

FABO X ACADEMY: WINTER BOOTCAMP

中国数制工坊 “数制学术 X” 冬令营

Fablab O Shanghai's "Fabo X Academy China", is a modular course about digital manufacturing and rapid prototyping. The course is based on MIT's "How to Make (Almost) Anything" course and the Fab Academy global seminar. Fablab O has been iterating its Fabo X Academy for many years through experience teaching collaborations with schools and universities, cooperating with institutions implementing fab labs, its Fabo X Academy three weeks seminar, hosting digital fabrication competitions, and numerous symposiums. The Winter Bootcamp is geared toward educators desiring to understand, experience and improve their implementation of STEAM related activities in teaching practices. Additionally, the Winter Bootcamp will introduce and extend an invitation to Fablab O's concept of a regional collaborative network of fab labs and STEAM educators within China.

FablabO Shanghai / 中国 “数制” 工坊的 “Fabo X Academy China / 中国智造学术 X” 是一个数字化制造及快速成型技术的课程。该课程基于麻省理工学院 “How to Make (Almost) Anything / 如何智造万物” 课程和 FabAcademy 的全球课程。 Fablab O 通过与全球其他 fablab 以及各高校合作的经验，还有主办数字化制造竞赛和众多的研讨会，一直在更新迭代 “中国智造学术 X” 的课程。本次冬训营适合于希望了解、体验和改进教学实践中的 STEAM 相关活动的教育者。此外，冬训营将向国内的 fablab 和从事 STEAM 教育的参与者们介绍并扩大一个 Fablab O 的区域协作网络的概念的邀请。

WHY A BOOTCAMP FOR EDUCATORS?

By understanding the basic concepts upon which Fablab O built its practice, educators will experience how Fablab O create and organize its courses at a regional level and they will be able to run them in their own site as local instructors.

为什么为教育者举办冬训营？

通过理解 fablab O 实施实践的基本概念，教育者会体验 Fablab O 怎样创造和构建它的在地域的课程体系，然后教育者们将能够作为当地指导者了解实验室的开展，开发自己的课程体系，并拓展区域及全球网络。本次冬令营是营建中国数制工坊联盟及推进课程建设的第一步。

KEY CONCEPTS / 核心概念

- **Fablabs enable STEAM education worldwide**

More than 1500+ fablabs in the world, connected on a global network, are creating STEAM contents and bringing them to schools and students.

- **Fablab O created a STEAM education platform in China**

Fablab O is the first fablab established in a university in China to focus on education and it is developing a Fablab regional network with Chinese characteristic that will be able to bring the global experience into the Chinese system.

- **Fablab O shares contents and practices to run a fablab**

Over the years and with the involvement of leaders from the global network, Fablab O acquired an extended experience on opening, running and managing a fablab, and all this material is shared among the new and old members of the regional network of China.

- **More educators need to be trained to be leaders in the regional network**

Machines, courses and experience are not enough to make the regional network of China bigger and stronger: more trained professionals are needed. The Fablab O's Bootcamp objective is to give educators the skills needed to be a leader in one of the future fablabs in the regional network of China.

- **Contents are generated locally and shared regionally**

As part of the regional network of China, educators will have access to the education contents created in Fablab O headquarter with video conference classes, and when they create contents locally in their own site, they will be able to share them with the regional network and also with the global network.

Fablab 提供全球范围的 STEAM 教育

全球超过 1500+ 的 fablab 通过网络互连，正在创造 STEAM 的内容并将它带到学校和学生。

Fablab O 搭建了一个中国 STEAM 教育的平台

Fablab O 是中国第一个开放创造实验室，它是一个建立在大学并关注于教育的 fablab，FABO 在 MIT 的合作基础上，试图营建一个具有中国特色的当地 fablab 网络，将当地经验回馈到国际网络。

Fablab O 分享内容和实践去运营一家 fablab

多年来随着全球网络的领导者的参与，Fablab O 获得了一个更多的经验去开展，运营，管理一家 Fablab，并且所有的材料分享给中国当地的一些网络联盟。

更多的当地网络的教育者需要被训练成领导者

机器、课程还有经验是不足以让中国的当地网络变得更大更强：需要更多的受到训练的专业人员。Fablab O 冬令营的目标是让教育者具备成为一个未来中国地区网络的 fablab 领导人的一些技能。

内容由当地产生分享给地域

作为中国地区网络的一部分，教育者能够通过视频会议课堂取得在 Fablab O 总部创造的内容，并且在实验教学的过程中创新适合本地的内容，的地点创造了当地的内容，同时通过在线平台，可以把内容分享给区域性网络或者全球网络。

BACKGROUND / 背景

The germ of fab labs started as a collaborative platform for exploring how the content of information relates to its physical representation. Leveraged by an open-source, share everything ethos, fab labs have quickly spread throughout the world. As of December 2017, there total 1205 official fab labs, worldwide. A fab lab (fabrication laboratory) is a small-scale workshop offering (personal) digital fabrication. A fab lab is typically equipped with an array of flexible computer-controlled tools that cover several different length scales and various materials, with the aim to make "almost anything". Recognizing the unique challenges within China and the profound advantages of open-source collaboration, Fablab O, China's first fab, has established a platform to install and manage new fab labs and a modular curriculum of STEAM related contents. Fablab O is raising a regional collaborative network of fab labs in China in which every school or institution with a fab lab will be connected, receive educational content from the global and regional network, and in turn share their local discoveries and content creation.

