'm looking forward to connect with developers of other projects (e.g. lab robotics, microfluidics and opendrop etc., but also environmental sensing) and to find potential users and collaborators. The long-term goal is to replace the widely used ELISA systems with something better and open source…

- ## Nakka Sai Bhaskar Reddy – NGO|India

I am Dr Sai Bhaskar Reddy Nakka, from Hyderabad, India. I have been contributing to the design process of products relevant to millions of people in the areas of Rural Energy: low cost biomass cookstoves (~50 designs) http://goodstove.com; soil fertility using biochar; and many other applications such as sanitation, green buildings, biochar compost bins, floating gardens, etc.; and technologies for conversion of waste biomass into biochar. http://biocharindia.com. I adopted Low-cost sensors +Arduino/GSM/etc. for water use efficiency in irrigation canals and on-farm, and designed rainwater harvesting systems, too. I believe the principles of GOSH, participated in GOSH 2009 held at Banff, Canada. I have declared all the above work, my books and podcasts as open knowledge http://okgeo.org, as I am against patenting things which are relevant to millions of people. I am very excited to meet the GOSH family, to learn from global happenings and share my experiences, and am looking forward to partner with similar organisations http://saibhaskar.com

- ## Oliver Keller – CERN / UniGe / Hackuarium | Switzerland

I'm Oliver (@0zelot, ozel@github), currently doing a PhD with the University of Geneva in Switzerland. Born and raised in Munich, with main backgrounds being engineering & applied physics, I worked professionally with embedded systems (Arduinos, RPi and the like) before switching to academia. I consider myself a solder iron ninja and pragmatic programmer by passion, so I really like both HW & SW. After I joined CERN 5 years ago, I got into radiation

detection and teaching tools for visualising and discovering natural radioactivity (hence my workshop on this). The line between intellectual property and published scientific methods seems pretty blurred to me, depending very much on the subject these days. I believe GOSH can improve this situation with guidelines and best practice examples.

Relevant projects:

- iPadPix: [paper](), All software components under my control are open. I'm currently working on a open hardware pixel detector platform to improve the situation and hopefully get more people into using this pretty unique tech.
- Living Instruments, doing experimental music with electronics & sensors by exploiting yeast, micro-organisms and particles [wiki@Hackuarium](), [video of last performance]()

● Palok Biswas (Pollock) – SOLshare & LEAP | Bangladesh

I am Pollock from Bangladesh. I graduated from the University of Nottingham in Mechatronic Engineering, and I have worked with Tech Academy where I researched and taught schoolchildren robotics, electronics, and programming from open-source platforms. I have also taught children from indigenous tribal communities in Bandarban, one of the most remote and impoverished places in Bangladesh.

I co-founded a nonprofit company, LEAP, where we developed a low-cost plastic recycling machine following the open-source blueprints of Precious Plastic. We are working to raise awareness about plastic pollution and optimizing and improving the design of the recycling machines. Alongside open source projects, I am also working full time as a Research Engineer at ME SOLshare. SOLshare is a social enterprise and it interconnects rural households with Solar Home Systems in a smart solar microgrid and allows users to trade electricity with their neighbors. It monetizes excess solar energy along the value chain in real time with mobile money and empowers communities to earn a direct income from the sun.

● Paula Pin Lage – Pechblenda lab and Hackteria network|Spain

A Transhackfeminist performer and researcher, who has a strong inclination towards research and experimentation processes with collective and free technologies, my active participation in the lab Pechblenda and Transnoise, besides my social ideals and my work as a noise performance and workshopologist, has taken me to many spaces and contexts, specifically to the point of starting to collaborate in 2012 with Hackteria, a Biohacking network.

Since last year, I have been designing and fabricating the devices for a Mobile Lab BIOTransLab and developing a line of hardware (HardGlam) for a Gynepunk project that is used for autonomous gynecology/ecology practices and investigation. As my knowledge in electronics is based on open source and DIY, the devices included in the laboratory are portable replications of a microscope, a speculum done with a 3D printer, an incubator, PCR, centrifuge …

Plants, microorganisms and other sources of alternative energy result in a complex web of interactions that fuses transversely machines and plant and animal organisms with the cosmos, and reveal a transfeminist queer ecology.

