Example #1

Phone Stand
CC-BY-SA (digital) CERN OHL (hardware)

Tools:
scissors
ruler
cutter
flat space
mobile phone

Materials
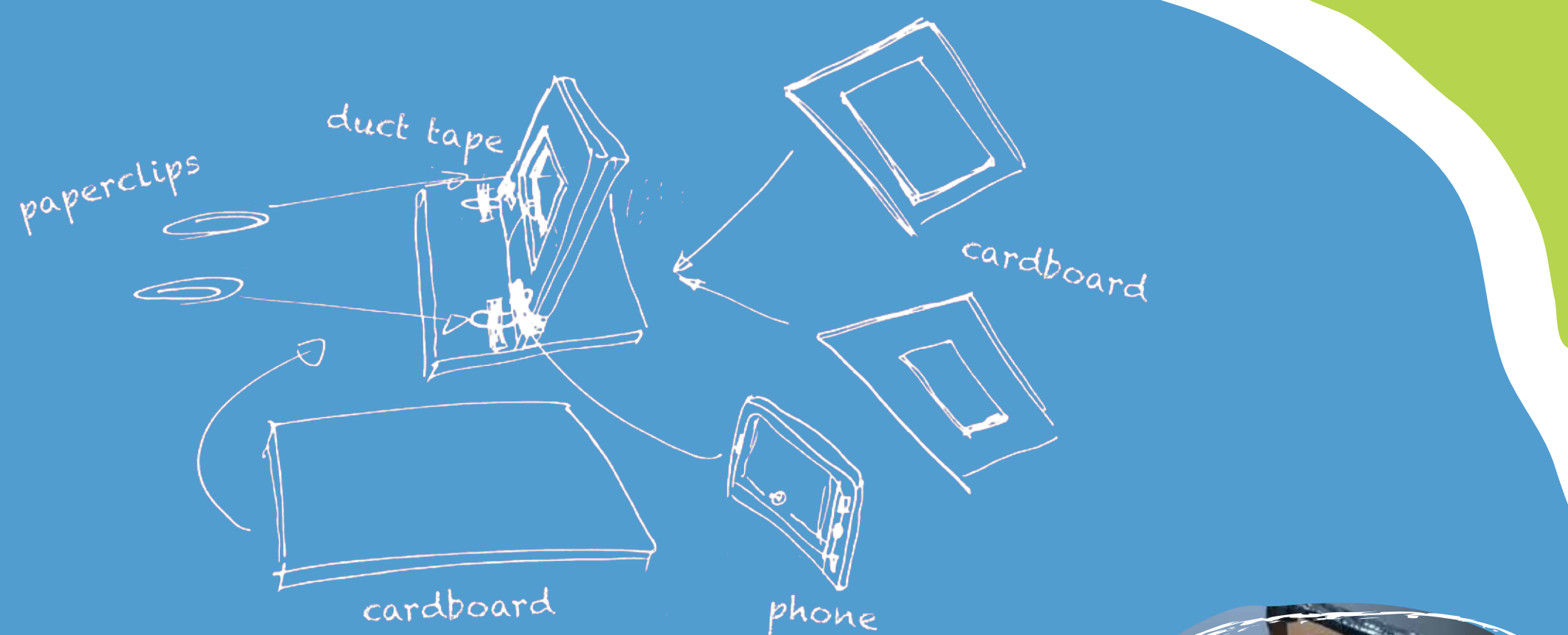cardboards
liquid glue
paper clips
tape (optional)

Tips and Usage
- Keep away from water
- Portable, flexible and easy to maintain

duct tape
paperclips
cardboard
cardboard
phone

Steps:

1. Preparation of working space
2. Get the cardboard and place on the table
3. Measure the length and thickness of the phone and choose outside measure
4. Start cutting the back of the phone holder
5. Measure the phone holder part if not done already and cut the phone stand.
6. Cut the side flips and glue them together, depending on the phone size
7. Cover it with duct/gaffer tape (optional)
8. Insert the phone in the back of the phone holder
9. Join the top flap with stand using paper clips

Open for improvements
- Make some extra holes on phone holder in order to charge your phone directly.
- Make extra holes for the headsetmake holes to support the volume side

Open Questions:
- What other materials are possible?