Fablab 起始于一个探索信息的内容如何与其物理表征相关联的协作平台，通过开源代码和分享一切的精神，fablab 迅速在全球范围内蔓延，截至 2017 年 12 月，全球共有 1205 家 fablab。Fablab 可以称为制造实验室，它是一个为个人提供数字化制造服务的小型工作室，fablab 里通常配备一系列灵活的计算机控制工具，涵盖了多种不同的尺寸和种类的材料，旨在“智造几乎万物”。鉴于中国国内独特的挑战性以及开源合作的深远优势，中国第一家“数制”工坊 Fablab O 已经建立了一个设置和管理新的 fablab 的平台，以及一个 STEAM 相关内容的模块化课程。Fablab O 正在筹建一个在中国的 fablab 的区域性协作网络，在这个网络中，每个拥有 fablab 实验室的学校和机构都将连接起来，接收来自全球和区域网络内的教育内容，然后分享他们在当地的发现和创作内容。

In October 2017, Fablab O organized the STEAM Education Symposium, hosted at Tongji University's College of Design & Innovation, to spread and promote innovation in the traditional education system. Throughout three intensive days, the event held a number of lectures, workshops and demonstrations helping hundreds of Chinese educators to deepen their understanding of how fab labs are helping their peers understand and implement STEAM education worldwide. Further, Fablab O fielded countless questions and challenges from the participating educators in regards to their experience with STEAM education. The FABO X Academy Winter Bootcamp has been formulated in direct response to these inquiries.

2017年10月，Fablab O 与中国教育协会联合在同济大学设计创意学院组织举办了 STEAM 教育的研讨会，传播和推动传统教育体系的创新改革。在紧张的三天期间，该活动举办了一系列的讲座、研讨会和展演，帮助数百名中国教育工作者深入了 fablab 实验室如何帮助他们和同行理解并实施全球范围的 STEAM 教育。此外，Fablab O 也从参与研讨会的教育工作者那里获得了许多有关 STEAM 教育经验的问题和挑战。“FABO X Academy / 中国智造学术”的冬季训练营将对这些疑问进行直接反馈。

OBJECTIVES / 目标

Fablab O's Winter Bootcamp will offer educators the opportunity to extend their understanding and experience with fab labs as an ecosystem for education through intensive seminars and technology-specific training workshops. The bootcamp is further intended to challenge the participants to take an active role in the definition and future development of the regional network in China, through discussion tables with local and global mentors and collaborative design sessions. The bootcamp culminates in participants creating new workshops generated through the training they received in digital fabrication, electronics and coding exercises across the week. These new workshops will be shared with all attendants and may be used for future education in their classrooms!

Fablab O 的冬季训练营将为教育工作者提供机会来加深他们对 fablab 的理解，通过深入的研讨会和特定技术的培训工作坊，增加实际操作经验，作为对教育生态系统扩展。训练营还旨在通过与当地和全球的导师协作设计会议的圆桌讨论，挑战参与者在中國区域网络未来的定义和发展中发挥积极作用。此次冬训营的高潮是让参与者们通过接受为期一周的有关数字制造、电路和编程的课程练习来创建新的工作坊，这些新的工作坊将与所有的出席人员共享，并可能在未来各自的教育领域中使用！

BOOTCAMP SCHEDULE & DETAILED CONTENTS / 冬令营日程安排

- **29 Jan, Monday:** Lecture and discussion / 1.29, 周一：演讲与讨论
- **30 Jan, Tuesday:** Hands-on training / 1.30, 周二：实践培训
- **31 Jan, Wednesday:** Hands-on training / 1.31, 周三：实践培训
- **1 Feb, Thursday:** Hands-on training / 2.1, 周四：实践培训
- **2 Feb, Friday:** Workshop development / 2.2, 周五：工作坊开展
- **3 Feb, Saturday:** Workshop finalization and presentation / 2.3, 周六：工作坊最终路演

GENERAL CLASS STRUCTURE / 总体课程架构

The principal for teaching is hands-on learning: keeping the theory short but dense before continuing on practical applications. The participant will be required to bring his/her own laptop, in good working order, with a mouse and basic softwares installed.

课程总则是动手学习：在实际应用前保持理论的简短充实。参与者需要带上自己的电脑，鼠标还有安装需要的基本软件。

BOOTCAMP GENERAL DAILY SCHEDULE / 冬令营时间安排

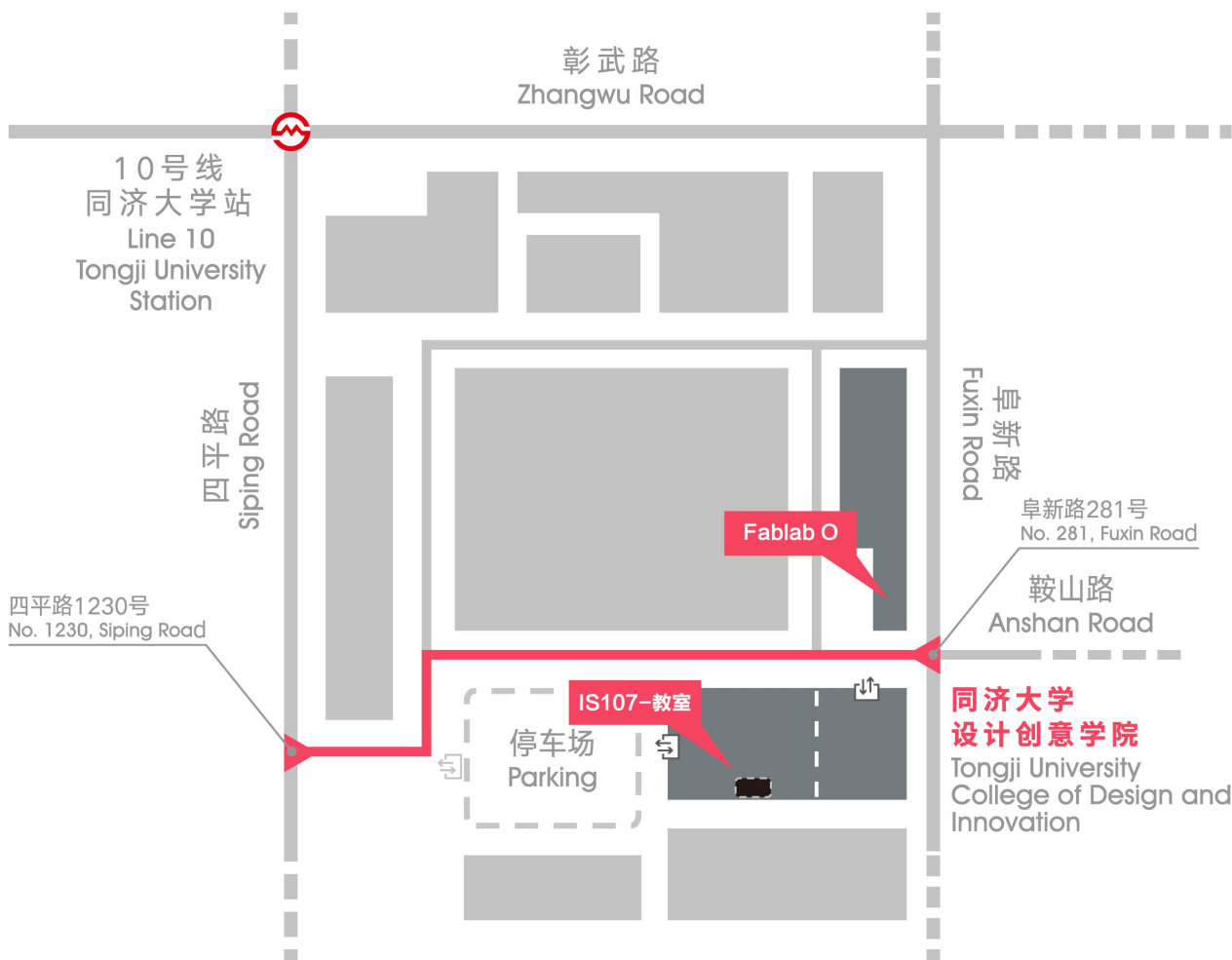
Daily activities begin at 9:00AM, with coffee brake at 10:30AM. Lunch brake from 12:00AM to 1:30AM. Afternoon activities from 1:30PM to 16:30PM with coffee brake at 15:00PM.