Networks and projects with which I have been involved:

https://prototypome.gridspinoza.net/index.php/Prototyp-ome_autoresidence

http://jellypin.hotglue.me/ visual map of projects, reading from right to the left, from individual to collective body (tentacular connexions)
http://hackteria.org/
biohacker biopunk network and wiki to document all the process and DIWO projects from hardware to wetlab
http://calafou.org
http://wiki.calafou.org/index.php/Pechblenda
collective space for autonomous free and open tech/nature projects
Hardlab TransHackFeminista – lab0rat0rio experimentaci0n bio-electr0-química
http://pechblenda.hotglue.me/   http://network23.org/pechblendalab/
http://biosensing-blog.tumblr.
plants queer microorganism beings more than Human... machine interactions (2012-2013) photosynthesis love

http://transnoise.tumblr.com/
http://akelarrecyborg.tumblr.

- Pierre G Padilla-Huamantinco – Universidad Peruana Cayetano Heredia / Institute of Tropical Medicine "Alexander Von Humboldt" / Biomakers Lab|Peru

I'm an Electronic Engineer with a Master degree in Biomedical Informatics in Global Health. I have also done some studies in Administration and Synthetic Biology. My research is focused on the design and development of open science hardware and, in particular, its application in the field of Public Health. My last projects have focused on the development of low-cost devices for monitoring and communication, and also open-source tools for the detection of infectious diseases. Currently, I'm co-director of the Health Innovation Lab from the Institute of Tropical Medicine Alexander Von Humboldt (Lima, Peru) and, lecturer and researcher in the School of Engineering from Universidad Peruana Cayetano Heredia. Director and Biohacking Enthusiast at Biomakers Lab and Peru coordinator of Syntechbio Network. Member of TECNOx, a community which promotes and develops open technologies in Latin America and the Caribbean.

- Prayush Bijukchhe - Karkhana Pvt. Ltd. Nepal|Nepal

I'm from Nepal. I am a third year undergraduate studying IT, and love coding and working with PI's and arduinos. I also work at an education institute called Karkhana where we teach students(age: 8-13yrs) to use these kinds of open source hardware and software.

- Rachel Aronoff - Hackuarium|Switzerland

I am a biologist and (relatively) newbie biohacker. I love open science and want to encourage citizen science, especially in the context of avoidable risks to our 'genomic integrity' (a dynamic 'big picture' concept meant to include all the molecular genetic details of cells, for public health). I have been working to 'open source' classic DNA damage detection methods (the comet cell assay and the micronuclei assay), so anyone can look in their own cheek cells for signs of DNA damage. As founder of AGiR! (Action for Genomic integrity through Research!) and president of the association Hackuarium, I am very lucky to have transdisciplinary teams inspiring me to do more…

- Rachel Hu - 3D Druckzentrum Ruhr|China

I'm Rachel Hu, a Shenzhen based Industry 4.0 Artist. (QueenPenelope on WeChat)
I'm building an AQI Asian network called Citizen Q, based on luftdaten and open sense box in Germany. I'm doing imperial research to improve the software and develop new open hardware. On the side, I do workshops on building the environment stations. I would love to meet all the contrasting characters of GOSH. I plan on finding more collaborative partners on new OScH projects.

- Rockets Xia - Mushroom Cloud MakerSpace|China

I am Rockets Xia from Mushroomcloud Makerspace Shanghai.
Mushroomcloud is a makerspace in Pudong Shanghai China, where we try to spur the maker spirit in China. We have cooperated with Green Seed and DFRobot to make a KnowFlow water monitor system. We hope the KnowFlow system can help people know the flow, more conveniently and easily. I hope more people can help KnowFlow grow and develop from this meeting.