Example #2

LED Light
CC-BY-SA (digital) CERN OHL (hardware)

Tools:
Breadboard (test circuit board) + wires
Helping hand (magnifier & clamps)
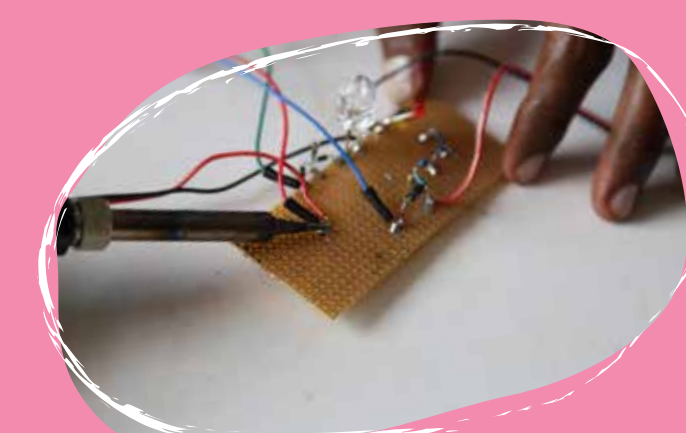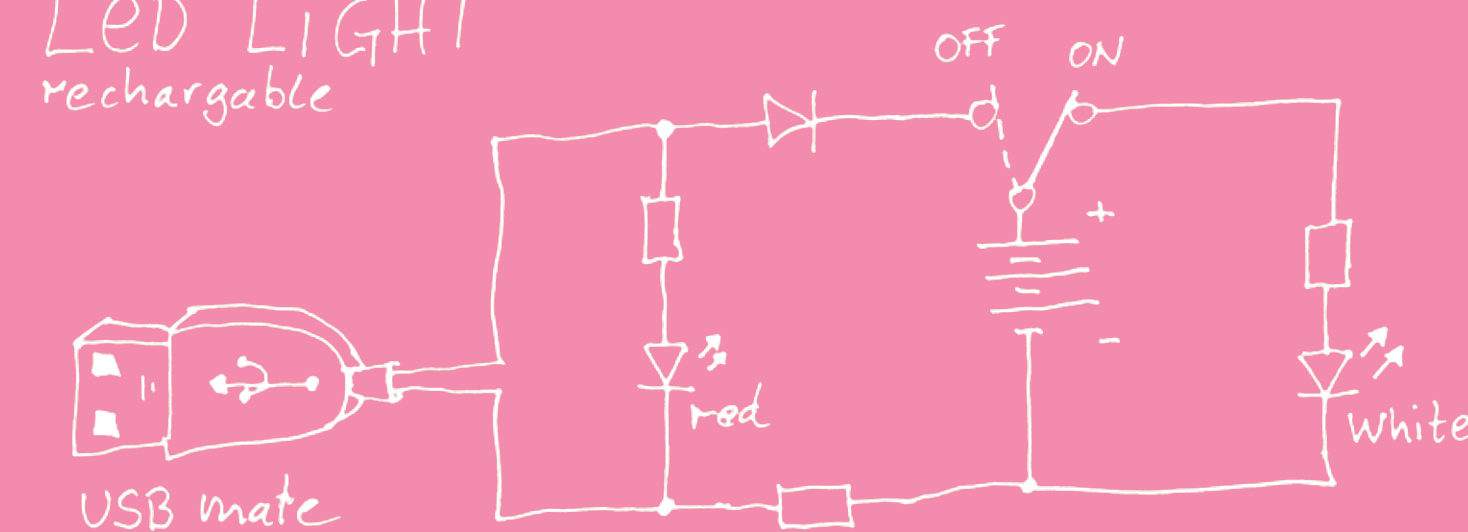Multimeter
Soldering iron plus support
Soldering wire

Materials
Resistors (600, 25, IO Ohm)
USB (male)
Red LED 2V
Big white LED 3V
Switch
Diode

Tips and Usage
- Draw your own electrical current diagram
- Take safety measures while handling soldering iron
- Always test on a breadboard before soldering