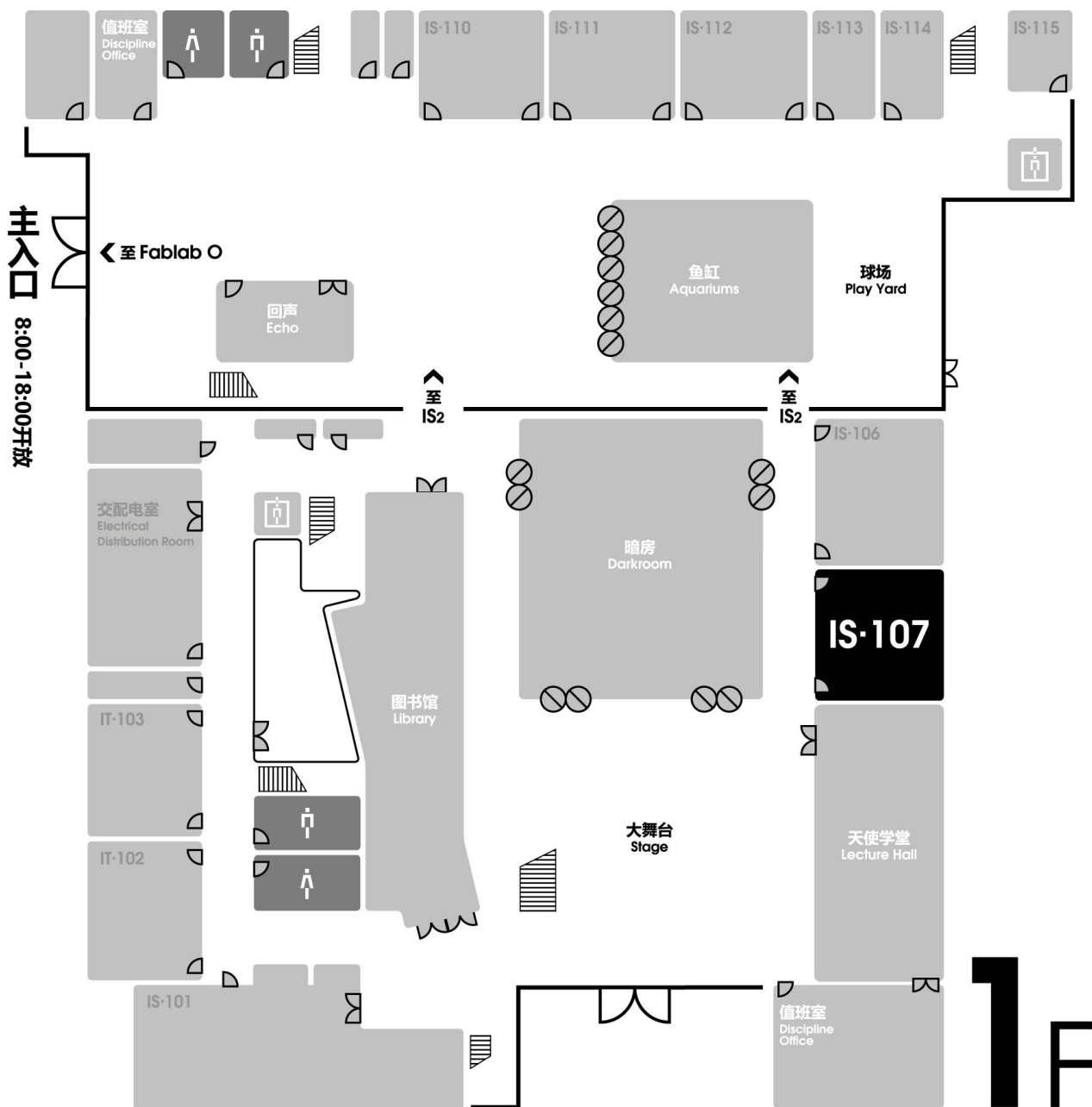
Schedule is subject to changes.