- Ryan Fobel - Sci-Bots |Canada

I am a biomedical engineer and co-founder of Sci-Bots Inc., based in Kitchener-Waterloo, Canada. I got involved with open-hardware while studying for my PhD at the University of Toronto, releasing plans for the original DropBot (a digital microfluidic platform for automation of biology and chemistry) in 2013. During my graduate studies, I helped more than 20 researchers from around the world to build these systems which are used for applications ranging from cell biology to environmental testing and synthetic biology. Post graduation, I helped lead two successful field-trials using DropBots to test for measles and rubella antibodies in fingerprick blood samples in Kenya (2016) and the Democratic Republic of the Congo (2017). I recently co-founded a company (http://sci-bots.com) where I continue

to collaborate with many others in the GOSH community to achieve the shared vision of programmable, miniature biology labs that fit in the palm of your hand.

- ● Saad Chinoy – Engineering Good, Sustainable Living Lab, Singapore Makers Association, Global Innovation Gathering, also Independent|Singapore

  - I am Geek, maker, inventor of quirky things like the "Caffeinator" (see [MakerShare](#)) and the world's first Butt-on Activated #SelfieBooth, from Singapore
  - Contributing for [careables.org 3](#) and with the Global Innovation Gathering ([GIG](#)), currently fascinated with the 3D printed "waterscope" microscope from the raspberryPi tech perspective. That, and the bobtail squid!
  - Looking forward to geeking-out(!) with innovators at GOSH. Hoping to connect with co-developers, co-creators, co-lab-rats for hardware prototypes for a couple of quirky but technically challenging ideas.

I also have a day-job that often gets in the way of fun and interesting things but it's in e-books and digital publishing in Singapore, see [Tusitala Books](#) and the [Storytellers' Kitchen](#)

- ● Sam Kelly – ConservationX|US

I am an engineer working for Conservation X Labs (from Rotorua, New Zealand), focusing on developing technology for conservation purposes. The projects I currently work on range from a genetic diagnostic tool for identifying species, a physiological tag for marine animals and an autonomous boat platform.

- ● Sam Sulaminov – Octanis | Switzerland

I was born in Uzbekistan, and grew up in Australia and Switzerland. Currently working on replicating, remixing and creating open science instruments in an association called Octanis, we've previously made an open source [rover 4](#) that went to Antarctica and now we're working on [helping 1](#) biologists study Barn Owls using RFID and load cells. On the side, I also work on fluorescence detection and microfluidics, which I'm hoping to share at GOSH, so we can maybe come up with a good open library of microfluidic parts.

- ● Samuel Raymond Davies – Hacklab Foundation | Ghana

Samuel Davies is Programs and Logistics Lead for Hacklab Ghana.
He is very passionate about DevOps, cloud architecture and blockchain development.
Samuel is also very interested in the core skills of software engineering and has competed in several hackathons. He volunteers for NGOs in the Technology Education space.

Social: @draysams

- ## Shan He – KnowFlow|China

I am Shan He from Guangzhou. I live in a eco-friendly community and teach science in a local school. My previous work regarding environmental injustice investigations brought me to Public Lab. Currently, we are organizing the first China Barnraising on our island. Also with Rockets we develop KnowFlow, not only water monitoring hardware, but also open science education in China.

I enjoying cooking, dancing, making and sleeping. currently practise stopping.

- ## Shannon Dosemagen – Public Lab|US

I'm Shannon Dosemagen (@sdosemagen on Twitter)! I work with an organization based out of the United States called Public Lab (publiclab.org or @PublicLab). We support communities and groups around the world in asking questions about their environment and health through processes we called "community science." Open hardware tools and the methods built around them are key to our work. At GOSH this year, I'm going to be running around making sure everyone is having an awesome experience, so I'll be excited to meet all of you one-on-one! I'm always interested in learning from others about community science work they are doing, but I'm especially interested in building connections at this GOSH that help move forward some of the items in the roadmap related to changing policy.