LED LIGHT rechargeable
OFF *ON*
red
white
USB mate

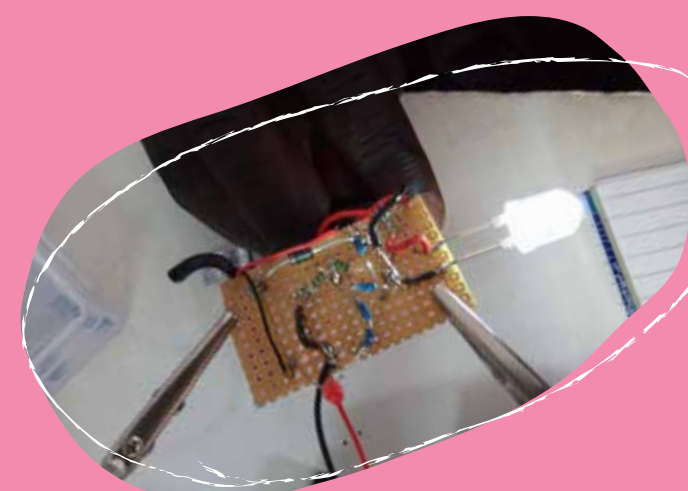### Steps:

1. Measure battery voltage
2. Calculate and sort out resistors
3. Measure and cut circuit board
4. Identify the negative and positive lines
5. Start to solder the resistors (solder on board)
6. Solder the big LED lamp
7. Connect the batteries and LED to the switch
8. Solder charging red LED
9. Light up the big LED
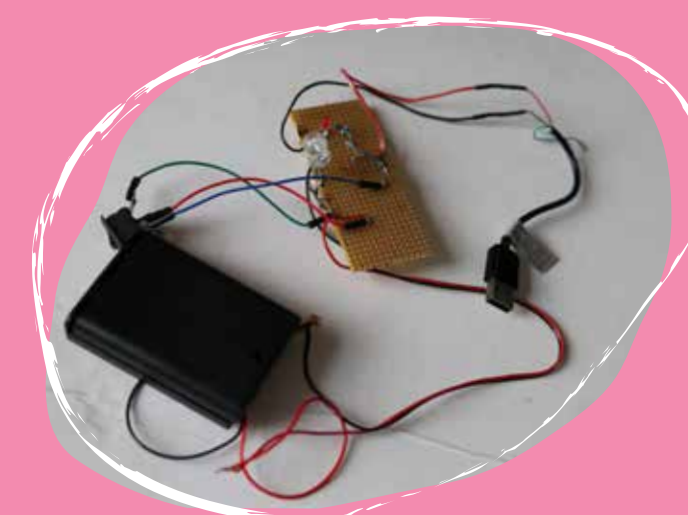
Open for improvements
- Show red LED only when charging
- Build a casing

Open Questions:
- How to prevent the battery from discharging too much over time with simple electronics?

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jHUB
South Sudan's Open Knowledge and Innovation Hub