每日的活动 9am 开始，10：30am 有一个茶歇。午休从 12：00 到 1:30。下午的活动从 1：30 到 16:30，中间 15:00pm 有一个茶歇。日程安排可灵活变动。

FABLAB INFORMATION / FABLAB 信息

Wifi Network / Wife 名称: FablabO Password / 密码: fablabshanghai	People Director 主管: 丁峻峰 Jeff - 18621832152 Manager 经理: 薛喜荣 Rio Xue - 18621284185 Instructor 导师: Saverio Silli - 13524015379 Instructor 导师: Jtravis Russett Instructor 导师: 林世國 Kirk Instructor 导师: 吕翰林 Lü Hanlin
Address / 地址 281 Fuxin Rd, Tongji University, College of Design and Innovation (D&I), Yangpu, 200092 Shanghai 上海市杨浦区阜新路 281 号 同济大学设计创意学院	





DAY ONE, MORNING: LECTURES AND DISCUSSIONS

The morning will be dedicated to lectures and discussion from leaders in the global fab lab network and professional STEAM educators from China and abroad. The main focus will be the development of the regional fab lab ecosystem established by Fablab O in China.

第一天，上午：演讲和讨论会

第一天上午的内容将会是全球 Fablab 网络系统的领导者和国内外 STEAM 教育领域的专家来进行演讲和互动讨论，主要的关注内容是 Fablab O 在中国建立的区域性 fablab 生态系统的发展。

- **How does the fab lab education system work? What we do and how we do it.**

A videoconference lecture by Fiore Basile

What is the global fablab network? Fiore Basile, one of the leaders of the Fab Foundation will talk about how it started and spread, how the local labs are connected and contribute and benefit from the global network. He will show notable examples, success stories and how he is kickstarting new labs around the world. Fiore will also explain how we use online resources to coordinate the Academany and he will introduce the Fab Academy X program that was developed in India and other future plans.

Fablab / 数制工坊的教育系统是如何工作？我们都在做什么和如何做到这一点。

Fiore Basile 的视频演讲

内容概述：什么是全球 fablab 网络？，fab 中心的领头人之一 Fiore Basile 会讲述 fablab 是怎样开始的怎么传播的，还有各地 fablab 是怎么连接并在全球网络下做出贡献与获益的。他也会展示一些值得注意的例子，成功的故事，还有他是怎么在全球发起这些新的实验室的。Fiore 也会解释我们怎样使用在线资源与 Academany 合作并且他会介绍在印度开展的 Fab Academy X 项目还有一些其他的未来计划。

- **The future of the Chinese Fabo Network and how local educators and institutions can be a part of the movement.**

By Jeff Ding

Jeff Ding will talk about the business model of FABO and how it will impact the future of education in China, how to open a new lab and be connected in the regional network of China. It will be easy to open a new lab thanks to the large amount of information, resources and contents the FABO network will provide and each new lab will be able to contribute with their own locally generated contents.

未来的中国 FABO 网络，和当地教育者和机构怎样成为运动的一部分

丁峻峰主讲

内容概述：丁峻峰会讲述 FABO 的商业模式还有它会怎么样影响未来中国的教育，怎样开一个新的实验室并连接到中国的地区网络。多亏了 FABO 网络提供的大量信息资源等内容，开一间新的实验室不会是一件难事，并且新的实验室能够产生他们自己的当地内容作出贡献。

- **How to: run a successful fab lab! The fab lab philosophy and core values.**

By Saverio Silli

The lecture will show examples of fablabs around the world, how they are managed and what activities they run locally. It will show the fundamentals of running a lab and how they can be adapted to the local needs. It will explain the basic values of working in a fablab such as documenting, using and applying the open-source model, organizing the space, understanding and sourcing an inventory of materials and machines shared by every lab.

怎么去运营一家成功的 fablab，fablab 的哲学和核心价值观

SaverioSilli 主讲

内容概述：演讲会展示全球各地的 fablab 的例子，它们完成了什么还有举办了什么活动。会展示运营一个实验室的原理并且怎样适应当地需求。还会解释在 fablab 工作的基本的价值观，比如文件编辑，使用并应用开源模型，构建空间，理解并采购材料的存货清单还有每个实验室的机器。

- **How to use the fab lab tools and processes to teach STEAM education.**

By Jtravis Russett, Lü Hanlin and Kirk

In this talk Travis, Harry and Kirk will show their personal experience teaching STEAM education contents created in the fablab, especially showing how they used the machines and material available, how they used the fablab environment to research and test and then to prepare a workshop or class for primary, middle and high schools.

怎么用 fablab 工具还有步骤去展开 STEAM 教育

主讲人：Jtravis Russett, 吕翰林和林世国

内容概述：在这场演讲，Travis, Harry 和 Kirk 会展示他们在 fablab 总结的一些关于 STEAM 教育的经验，尤其是展示他们怎样用可以使用的机器和材料，他们怎样使用 fablab 的环境去研究和测试然后准备 workshop 还有给给高中，初中中小学的课堂。

DAY ONE, AFTERNOON: COLLABORATIVE DISCUSSION TABLES

In the afternoon, the lecturers and the participants will join tables focused on the morning subjects and participants will be encouraged to share their points of view and ideas, make questions, propose new arguments, define and prepare the contents for the coming activities in a collaborative way.

第一天，下午：讲座与讨论：协作讨论圆桌会议

下午，讲师和参会者将加入聚焦于上午科目的圆桌会议，鼓励参会者分享他们的观点和想法，提出问题，提出新的论点，共同为接下来的活动内容进行准备和定义。

DAY TWO, THREE AND FOUR: HANDS-ON TRAINING

Three days of intensive workshops, trainings and hands-on sessions to experience how the processes and tools within the fab lab can be used in the creation of STEAM education contents. The focus of the sessions is to experience the “learning-by-doing” approach and, in reflection, “teaching-by-doing”.