- ## Shubhi Saxena – Innovation Garage|India

I am Shubhi Saxena – a software developer and data scientist based out of India. I started a makerspace called Innovation Garage, NIT Warangal while in college and it's currently running in its 4th year. (I have graduated from college and am a mentor for Innovation Garage now). To date, we have won hundreds of competitions, conducted hundreds of workshops, 10+ hackathons, etc. for students in and around college. Recently, we collaborated with researchers from Cambridge to work on Drone Surveillance and Image Processing. Lots of interesting projects in the pipeline there.

Now ,I want to start a makerspace in Hyderabad – the city where I live. I am looking for ideas to make hardware more open and accessible to citizen scientists and farmers of India, eventually leading to Grassroot Innovation 2.

- ## Tamara Matute Torres – TecnoX / Pontificia Universidad Católica de Chile|Chile

I am based on PUC Chile, where I am doing my PhD research focused on development of open resources (DNA, Hardware and software) for the early detection of invader species in hydric ecosystems. I am on the organization of TECNOx because I think that open source technologies have great power for the empowerment of people in solving the problems of their communities and to generate collaborations between different kinds of social characters. Also, I am working on the development and application of open technologies to new educational approaches (e.g. FluoPi).

- Tobias Wenzel, Nickname "Tobey" – Journal of Open Hardware; EMBL Heidelberg|Germany and Chile

I am a post-doc scientist at www.EMBL.org. In my research, I work on the bacteria in our gut (microbiome) with genomics in droplet microfluidics. I also build and promote open hardware. I was part of both previous GOSH meetings and am excited to meet you.

As one of the main outcomes of the first GOSH at CERN, we founded the Journal of Open Hardware. I am editor-in-chief together with Luis Felipe R. Murillo. Have a look at it and consider publishing your project(s) there! You are also welcome to join our open hardware communication initiative as editor, reviewer or other supporter.

Before the Journal, I founded the Open Source Hardware documentation standard DocuBricks, and an online repository where the documentations are automatically rendered nicely. Check it out! Many GOSH projects are there and many of these documentations have been used in academic publications: https://www.docubricks.org/search.jsp

I am currently Open Knowledge Fellow of the Germany Wikimedia Foundation, together with @amchagas (https://de.wikiversity.org/wiki/Wikiversity:Fellow-Programm_Freies_Wissen).

Together with you, I want to liberate microfluidics by assessing openness of the field in a review article. We are also building relevant hardware pieces and test them. Here we focus on research grade equipment and not outreach style DIY projects. If you are interested, please get in touch and participate!

Also, let's exchange on twitter @MakerTobey!

- Tony Yet – Independent|China

I'm Tony Yet from Guangzhou, China. I am a writer and translator by profession, on the side, I am also a TEDx organizer. My involvement with open source / citizen science dates back to a blog 1 that I started a while back, which communicates citizen science in Chinese. I have since moved on to work on community building and some policy research at the Good Lab in Hong Kong. More recently, I am helping with the Public Lab Barnraising unconference in Guangzhou.

- Urs Gaudenz – Gaudi Labs|Switzerland

I'm Urs from Switzerland. My background is in micro-technology and innovation management, and I have been learning about biotechnology in recent years. I am founder of GaudiLabs (gaudi.ch), third space for third culture and last founder of Hackteria.org, a global network for open source biological art and generic lab equipment. I am teaching at Lucerne University of Applied Sciences and Arts, where I lecture on open innovation and MedTechDIY.

I was around when GOSH got started, just two short years ago at CERN IdeaSquare. I missed Santiago, so I'm excited to see how the community has grown and what people are working on these days.

Projects I have been working on lately include:

- OpenDrop – an open source platform for digital microfluidics (http://www.gaudi.ch/OpenDrop/)
- HiSeq2000 hacking - https://www.hackteria.org/wiki/HiSeq2000_-_Next_Level_Hacking 1
- DVD Laser Microscope - http://www.gaudi.ch/GaudiLabs/?page_id=652 1
- DIY Open Source Single Photon Generator and Detector - http://www.gaudi.ch/GaudiLabs/?page_id=718 2
- DIY Electrospinner – http://www.gaudi.ch/GaudiLabs/?page_id=328
- ChaosLooper Noise Synthesizer – https://gaudishop.ch/index.php/product/chaoslooper/

● Valentina Yepes Ardila – Biohacking Colombia|Colombia

Biomedical engineering student, Valentina is a young woman empowered with change and social transformation through knowledge dissemination and science literacy.