OPEN HARDWARE GUIDE
Pioneering Open Tech Innovation for South Sudan
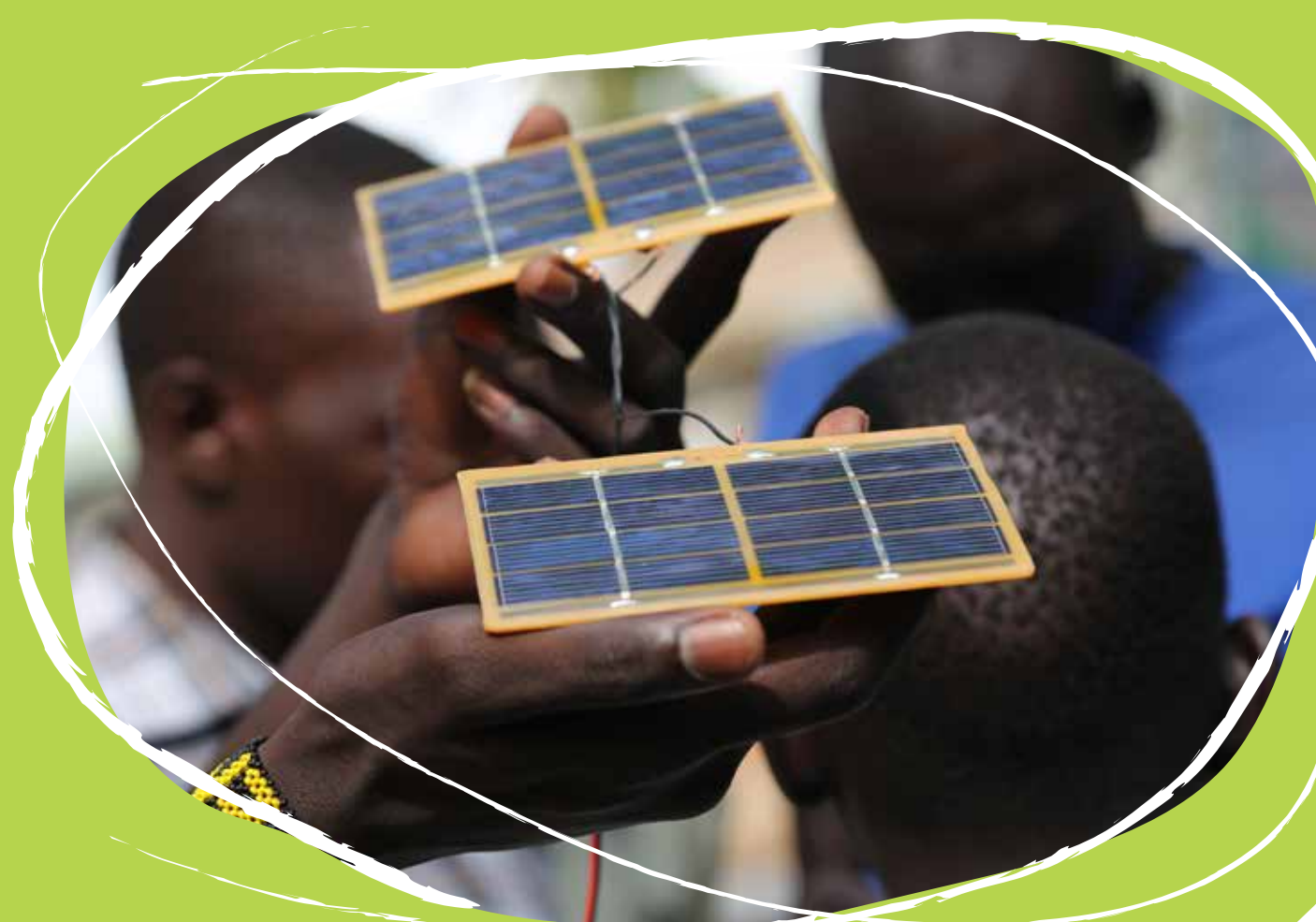
Example #3

Solar Charger
CC-BY-SA (digital) CERN OHL (hardware)

Tools:
Color-coded wire (red and black)
Soldering iron
Soldering grease
Soldering Sucker
Helping hand (magnifier & clamps)
Soldering wires

Materials
Solar panel 8V +/- 250mA
Resistor 1200 Ohm (I. option)
Resistor 600 Ohm (2. option)
I Diode (for either Option I or Option 2, Option 2 is recommended)
Capacitor one IO µF
Capacitor two IOO µF
Female USB
5V Regulator
Circuit board
LED light (red one)

Tips and Usage
- Can be used for charging phones
- Environmentally friendly
- Saves money
- Test with mobile phone or LED light

SOLAR CHARGER
1. Option *2. Option*
USB female

Steps:

1. Draw diagram of the charger for easy understanding (optional)
2. Open your ASKotek kit for tools
3. Get circuit board and solder the diode and LED in place
4. Solder the resistor in the front of the LED
5. Connect to the LED lights to the negative side
6. Solder the capacitors with long side connected to the outer regulator legs
7. Fix regulator with black side facing you and connect between diode and resistor
8. Connect the other side of the regulator to the capacitor (long side connected)
9. Connect all the negatives sides together
10. Cross the middle pin to the negative with side to LED
11. Behind the diode (I. option) or to the right capacitor connect the positive wire from solar panel
12. And the other negative to the negative side
13. Connect female USB. Positive on red and negative on black
14. Test the Solar Charger in the sun
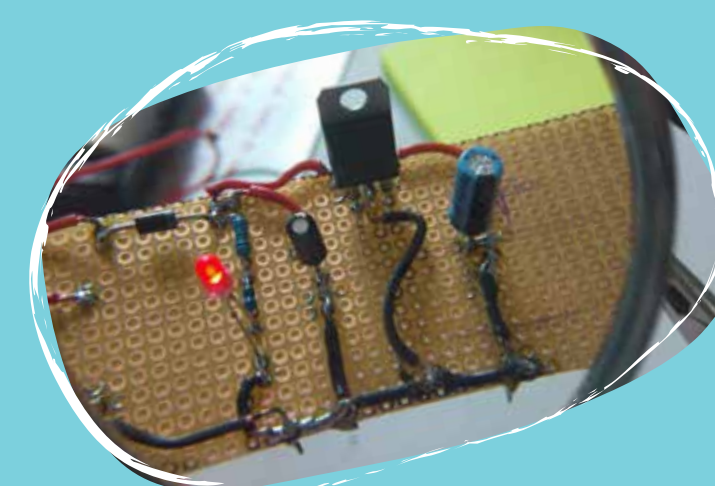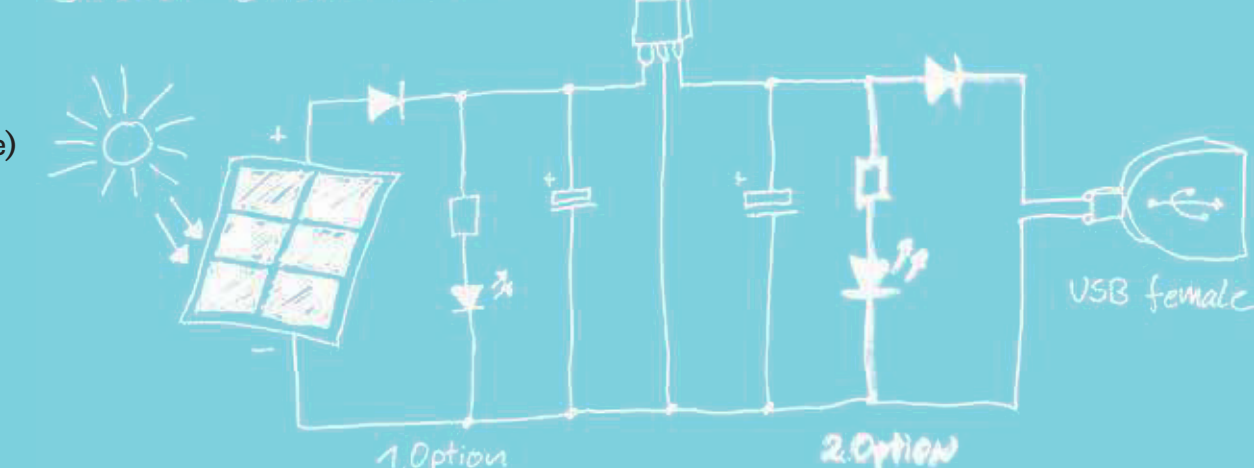
Open for improvements
- Build a casing

Open Questions:
- How to find + and – wires on female USB (if not red and black)?
- What if somebody is surrounded with no material, how to use old electronics?

Open Hardware

Introduction

Open Hardware (OH) or "Open Source Hardware (OSHW) is a term for tangible artifacts — machines, devices, or other physical things — whose design has been released to the public in such a way that anyone can make, modify, distribute, and use those things."[I]

The general benefits of open source methods and open tech innovation are:

Access to knowledge and product designs
Fast and distributed exchange of skills and knowledge
Accelerated innovation due to collaborative development
Low development costs and more expertise
Easy adaptation and customization

What do you need for Open Tech?

Tools & Materials:
Depends on the technology. Always try local sourcing first!