Each day the participants will experience a complete workshop about a different subject. They will learn specific techniques like laser cutting and 3D scanning, but at the same time the mentors will show them how a STEAM workshop is designed, prototyped and created. Special attention will be given to the definition of the inventory list, learning outcome and scheduling.

第二、三、四天：操作培训

三天的紧凑的 workshop,训练还有亲手实践的任务去体验什么样的步骤和工具可以创造 STEAM 教育内容。会议聚焦于体验“做中学”的方法和思考“在做中教学”。

每天参与者会体验一个完整的关于不同主题的 workshop。他们会学习具体的技术比如镭射切割机，3D 扫描，与此同时老师也会向他们展示一个 STEAMworkshop 是怎样被设计，开发原型与创造。特别需要注意材料清单的设定，学习的产出还有学习的时间安排。

WORKSHOP ONE – DESIGN AND LASERCUT A CUSTOM SEAL with KIRK

Make a seal with the laser cutter: the workshop begins with a design thinking session and will then move on to training on the laser cutter and on 2D design software. The participants will make a customized seal and will design a case to carry it.

工作坊 1 - 激光切割 DIY 个性印章 林世国

用镭射切割机制作一个印章：workshop 以设计思维会议展开，接着是镭射切割机的培训还有 2D 设计的软件。参与者会制造一个定制化的印章并设计一个盒子去装它。

WORKSHOP TWO - FROM ATOMS TO BITS AND BACK with TRAVIS

From Atoms to Bits and Back introduces the core concept of fab labs: our physical world (atoms) is nearly as malleable as our digital world (bits), in an engaging fun workshop using 3-D printing and 3-D scanning technologies. Participants will make something with modeling clay, 3-D scan it, modify it using Meshmixer, and print their modification. And again and again! Optimally, there are myriad methodologies to resolve making any thing!

工作坊 2 - 原子与比特间的交互循环 J.TRAVIS

我们用原子与比特间的交互循环来介绍 fablabs 的核心理念：在一个有趣的工作室，使用 3d 打印技术和 3d 扫描技术可以使我们的物理世界(原子)几乎和我们的数字世界(比特)一样具有可塑性。参与者将制作粘土模型，三维扫描自己的模型，使用 Meshmixer 软件修改，并打印出自己修改的模型。经过一次又一次地尝试，最理想的情况下，我们可以产生无数方法来解决任何问题！

WORKSHOP THREE – MAKE A MOOD INDICATOR with SAVERIO

Make a Shanghai, program it and make an input+output device to indicate your daily mood. Shanghai is a simplified Arduino clone, developed in Fablab O Shanghai. In the workshop the participant will assemble their own device with simple components, solder and program it with the Arduino environment, developing basic soldering skills and learning the fundamental programming workflow.

工作坊 3 - 制作一个情绪显示器 SAVERIO

焊接一个 shanghai 板，给它编程并制造一个输入输出设备区显示你的日常心情。

Shanghai 是在 Fablab O Shanghai.制作的一个简化的 Arduino 克隆版。在这个 workshop 参与者会收集他们自己的设备和一些简单的组件，焊接并用 Arduino 环境给它编程，培养基本的焊接技能并学习基础的编程流程。

DAY FIVE AND SIX: DESIGN AND PROTOTYPE A STEAM WORKSHOP

Over the final two days, the participants will be divided into teams and, supported by mentors, will design, develop, test and prototype a STEAM workshop that can be made in the fab lab. Special attention will be given to the brainstorming session and the definition of all the components of a workshop. The group must provide powerpoint introduction/slides, a bill of materials, the list of software/hardware. Optionally they can make a simple one-page html website that could be used to share their work with the network.

Designing a workshop will let the participant experience the fablab approach, apply the fablab philosophy and create exceptional STEAM contents that can be shared in the network.

第五、六天：设计并创建一个 STEAM 工作坊

在最后的两天，参与者会被分成组并且有老师指导，一起设计，开发，测试，设计一个可以在 fablab 里制作的 steam workshop 原型。

特别需要注意的是头脑风暴还有 workshop 的组成部分的设定。每个组必须提供一个 PPT，一些材料，一套软硬件的清单。可选项（可以制作一个简单的一个页面的网页）

设计一个 workshop 会让参与者体验 fablab 的方法，应用 fablab 的哲学并创造优秀的 steam 内容去在网络上分享。

DAY SCHEDULE / 日常安排：

- Groups formation.
- Brainstorming moderated by the mentors: Find a problem. Find a solution. Formulate proposal.
- At the end of the first day each group explain what they did so far to the others, mentors can give their suggestions.
- They can work overnight if they want.
- On the morning of day six, the groups must deliver their project before 12.30AM.

组成小组。

由导师主持的头脑风暴：发现问题、找到解决办法、规范提案。

第一天的最后，每个组向其他人阐述他们目前做了什么，导师可以给出建议。

如果愿意，可以通宵工作。

第六天的早上，每个小组必须在 12:30am 之前提交他们的项目。

Proposal requirements / 提交要求：

- Must use at least one of the techniques from the workshops.
- Must be easily replicated in any fablab (i.e.: use the general fablab inventory)
- Must use materials found in the fablab with fewest exceptions
- Group must provide powerpoint introduction (at least one slide), bill of materials, list of software/hardware, schedule and learning outcomes.
- Extra-credit: make a one-page html website.

必须使用至少一个从 workshop 中学会的技术。

必须可以在任何的 fablab 复制出来（用 fablab 里通常的材料存货）。

必须尽可能少用在 fablab 外的一些材料。

每个小组必须提供 PPT 介绍（至少一页）材料清单、硬件/软件的清单、日程安排还有学习成果。

额外加分：制作一个一页的 html 网页。

DAY SIX, AFTERNOON: PRESENTATION AND CLOSING CEREMONY

Each team will present its workshop prototype to the audience. The results and the materials will be shared among all the participants and be open to use in the future. The best workshop, elected by consensus of the mentors, will be awarded in the closing ceremony.