● Valerian Linus Sanga – STICLab|Tanzania

I am a Tanzanian Engineer, the co-founder and Director of Finance and Administration of STICLab in Dar es Salaam. I am a tech enthusiast and innovator, dedicated to building sustainable solutions using local available resources and tech, and utilizing Open Source/Science resources (Hardware and Software). I am also a Visiting Industrial Fellow at The University of Bath and a Visiting Researcher at Cambridge University, UK.

Together with my team and collaborators from the UK, we are working on building a 3D Printed Digital Microscope for Malaria Diagnosis with AI and Machine learning capability, a 3D Printed Digital Microscope for supporting science learning in both primary and secondary school throughout Tanzania.

I am one of the steering committee members of Africa Open Science and Hardware (AfricaOSH) Community, which is a platform that envisages Open Science and Hardware as very important in establishing locally adapted, culturally relevant, technologically and economically feasible production in Africa, to lead to equitable progress in scientific research, agriculture, health, education, conservation, technology and entrepreneurship.

● Vicky Xie – Shenzhen Open Innovation Lab|China

Vicky Xie is the director of International Collaboration at Shenzhen Open Innovation Lab (SZOIL). Before, she majored in English and started off her career in the international department of Shenzhen Industrial Design Association. In the past few years, she played a key role to build up the first Fablab Makerspace in Shenzhen. Vicky Xie was part of the FAB11

delegation in Boston and later helped to bring the gathering of worldwide experts to Shenzhen. Fascinated by hands-on maker skills herself, she graduated from the Fab Academy and learned to design, prototype and fabricate her hardware ideas. At SZOIL she facilitates the collaboration between the international maker community and the Pearl River Delta.

- ● Wei Li（李威）– Tsinghua University|China

Wei Li, scientist of Shenzhen Digital Life Institute, Shenzhen, China; Biologic Science graduate of Open FIESTA, Tsinghua University; Beginner of arduino hardware, interested in DIY models build up. I think OPEN CULTURE is cool, maybe it could someday change the world.

- ● Haijiao Xing (Elizabeth) – FOSSASIA|China

I am a program coordinator of FOSSASIA based in China. FOSSASIA aims to bring together an inspiring community across borders and ages to form a better future with Open Technologies and ICT. http://fossasia.com/ We develop Free and Open Source Software and Hardware and cooperating with the most forward thinking Open Tech innovators and companies of the planet. We create software and hardware for the Pocket Science Lab (PSLab) to miniaturize scientific laboratories, develop applications to organize events (Eventyay), Big "open" data tools (loklak), personal assistants (SUSI.AI), an auto-generator for Linux images (Meilix), a popular FOSS imaging app (Phimp.me) and many more. PSLab is a FOSS/Open Hardware extension for your smartphone or PC. It enables you to measure all kinds of things by connecting it to your phone or PC via USB. You can use it as an Oscilloscope, Multimeter, Frequency counter, Power Source, Logic Analyzer, Wavelength Generator, Luxmeter, Barometer and many more. Use our Android or desktop app to collect and view the data. And, you can even plug in hundreds of compatible sensors to the PSLab pin slots. What experiments you can do is just limited by your imagination! ^_^

- ● Yamile Minerva Castellanos Morales – Scintia|Mexico

I am a co-founder of Scintia, a startup that develops low-cost synthetic biology hardware and its open versions so that anyone can learn and research easily and quickly in synthetic biology and biotech. Also, I am an engineer in biotechnology with minor in molecular biology, with an interest in STEM education. Through Scintia, I am developing educational content on synthetic biology for high schools, and also developing workshops for the mexican DIYbio community. Through frugal innovation we designed more accessible equipment for the Latin American region. I am also a biohacker and I am working to open a community laboratory in Monterrey (Mexico). Through this project we make scientific dissemination through events such as talks, bioart exhibitions and workshops. Recently, I organized a bioart exhibition at the contemporary art museum in the city of Monterrey, inspired by

bioluminescence. The centerpiece was a beer (only for exhibition) made with a modified yeast to express GFP, based on speculative design of a futuristic beer. We work on the regulatory framework for biological activities and open the way and guide others to get involved ethically and responsibly. This 2019, I'm organizing more bioart exhibitions

- ● Yanick Kemayou – Kabakoo – The House Of Wondering|Mali

Hi world! Nice to meet you :-) I am yk, a stubborn dreamer, heavy grinder, social scientist, and entrepreneur. In academia I have been most recently in charge of the French-German Master in Business Administration at the Sorbonne in Paris. What brings me to the GOSH community is the open science lab "Kabakoo – The House Of Wondering" (www.kabakoo.africa) which I have founded to work towards my vision of a better Africa. Kabakoo is Mali's first open-science lab. Our core features are inclusiveness and sustainability.
Our most relevant recent project is http://respire.kabakoo.africa, West-Africa's first citizen platform for monitoring air quality. We are currently working on biogas devices and some other environment-related projects.
I look forward to experience sharing and maybe even to some collaborations with other members of this amazing GOSH community! Thank you :-)

Yao Cheng – 北京乐舟博雅教育科技有限公司|China

Appendix 2: GOSH Code of Conduct

The Gathering for Open Science Hardware (GOSH) is a diverse, global community working to enhance the sharing of open, scientific technologies.

We strive to make open science hardware open to *everybody*, regardless of scholarly or professional background, gender identity and expression, sexual orientation, ability, physical appearance, body size, race, age, economic background, country of origin or employment, religion, and other differences. Because we come from different backgrounds, it is important to be intentional about providing respectful, equitable spaces — both online and in person — for our community to come together and engage in constructive, respectful discourse. As our manifesto states: GOSH is used for peaceful purposes and causes no harm.

GOSH is equitable. Equity is different than equality; equality is about treating everyone exactly the same, while equity recognizes that everyone does not start from the same position and so treating everyone the same may leave them in the same uneven positions they began in. For this reason, we are intentional about actively reducing the inequitable barriers that stand between science and those who create, use, and learn from it.

This code of conduct applies to all GOSH spaces, both online and in person.

While we operate under the assumption that all people involved with GOSH subscribe to the GOSH Manifesto and the values laid out above, we take Code of Conduct violations very seriously. Therefore, individuals who violate this Code may affect their ability to participate in GOSH, ranging from temporarily being placed into online moderation to, as a last resort, expulsion from the community or in-person events. If you have any questions about our commitment to this framework and/or if you are unsure about any aspects of it, email organizers@openhardware.science and we will provide clarification.

How It Works

This Code is an effort to maintain a respectful space for everyone and to discuss what might happen if that space is compromised. Please see the guidelines below for community behavior at GOSH 2017 in Santiago.

We listen.

We begin interactions by acknowledging that we are part of a community with complementary goals. When something has happened and someone is uncomfortable, our first choice is to work through it through discussion. We listen to each other.

For active listening, we ask questions first, instead of making statements.

We give people time and space to respond.

We appropriately adjust our behavior when asked to.

We know that repeating hurtful behavior after it has been addressed is disrespectful.

We avoid this ourselves and help others identify when they are doing it.

We practice consent.

At in-person gatherings, everyone's physical space must be respected at all times. We do not touch other people without asking first — this includes physical greetings such as hugs, handshakes, or kisses, since not everyone is comfortable with the same type of touch..

Ask first.

We respect everyone else's right to walk away at any time.

If you see or experience a violation of consent on a GOSH platform or at a GOSH event, please contact the GOSH organizers in person or on organizers@openhardware.science.

Note that many forms of harassment do not look like physical or verbal abuse, but still fall into this category. Non-consent can include exhibiting sexual images in public spaces, deliberate intimidation, stalking, following, photography or recording without permission, sustained disruption of talks or conversations, inappropriate physical contact, and unwelcome sexual attention.