License Example:
A proper license for the product design.
For design-files, digital work: cc-by-sa Creative Commons License[2]
For hardware, functionality: CERN OHL (Open Hardware License)[3]
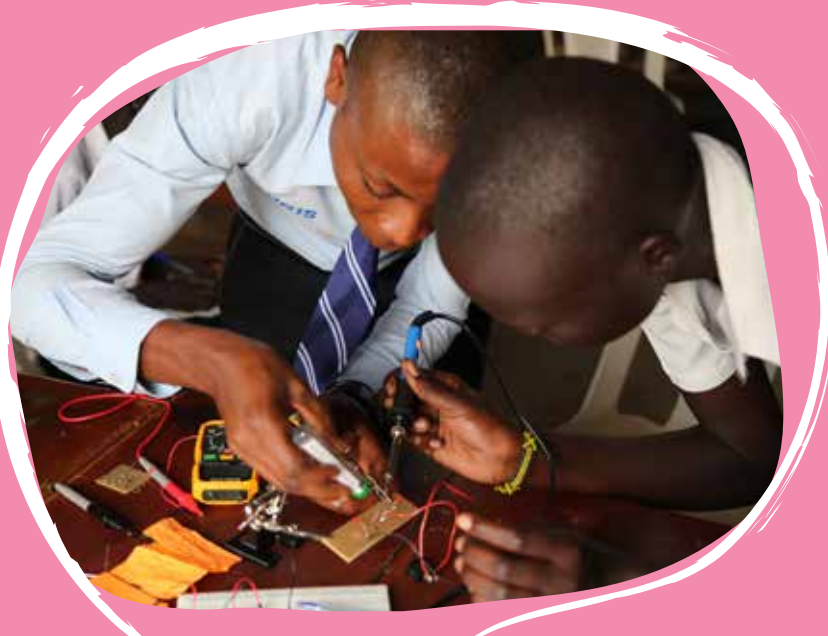
Open Source Software: Linux and platform independent if possible
Examples: see section Resources

[I] www.oshwa.org/definition
[2] www.creativecommons.org/licenses/by-sa/4.0/
[3] www.ohwr.org/cernohl

Open Tech Skills

Training and Team
.

Motivational Skills
Experience   Improvisations
Creativity   Basic Tool Skills
Knowledge   Good Listening   Hopeful
Entertaining
Time Management Skills   Passionate
Social Skills
Mission   Commitment
Hands-on Skills   Explanation Skills
Approachability   Visionable
Technical Skills   Flexibility   Word Skills

Open Tech Linux Software Installation

(on Ubuntu based OS)

Please run:
sudo apt update
sudo apt upgrade

sudo apt install gdebi software-properties-common libavcodec-extra ffmpeg redshift firefox libreoffice shutter vlc pinta pdfshuffler geogebra darktable gthumb trash-cli gimp inkscape openshot kazam audacity kdenlive freecad librecad fritzing kicad

Open Hardware Process - Documentation Principles

One key instrument of Open Hardware is clear documentation. In order to stay on track while developing or adapting a product, it is highly recommended to document the process to create an easy pattern to follow: Open Hardware Guide. This saves time and prototyping iterations.

Therefore good sketches and pictures of the steps are needed, that trace the development process clearly and simply in the order that it happens. The following template might help as you take important notes along the way:

Steps: Follow all working procedures & note the process step-by-step in the order it happens. Keep it clear and simple, note additional tips or details.

Flops & Tops: What went wrong and should be avoided? What went right and is noted as best practice?

Open Questions: What challenges, problems still need to be solved?(NB: This section is key to make progress and help others to participate in the process and get on board the project)

Open Process Documentation - Open Tech Guide

Using your Open Process Documentation (OPD) the next part is to create a clean and visualized Open Tech Guide for the current version.
This Guide is key to empower further development and innovation.

+ References (weblinks, if available)

#ASKotek

Access to Skills and Knowledge - open tech emergency kit

Freely shareable and collaboration based Open Technologies are a form of Open Source that can also act as accelerators for peace and empowerment.

A versatile, robust and mobile trainer's kit with 40 items designed to tackle a range of basic education, innovation and self-training challenges #ASKotek enables 'Access to Skills & Development' in the field ... anywhere!

This basic Open Tech Kit provides tools and materials to learn and distribute knowledge and product development.