第六天，下午：演讲和毕业典礼

第六天，每个小组都会向观众呈现他的 workshop 原型。所有的成果和材料会被分享给所有的参与者，并且会开放使用。由共同的导师选出的最好的 workshop 将在毕业典礼被奖励。

MENTORS / 导师

Throughout the Winter Bootcamp, like the October STEAM Education Symposium, there will be numerous experienced mentors speaking, teaching workshops, and hands-on coaching participants. The mentors will be nationally and globally based experts offering a wide-range of perspective and experience teaching and developing STEAM programmes, starting fab labs, working alongside local and national institutions, and fostering thriving communities.

在冬季训练营的过程当中，就像 10 月份的 STEAM 教育论坛一样，将会有许多经验丰富的导师进行演讲、教授工作坊，以及指导参与者进行实践。导师将是国际化和全球领域的专家，提供广阔的视角和丰富的经验指导和研发 STEAM 项目，启动 fablab 实验室与地方和国家机构的合作，促进社区繁荣。

Junfeng “Jeff” Ding

Associate Professor, School of D&I, Tongji University; Deputy Director of Environmental Design; Founder of FABO | Shanghai, FABO | Playground.

He earned a dual master's degree in Architecture Design from Iowa University and Harvard University. He has been the creative design director of Atelier-iform. Since 2013, he has been the Fablab director of the School of Design and Innovation at Tongji University. He founded the Fablab O brand .

丁峻峰，同济大学设计创意学院，副教授；环境设计专业副主任；FABO|中国数制工坊，FABO PlayGround|中国“数制”乐园创始人；
本科毕业于东南大学建筑学，并获得哈佛大学设计学和爱荷华建筑学双硕士，任 Atelier-iform 创意设计总监，自 2013 年开始，担任同济大学设计创意学院 Fablab 主任,创办了 Fablab O 品牌。

Shih-Kuo Lin

Shih-Kuo Lin, nickname is Kirk.

Graduated from the Fab Academy 2017. His major is electrical engineering, and he is a senior high school teacher. He teach about making some interesting things such as go-kart, standbeast bicycle, record & play device, etc.

林世国，英文名 kirk，毕业于 2017 年的全球 Fab Academy 课程。他的专业是电子工程，他也是一个高中老师。他教授怎样做一些有趣的东西，比如卡丁车，“行走的怪兽”自行车，录音播放设备，等等。

Fiore Basile (意大利)

Fab Academy | Head of Global Systematic Academic Programs, Fablab Head of Cascina in Italy, Co-Founder of Fab Factory.

Fab Academy | 全球数制学术课程项目负责人，意大利卡希纳 Fablab 负责人，数制工厂 (Fab Factory) 联合创始人。

Saverio Silli

Graduated in architecture in Roma Tre University, Saverio Silli worked as an architect, while pursuing the academic career as a lecturer in Roma Tre's School of Architecture, for the classes "Visual Communication Design" and "Graphic Representation Methods".

Since December 2016 he is the Director of Courses at Fablab O Shanghai and Assistant Research Fellow in Tongji University's College of Design and Innovation in Shanghai, working as an instructor and developing new classes for the STEAM education.

Saverio Silli 毕业于罗马第三大学建筑学院，曾担任建筑师，同时在 Roma Tre 建筑学院担任讲师，担任“视觉沟通设计”和“图像表达法”课程。

自二零零六年十二月起，他是上海市 Fablab O 课程主任，同济大学设计与创新学院助理研究员上海作为讲师，为 STEAM 教育开设新课程。

J.travis Russett

J.travis Russett, founder of *bēstia—a laboratory for symbiotic life-machine exploration*. His work: *dishūBot*, a self-learning robot that paints Chinese calligraphy in water (featured in the 2017 Bay Area Maker Faire) and *Pure Imagination*, plant fed microbial fuel cells that will power our homes and much more. J.travis holds a Master degree in Architecture from UCLA and a Fab Diploma of the 2017 Fab Academy. Further, he is a researcher at Tongji University of Shanghai, developing STEAM education and outreach in a number schools and universities throughout Eastern China.

J.travis Russett，是致力于探索生命与机器共生模式的 *bēstia* 实验室创始人。*dishūBot* 地书机器人——能以水性涂料书写中国书法的自我学习型智能机器人（2017 年旧金山湾区 Maker Faire 特别精选作品）；以及 *Pure Imagination* 纯粹的想象力——能为人类家园提供电力的纯植物喂养型微生物燃料电池。J.travis 拥有加利福尼亚大学洛杉矶分校建筑学硕士学位，并且毕业于 2017 年度 Fab Academy 课程。

Harry Lv

A core member of Fablab O Palyground to study VR virtual reality technology, he published a number of digital design related academic papers. At present, the laboratory devotes itself to developing a digital design platform that makes work easy and efficient, and endeavors to improve students' innovative ability.

吕翰林, Fablab O Palyground | 中国数制乐园课程研发中心核心成员, 数字工坊研究 VR 虚拟现实技术课的优秀老师, 他发表了多篇数字设计相关的学术论文。目前实验室致力于开发出让工作变得轻松高效的数字设计平台, 为提高同学们的创新能力而努力。

LASER CUTTING STAMP INDICATOR

激光切割 DIY 个性印章

Tuesday 30th / 周二 1.30 - Kirk

ABSTRACT / 摘要

Design and make your own stamp with laser cutters and small saws machine to indicate what you want people to feel about you.

The stamp is an expression of Chinese culture and a traditional way of presenting personal style. In the workshop the participant will use 2D design software to design their own stamp and case. Using laser engraving and cutting to make their stamp. Finally, use a small saw machine to hand make the body of the stamp.

用激光切割机和小型曲线锯设计和制作属于你自己的印章，以展示你想要带给人们有关于你的感受。

印章是中国文化的一种表达，也是一种传统的呈现个人风格的方式。在研讨会上，参与者将使用二维设计软件设计自己的印章案例。使用激光雕刻和切割，制作他们的印章。最后，用小型曲线锯手工制作实体印章。

DESCRIPTION / 内容描述

How do people imagine you when they see your seal? Passionate? Rigorous?

How to use a seal so strangers can quickly understand you? Close to each other's distance?

Through the process of design thinking, participants can understand the significance of the seal and design their personal seal while using the digital tools such as laser cutting machine to realize the design in the brain.

The process allows participants to learn 2D drawing software, laser cutting machine operation, the use of small wire saws and other technologies.

当别人见到你的印章，会如何想象你这个人呢？是热情？还是严肃？

如何利用印章让陌生人能迅速了解你？拉近彼此的距离？

透过设计思考的过程让参与者了解印章的意义，并设计专属于个人的印章，同时利用数位工具，例如镭射切割机来实现脑中的设计。

过程中可以让参与者学习到 2D 绘图软件、镭射切割机操作、小型曲线锯使用等技术。

MATERIALS FOR ONE STUDENT / 每人所需材料

- 1 MDF(Medium Density Fiberboard) 600x450x3 mm
- 1 wood block 50x50x80 mm
- 1 Odorless rubber 148x210 mm
- 1 Sandpaper 210x297mm 300p

- 1 块 MDF (多层夹板) 600x450x3 mm
- 1 块木块 50x50x80 毫米
- 1 无臭橡胶 148x210 毫米
- 1 张砂纸 210x297mm 300p

TECHNOLOGIES / 技术

- 2D design software(Corel Draw、Inkscape) / 二维设计软件
- Laser cutter / 激光切割机
- Small saw machine / 小型曲线锯
- Computers / 电脑 (自带)

LEARNING OUTCOMES / 学习成果

- Learn to design a stamp and case with 2D design software.
- Learn to operator the laser cutting machine.
- Learn to use small saw machine to make the body of stamp.
- 学习使用 2D 设计软件设计图章和案例。
- 学习操作激光切割机。
- 学习使用小型曲线锯做印章的身体。



From Atoms to Bits and Back

原子与比特间的交互循环

Wednesday 31st / 周三 1.31 - Jtr \angle vis Russett

ABSTRACT / 摘要

From Atoms to Bits and Back introduces the core conceit of fablabs: our physical world (*atoms*) is nearly as malleable as our digital world (*bits*), in an engaging fun workshop using 3-D printing and 3-D scanning technologies. Participants will make something with modeling clay, 3-D scan it, modify it using *Meshmixer*, and print their modification. And again and again! Optimally, there are myriad methodologies to resolve making any thing!

我们用原子与比特间的交互循环来介绍 fablabs 的核心理念：在一个有趣的工作室，使用 3d 打印技术和 3d 扫描技术可以使我们的物理世界(原子)几乎和我们的数字世界(比特)一样具有可塑性。参与者将制作粘土模型，三维扫描自己的模型，使用 Meshmixer 软件修改，并打印出自己修改的模型。经过一次又一次地尝试，最理想的情况下，我们可以产生无数方法来解决任何问题！

DESCRIPTION / 内容描述

Critical to learning digital manufacturing is an understanding of the interaction between the computer's digital world of bits and the physical world of atoms. Tools common to fab labs make atoms as malleable as computer files. *From Atoms to Bits and Back* introduces this concept in an engaging fun workshop using 3-D printing and scanning technologies. The workshop begins with a demonstration of the capabilities and limitations of PLA 3-D printers. 3-D printing, a process of additive manufacturing, is beginning to disrupt portions of the \$10 trillion dollar global manufacturing industry (*McKinsey Global Institute, "Manufacturing the future: The next era of global growth and innovation"*) as a tool for rapid prototyping and custom manufacturing and is often the first machine people ask to learn within fab labs. Next, everyone will make something from modeling clay (atoms) which they will in turn 3-D scan. A 3-D scanner is a device that generates digital models (bits) from the shape, textures and often colors of physical things. This technology is common to many industries including medical sciences, industrial design, virtual and augmented realities, video-game design and filmmaking. Next, using Meshmixer, a simple, free 3D modeling application, participants will learn to modify their models digitally and they will 3-D print (atoms) the new digital versions of their things. Although, having a new physical iteration of their things in hand is the official finish of the workshop, is it really the end? Each person could modify their prints with clay and 3-D scan them again or directly adjust aspects digitally before making another 3-D print. And again!

学习数字制造的关键在于理解计算机的数字世界和原子的物理世界之间的相互作用。fab labs 常见的工具可以使原子像计算机文件一样具有可塑性。参与我们有趣的工作坊活动，就能了解使用 3d 打印技术和扫描技术将原子转换到比特，再从比特回到原子的始末！工作坊将从展示 PLA 3D 打印机的能力和局限性开始。3D 印刷是一个增材制造的过程，同时作为快速原型和自定义工具制造的一种技术，往往是人们在 fablab 实验室第一台学习的机器，但它已经开始破坏价值 10 万亿美元的全球制造业(麦肯锡全球研究所的研究显示，未来的时代是制造的时代,制造是全球经济的增长点和创新点)。接下来，每个人都将通过对黏土(原子)的建模来制作三维扫描图。

3D 扫描仪是一种从形状、纹理和通常颜色的物体中产生数字模型(比特)的装置。这一技术在许多行业都很常见，包括医学科学、工业设计、虚拟现实和增强现实、视频游戏设计和电影制作。接下来，我们会使用 Meshmixer，一个简单的、免费的 3D 建模应用程序，参与者将借助于此学习如何修改他们的模型，然后 3D 打印(原子)他们新设计出的数字版本。尽管掌握了手中物品的新算法似乎

意味着工作坊步入尾声了，但这真的算是结束了吗？每个人都可以用黏土修改他们的 3d 模型，然后再进行三维扫描，或者在进行另一个 3D 打印之前直接进行数字调整。一次又一次！

MATERIALS FOR ONE STUDENT / 每人所需材料

- Modeling Clay / 黏土
- Small clay modeling tools / 小型黏土建模工具
- Calipers / 卡尺
- Polylactic Acid (PLA) is a biodegradable thermoplastic, made from renewable resources like corn starch or sugarcane. Outside of 3D printing, it's typically used in medical implants, food packaging, and disposable tableware. The main benefit of PLA is that it's easy to print.
- 聚乳酸 (PLA) 是一种可生物降解的热塑性材料，由玉米淀粉或甘蔗等可再生资源制成。在 3D 打印之外，它通常用于医疗植入物，食品包装和一次性餐具。PLA 的主要优点是易于打印。

TECHNOLOGIES / 技术

- 3-D Printer / 3D 打印机
- 3-D Scanner / 3D 扫描仪
- Computers (Preferably people have their own for 3-D modeling)
电脑 (最好是学员有自己的三维模型)

LEARNING OUTCOMES / 学习成果

- Learn to use a 3-D printer
- Learn to use a 3-D scanner
- Learn basic digital 3-D modeling
- Understand the malleability and interchangeability of atoms and bits
- 学习使用 3D 打印机
- 学习使用 3D 扫描仪
- 学习基本的数字三维建模
- 理解原子和比特的可延展性和交互性

This workshop will use the freely available applications linked below. In order to hit the ground running, please download, install, and confirm their operation prior to the workshop. You will need to create no-strings-attached accounts online.

这个工作坊将使用下面链接里的免费应用程序。为了成功运行软件，请在工作坊开始之前下载、安装并确认其运行。您需要在线创建无附加条件的帐户。

Makerbot Print: <https://www.makerbot.com/download-print/>

Meshmixer : <http://meshmixer.com/download.html>



SHANGHAINO MOOD INDICATOR

SHANGHAINO | 小上海情绪指示器

Thursday 1st / 周四 2.1 - S∠verio Silli

ABSTRACT / 摘要

Assemble a Shanhaino board, program it and make an input+output device to indicate how you feel today!

Shanhaino is a simplified Arduino clone, developed in Fablab O Shanghai. In the workshop the participant will assemble their own device with simple components, solder and program it with the Arduino environment, developing basic soldering skills and learning the fundamental programming workflow.

组装一个“Shanhaino | 小上海”电路板，对它进行编程，并建立一个输入和输出的设备，来表达你今天的感受！

Shanhaino 是在 Fablab O Shanghai 制作的一个简化的 Arduino 克隆版。在这个工作坊中，参与者会收集他们自己的设备和一些简单的组件，焊接并用 Arduino 环境给它编程，培养基本的焊接技能并学习基础的编程流程。

DESCRIPTION / 内容描述

Shanhaino is a simplified Arduino clone, developed in Fablab OShanghai. It allows students from K12 to university to learn electronic production, PCB soldering, programming and prototyping a circuit in a fun and engaging way: they have to assemble their own device! The kit has few and simple components, and in a short time it can be soldered and connected to the computer to start using it. It is fully compatible with the Arduino environment and it is perfect to teach programming.

In the first part of the workshop we will understand how the board is made and what is the function of each component. Then we will connect it to a computer and we will use Arduino IDE to write a simple code. The code will show how each component can be programmed with

its specific functions. We will connect the input and the output devices such as a potentiometer, a servo motor and an LCD screen using cables and a breadboard. In the end we will create a simple enclosure with cardboard, tape and markers to understand how easy it is to make a simple product out of some bare electronic components and wires.

“Shanghaino | 小上海”是 FablabO 中国“数制”工坊实验室基于 Arduino 开源单片机基础上，开发的简化的上海地图版本的开源单片机。可以让 K12 年龄到大学的学生学习电子制作，PCB 焊接，编程和原型设计，以有趣的方式组装自己的设备！该套件具有几个简单的组件，并且在短时间内可以焊接并连接到计算机以开始使用它。它与 Arduino 环境完全兼容，可以用以开源编程。

在工作坊的第一部分，我们将了解如何制作电路板，以及每个组件的功能是什么。然后我们将它连接到一台电脑，使用 Arduino IDE 编写一个简单的代码。代码将显示每个组件如何通过其特定功能进行编程。我们将使用电缆和面包板连接输入和输出设备，如电位计、伺服电机和液晶显示屏。最后，我们将创建一个带有纸板，胶带和标记的简单外壳，从而了解由一些裸露的电子元件和电线来制造简单的产品是多么容易。

MATERIALS FOR ONE STUDENT / 每人所需材料

- Shanghaino Kit / Shanghaino |小上海 套件
- 1 small servo motor / 1 个小型伺服电机
- 1 potentiometer 10k / 1 个 10k 电位器
- 1 trimmer 10k / 1 个 10k 蓝白可调电阻
- 1 330 Ohm resistor / 1 个 330 欧姆电阻
- 2 Capacitor 100uF (electrolytic) / 2 个电容器 100uF (电解)
- 1 LCD Screen 1602 / 1 个 LCD 屏幕 1602
- 20 jumper cables male to male / 20 根公对公杜邦线
- 20 jumper cables male to female / 20 根公对母杜邦线
- 1 small breadboard / 一个小型面包板

TECHNOLOGIES / 技术

- Soldering Iron, solder tin / 烙铁，焊锡
- Arduino IDE (<https://www.arduino.cc/en/Main/Software>)
- Computers / 电脑

LEARNING OUTCOMES / 学习成果

- Learn to use a soldering iron and to manage electronic components
- Learn basic programming skills with Arduino IDE
- Understand how to associate electronic parts with programming language blocks
- Experience creating an integrated system from bare electronics and cardboard
- 学习使用烙铁并管理电子元件
- 使用 Arduino IDE 学习基本的编程技巧
- 了解如何将电子零件与编程语言模块相关联
- 从裸露的电子元件和纸板创建集成系统的经验