Examples of in-person community behavior

Do	Don't
Ask permission to take pictures of and post about others on social media (*see Media Consent, below*).	Do not upload photos, tag or mention others online without their consent.
Speak your own narrative, from your own unique experiences and culture.	Do not imitate the cultural expressions of groups you are not a member of, or dismiss people's experiences as illegitimate or merely personal.
Use accessible language to talk about your area of expertise. If others in the group seem confused, slow down; stop and ask for input.	Do not present information in a way / language that no one else in the room can understand, with no attempt to include others in the discussion. Accessible language is part of the GOSH manifesto.
Give everyone a chance to talk, only interrupting if absolutely necessary – for example, for Code of Conduct violations or time updates.	Do not repeatedly disrupt a discussion.
Stop, listen and ask for clarification if someone perceives your behavior or presentation as violating the Code of Conduct.	Do not ignore or argue others' request to stop potentially harmful behavior, even if it was an accident or you don't mean it as it is being interpreted.

Use words that accurately describe the situation rather than culturally or socially loaded terms – For example, "The wind was ridiculously strong!" instead of "The wind was crazy!"	Do not use disability and mental/emotional health terminology to describe a situation metaphorically, even if it seems normal to use it.
Ask someone before you touch them, even when joking or greeting, unless the other person has given verbal consent. Hugs, cheek kisses, and handshakes are normal greetings in some cultures, but not in all cultures.	Do not initiate or simulate physical contact without consent, even if it seems normal.
Disengage and find another activity if someone did not invite you and is not engaging with you.	Do not violate personal space by continuing your physical presence into private spaces without consent.
Use an even tone, rate, and volume of voice when disagreeing. Note that differences will be common, and some will be irreconcilable in a diverse movement.	Do not verbally or physically abuse, harass, yell at, or intimidate any attendee, speaker, volunteer, or exhibitor.
Use the pronouns people have specified for themselves.	Do not purposely misgender someone (ie, refusing to use their correct gender pronouns) after they have told you their correct pronouns.
Step up and comment when you see violations occur by emailing organizers@openhardware.science.	Do not expect that people who are subject to Code of Conduct violations are comfortable or able to address or report them themselves.

Additional guidelines for online community behavior

Online modes of interaction involve large numbers of people without the helpful presence of visual cues. Because of this, respectful and self-aware online conduct is especially important and difficult. In addition to the Code, which remains in play in online spaces, our community has created specific guidelines for online interactions. If someone violates these guidelines, someone from the Moderators group (currently GOSH organizers) will place them into moderation by changing that person's posting permission on the relevant list or forum, on the website, or both. Our triple notification standard for moderation means a point person from the Moderators group will 1) email the person directly with a brief explanation of what was violated, 2) send a summary email to the rest of the moderators group, 3) if it happened on a public list (vs a website), notify the list that one of our members has been placed into moderation with a brief explanation of what is not tolerated.

If you wish to begin the process of getting out of moderation, respond to the email sent to you from organizers@openhardware.science.

Do	Don't
Stay on topic to make long threads easier to follow.	Do not send unnecessary one-line responses that effectively "spam" hundreds of people and lower the overall content quality of a conversation. (Exception: expressions of appreciation and encouragement!)
Start a new thread to help others follow along. Important if your response starts to significantly diverge from the original topic.	Do not respond with off-topic information, making it hard for the large group of readers to follow along.
Write short and literal subject lines to help the readers of the list manage the volume of communication.	Humor and euphemisms in subject lines are easily misunderstood, although enthusiasm is welcome!
Mind your tone. We are not having this conversation in person, so it is all the more important to maintain a tone of respect.	Do not write in an aggressive, disrespectful or mocking tone. Note: writing in all caps is regarded as shouting.

Media Consent

There will be a media release for GOSH 2017. If you do not wish to be photographed or sign the release, you are responsible for placing stickers on your nametags, and/or raising your hand in the moment to alert photographers to move you out of frame. We are happy to accommodate you.

If you are taking a photograph, let people in the room know.

Always check with parents about posting anything with minors, and never post the name of a minor in conjunction with their photograph.

How To Report A Problem

In Person — Safety Officer or GOSH Organizers: If you are at a GOSH event with a designated Safety Officer, feel free to approach them or an organiser.

Via email — GOSH Organizers: If you experience or witness something, you can also email the organizers at organizers@openhardware.science.

Reporting should never be done via social media.

Consequences

Anyone requested to stop behavior that violates the Code of Conduct is expected to comply immediately, even if they disagree with the request.

The GOSH organizers may take any action deemed necessary and appropriate, including immediate removal from the meeting without warning.

The organizers reserve the right to prohibit attendance at any future meeting.

By attending GOSH events and posting in our online forum, you are agreeing to this code of conduct.

This Code of Conduct was created collaboratively and drew from other CoCs, including those by Public Lab, International Congress of Marine Conservation 2016, and TransH4CK.

Appendix 3: GOSH 2018 Media and Online Coverage

Journal Articles

Maia Chagas A (2018) Haves and have nots must find a better way: The case for open scientific hardware. PLoS Biol 16(9): e3000014.

PLos Blog

Boosting Open Science Hardware in an academic context: opportunities and challenges

https://blogs.plos.org/plos/2019/01/boosting-open-science-hardware-in-an-academic-context-opportunities-and-challenges/

Open FIESTA Wechat

https://mp.weixin.qq.com/s/j7qXa6NsLdPc4OEFw8mTxA

Interview of GOSHer

https://zhuanlan.zhihu.com/p/48503334

SDGo Wechat

https://mp.weixin.qq.com/s/fdhGyaAq3DH7F9G3qzEQnA

**Post GOSH 'Local' Media Coverage
(Global Open Science Hardware * Shenzhen Maker Week)**

TV:

1. Shenzhen News: finance and economics channel

http://www.cutv.com/v2/shenzhen/b/b/a/2018-10-16/b8785ec25a4b418a97b2704d8131b52c.shtml

2. Shenzhen News, reported on October 14th, 2018,

https://www.iqiyi.com/v_19rr5yjpf0.html

3. Oct 16th, 2018, Maker TV

https://v.qq.com/x/page/h0749a4ykz0.html

4. SZTV, Oct 12th 2018

http://static.scms.sztv.com.cn/ysz/dsdb/szws/ssxw/28012738.shtml

Newspapers:

1. Shenzhen Evening News, October 15th, A06,

http://wb.sznews.com/PC/layout/201810/15/node_A06.html#content_481325

2.Guangzhou Daily, October 16th, SZA16

http://gzdaily.dayoo.com/pc/html/2018-10/16/content_100978_551911.htm

3.Shenzhen Special Zone Daily, October 15th, A07

http://sztqb.sznews.com/PC/content/201810/15/content_481202.html

Websites:

1. China Daily:

http://caijing.chinadaily.com.cn/chanye/2018-10/16/content_37078127.htm

2. Southern Metropolis Daily

https://m.mp.oeeee.com/a/BAAFRD000020181014109290.html?wxuid=ogVRcdO-znHi90MabgZzH1Dn7XvA&wxsalt=9d8ed1&wxOauth=1

3. Shenzhen Evening News

http://wb.sznews.com/PC/content/201810/15/content_481325.html

4. PhoenixNet

http://biz.ifeng.com/a/20181016/45192326_0.shtml

5. Shenzhen Government Online

http://www.sz.gov.cn/cn/xxgk/zfxxgj/zwdt/201810/t20181015_14282110.htm

6. Tencent News

http://view.inews.qq.com/a/20181015A1IWTT00

4. ZAKER

https://app.myzaker.com/news/article.php?app_id=11985_zk_app_column_block_10055&pk=5bc2d8a31bc8e0457a0000c8&sharechannel=wx

5.   ZAKER

http://www.myzaker.com/article/5bc2d8a31bc8e0457a0000c8

One more
https://mp.weixin.qq.com/s/tMbk0Yn_N6KuCF2MHek2YA