The set contains:
Basic electronics and connections
Soldering and cutting tools
Mechanical and measurement tools
A Linux computer and some adapters
Guidelines and additional things to get creative and start innovation on the spot

The kit can be used on site, in the field and can function as a startup tool-set for building a co-working space, learning hub or any other innovation community setup.

It is designed to be modular, mobile and adaptable to any location or situation to share knowledge and empower innovation.

#ASKotek was created by the participants of the Let's Go jHUB project.

The #ASKotek set contains:

books (I jHUB booklet, I solar book, I Open Learning Guide)
I small trainers notepad
I blue HP notebook (Linux Elementary OS installed)
I clipboard with paper
I protractor / square rule
I pencil pouch (pen, pencil, ruler, cutter, 9V battery w/ wire connection, USB current meter, small Post-It Notes, highlighter, pencil sharpener, saw blades, small brush, I6GB USB memory stick)
twine
I pair of scissors
I 'helping hand' tool with magnifying glass
I travel plug adapter
I upgrade electronics kit
I little electronics box (incl. solar charger pieces)
I first aid kit incl. burn ointment
3 circuit boards
2 bread boards
4 x 4V solar panels
I2V solar panel with adapter (in box)
foam padding for PC
small multimeter
crocodile clips, jumper wires, twin wires
2 packets of 4 rechargeable AA batteries (2000 mAh)
3 x AA battery cases with switch
I bag of switches
I big multimeter
I soldering kit (3 extra wires, 2 rolls of solder, I sucker, I solder iron + stand, I pack of extra tips, soldering grease and solder remover)
I wire stripper
I universal mobile phone repair tool set
assorted heat shrink tubes
I pack of 4 USB plugs
2 sizes zip ties (black - short, colour - long)
I small hacksaw
I pair chopsticks
I mechanical tool set (Black and Decker)
disposable cleaning pads
2 sizes of small zip-lock bags (I50 and 380 ml)
I LED light strip
I ASKotek table of contents + packing / unpacking guide
I small combination padlock (for locking case itself)
I coloured combination chain lock (for locking case to something secure)
I black dustproof / waterproof hard case 520 x 4I5 x I95 mm

Resources

OPEN TECH, OPEN HARDWARE + ELECTRONICS

MOZILLA WEB LITERACY

https://learning.mozilla.org/en-US/web-literacy
Web literacy 21st Century Skills: Problem-Solving, Communication, Creativity, Collaboration. Share, design, code, compose, remix, navigate, connect, open practice, contribute.

OPEN! METHODS & TOOLS FOR COMMUNITY-BASED PRODUCT DEVELOPMENT

opensourcedesign.cc
Current practices of open source product development & concrete guidance to support design process efficiency of open source product development projects.

OPEN SOURCE HARDWARE ASSOCIATION

https://www.oshwa.org
Open hardware community ensuring technological knowledge is accessible to everyone. Collaborative development of technology that serves education, environmental sustainability, and human welfare.

OPEN SOURCE EDUCATION

https://opensource.com/education/13/4/guide-open-source-education
A guide to free and open source education. Stories about creating, adopting, and sharing open source solutions.

AFRIMAKERS

http://www.afrimakers.org
Empowers makers in Africa to develop sustainable projects using rapid prototyping to solve local challenges.

APPROPEDIA

http://www.appropedia.org/Welcome_to_Appropedia
Sharing knowledge to build rich, sustainable lives.

IFIXIT

https://www.ifixit.com
The free repair guide for everything, written by everyone.

INSTRUCTABLES

http://www.instructables.com
Share what you make with the world, and tap into an ever-growing community of creative experts. Participate in make-a-thons through the platform. Add your own instructables.

OPEN SOURCE ECOLOGY

http://opensourceecology.org
Open source industrial machines can be made for a fraction of commercial costs, designs shared online free, to create an open source economy which increases innovation by open collaboration.

WIKIFAB

http://wikifab.org
Open source hardware documentation platform. Tutorials to make anything, written by everyone.

WIKI-HOW

http://www.wikihow.com
"We're trying to help everyone on the planet learn how to do anything. Join us."

NOTES: