Have a fun with 'name-card-sized' computers!

Histories, Use Case and Tips

Japanese Raspberry Pi Users Group

Masafumi Ohta

SOSCON 2018

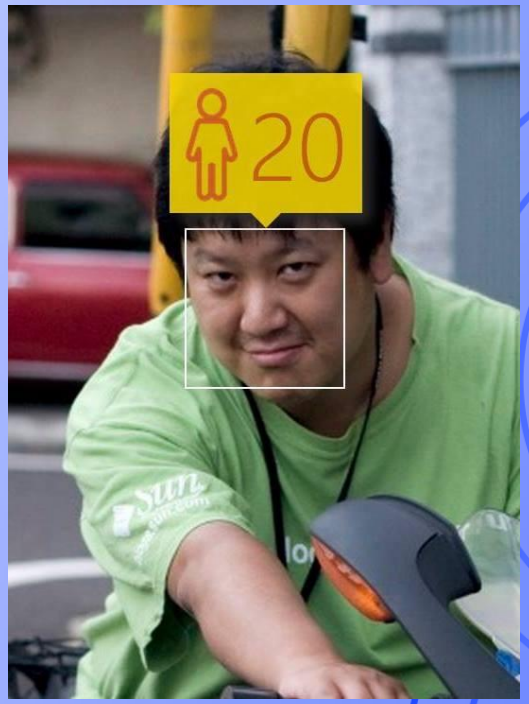
SAMSUNG OPEN SOURCE CONFERENCE 2018

Introduction

This presentation may be included my thoughts and prediction, but it is not affiliated with any companies and organizations and it is not incorporated into any commitments.

About me - Masafumi Ohta

Founded Japanese Raspberry Pi Users Group with a few Raspberry Pi enthusiasts in 2012
Volunteer Raspberry Pi Foundation as one of the moderator at the official forum on Raspberry Pi website and help their business in Japan.
Now looking into ASUS tinker board to fix the issues on it



日本語フォーラムについて

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日本語フォーラムについて

Fri Dec 14, 2012 1:14 pm

太田といいます。何人かの日本の皆さんはじめまして。日本Raspberry PIユーザグループの代表をしてます。

ようやっと悲願でもありました日本語フォーラムを作っていただきました。まずここまで来たことに日本のコミュニティメンバーの皆さん、また日本でこの機械をお使いいただいている方、これからお使いいただこうと考えている皆さんに御礼申し上げます。

是非今後日本のコミュニティを盛り立てるためにもどうぞこのフォーラムをどしどしお使いくださいませ。普段日常のお仕事もあり、ポスト承認がおくれちゃったらごめんなさい、なのですが、できる限りスムーズに皆様がここでいろいろお話できるよう、頑張ります。

masafumi_ohta
Forum Moderator
MODERATOR

Posts: 359
Joined: Sun Sep 09, 2012 9:07 am
Location: Tokyo
Contact:


arm
INNOVATOR
PROGRAM

Branch: release-4.4 kernel / README-tinkerboard

Find file | Copy path

Masafumi Ohta modify for bluetooth use on rockchip kernel — 602c5ce on 12 May

1 contributor

56 lines (49 sloc) | 2.06 KB

Raw | Blame | History

```
Install rockchip image for Tinkerboard with patch

1)Compile kernel as debian_kernel
cd rk-linux/kernel$
patch -p1 < rk_kernel_tinker_wlan_bt.diff
make ARCH=arm miniarm-rk3288_defconfig -j16
make zImage ARCH=arm CROSS_COMPILE=arm-linux-gnueabihf- -j16
make modules ARCH=arm CROSS_COMPILE=arm-linux-gnueabihf- -j16
make ARCH=arm rk3288-miniarm.dtb CROSS_COMPILE=arm-linux-gnueabihf- -j16
make dtbs CFLAGS=-g ARCH=arm CROSS_COMPILE=arm-linux-gnueabihf- -j16

2)Make system.img as rockchip wiki instruction
build/mk-kernel.sh rk3288-miniarm
build/mk-image.sh -c rk3288 -t boot
cd cd ../rootfs/
sudo apt-get install binfmt-support qemu-user-static
sudo dpkg -i ubuntu-build-service/packages/*
sudo apt-get install -f
RELEASE=stretch TARGET=desktop ARCH=armhf ./mk-base-debian.sh
RELEASE=stretch ARCH=armhf ./mk-rootfs.sh
```

Agenda

What is 'name-card-sized' computers?

The histories of the 'name-card-sized' computers.

- Where it comes from
- How it grows
- How it is now

Use cases an Tips

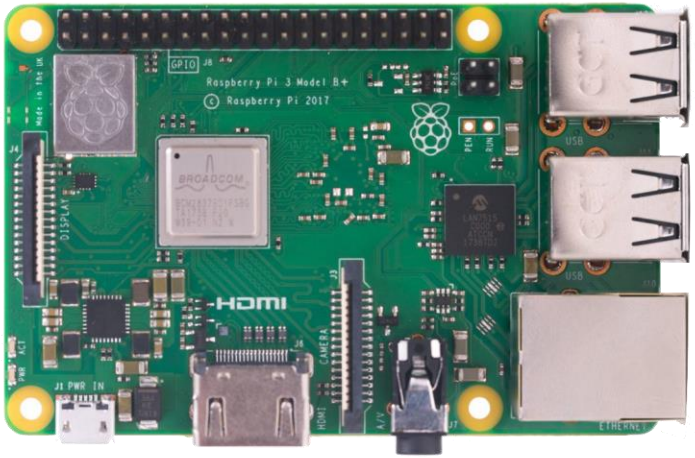
What is ‘name-card-sized' computers?

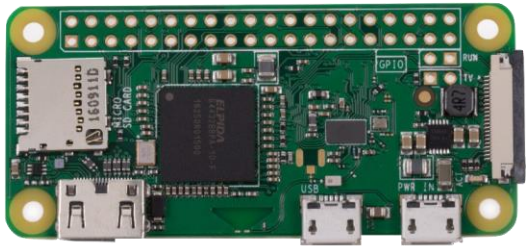
Small, bared, embed, cheap and etc

What is the name-card-sized computer?

Small, bared, embed, cheap and what?

- Small factor like name-card-size
  - Raspberry Pi 3B+ is the standard name-card-sized factor
- Bared and embed
  - Easy to access hardware stuff and useful for DIY and IoT
- Cheap
  - Raspberry Pi Zero (W/WH) is very cheap, it is 5-15US$
- Enough memories and disks
  - Almost all have 1-2GB main memories
  - Raspberry Pi 3 or later is supported PXE network disk boot.
- Run full OS
  - Run full-distribution OS like x64 PC
    (Linux, BSD, hopefully run Windows10)


GPIO
Raspberry Pi 3 Model B+
© Raspberry Pi 2017
BROADCOM
HDMI
USB
USB
ETHERNET
DISPLAY
CAMERA
J1 PWR IN


GPIO
RUN
USB
PWR IN

The histories of ‘name-card-sized' computers.

Where it comes , How it grows ,
Current and Future

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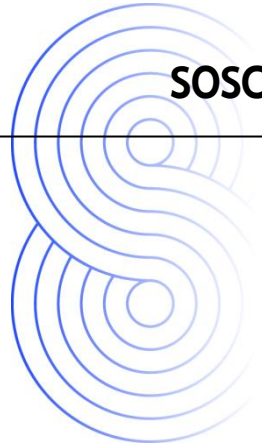
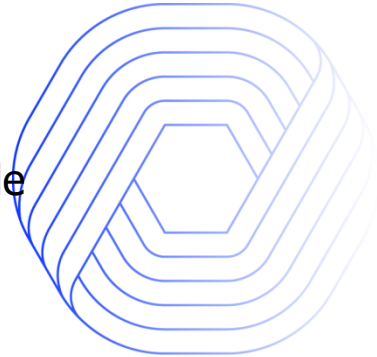
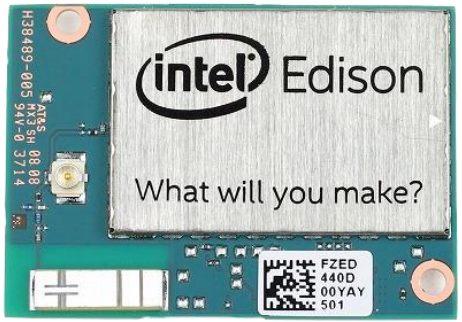
Where name-card-sized PC comes from?

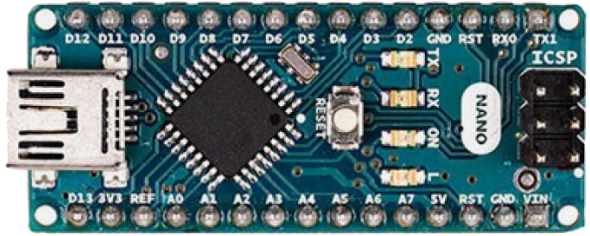


The opportunity how it comes..

- PC is expensive but useful as documents and internet tools
  - Works good with Office and net surfing apps.
  - It is getting hard to access core (Kernel) system in PC OS.
    PC often brings unexpected and difficult error to handle
- Cellphone and Tablet are getting smaller, higher specs and useful
  - They are almost same spec as PC but getting smaller
  - They are very useful for netsurfing, email and documenting
  - It also cheaper than PC and more some doesn't need PC
    because they purpose to use it for email and Web surfing.
- Embedded devices is now opened for everyone but need to care to handle
  - Arduino is very useful but need to work with PC to control.
  - Intel Edison is really small but it is not provided full-distribution OS
    Also need to work with PC to control




intel Edison
What will you make?
FZED
440D
00YAY
501


D12 D11 D10 D9 D8 D7 D6 D5 D4 D3 D2 GND RST RX0 TX1
ICSP
TX
RX
ON
L
RESET
NANO
D13 3V3 REF A0 A1 A2 A3 A4 A5 A6 A7 5V RST GND VIN

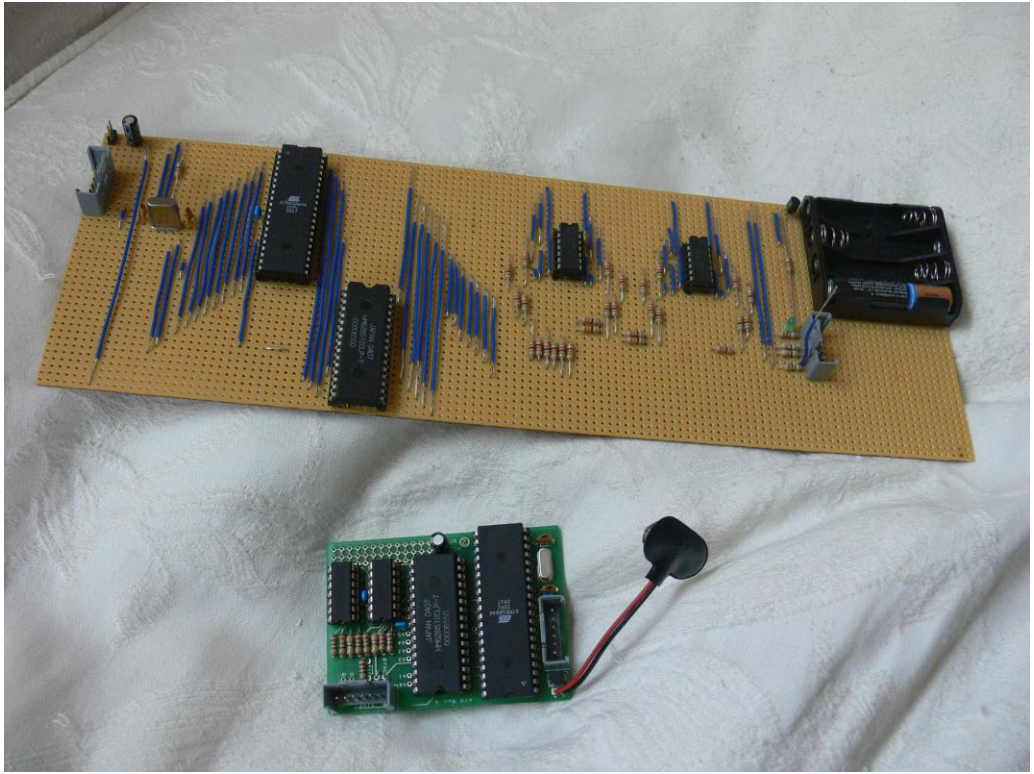
Cellphone and Tablet make PC thrown out!

Bye bye expensive PC with hang up! Say hello smart one!!

Eben Upton, looked into Chips on Cellphone

When Eben was teaching at Cambridge University,
He tried to make cheap computer for programing education

- Less applicants to major in Computer Science at the University,
  Less technical skills in the students even though they major
  in the subject.
  - Eben got start the device development for program education
    in 2007
- Eben looked into Broadcom ARM GPU SoC chip in Nokia cellphone
  - It is enough speed to learn programing.
  - Eben inspired old PC (BBC Micro/PC-9800), it is enough to educate
    programing because cellphone has the same CPU speed nowadays
    as those old PC
  - It may be cheaper than ordinary x64-based PC
    It should be the same price as textbook (within 25US$)



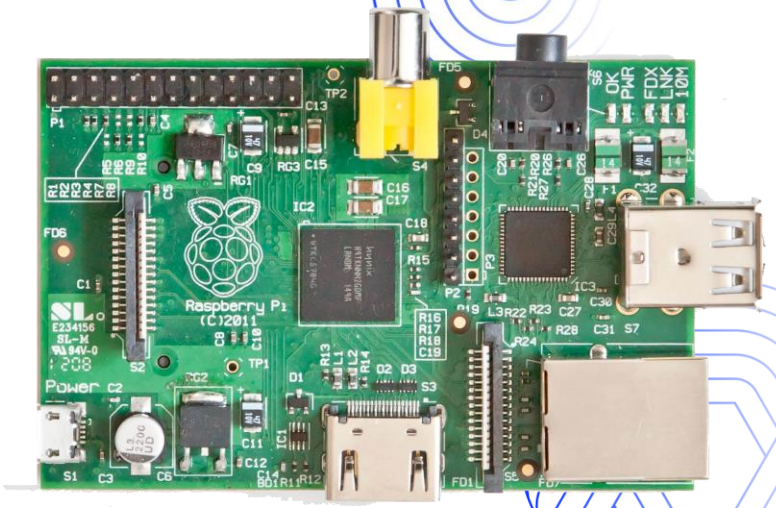
‘I felt that much higher performance, and the ability to run a general-purpose operating system, outweighed the benefits of home assembly’

- Eben Upton posted ‘RASPBERRY PI – 2006 EDITION’ to Raspberry Pi official blog, 23rd Oct 2011

Raspberry Pi Foundation and Raspberry Pi 1

Raspberry Pi Foundation was incorporated in 2008,
'First' Raspberry Pi 1 was launched in 2012

- Raspberry Pi Foundation
  - UK charity for kids programming education
  - Under stealth mode until 2011
- Raspberry Pi 1 Model B
  - Launched in 2012
  - 700MHz ARM11
  - 256MB RAM
  - $35
  - Five major revisions
  - 10,000 units made as 'first' lot,
    100,000 units generated as 'first' order

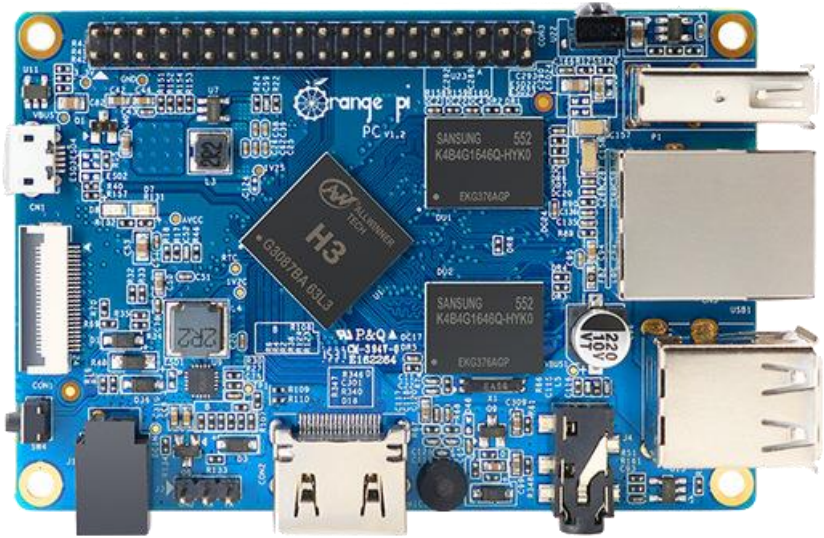


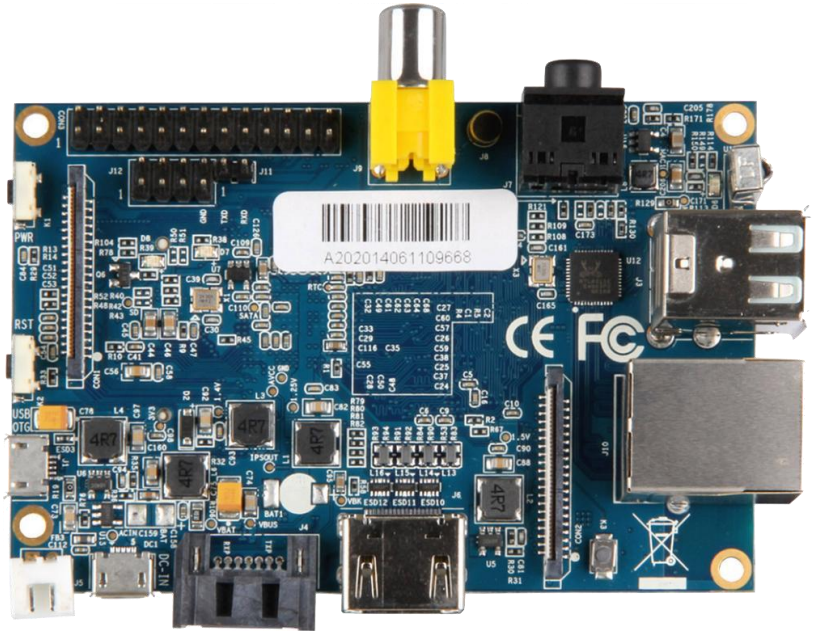
Raspberry Pi ‘fake’ copies was in bloom

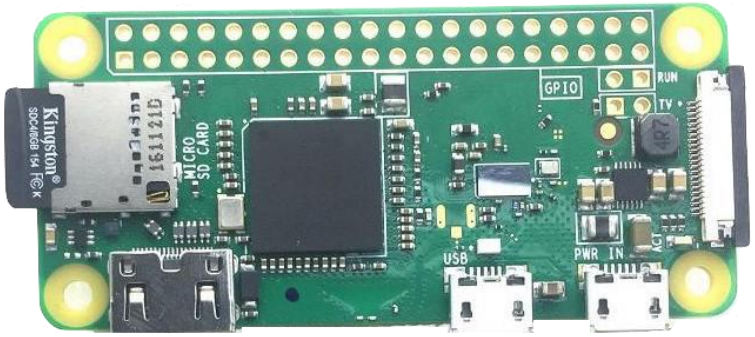
Most of them came from China…got the issue

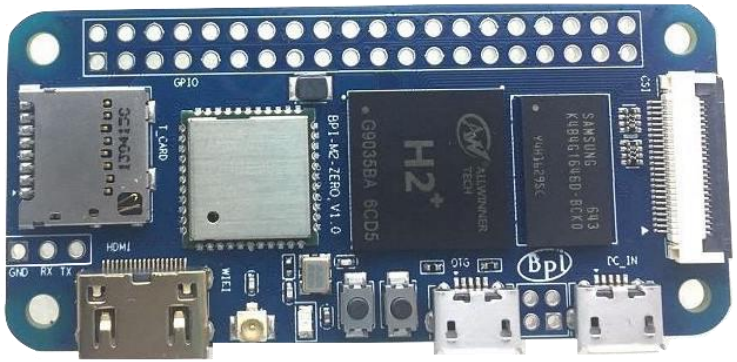
- Official Forum was trolled by Chinese
  - Orange, Banana Ads and Promotions were posted but cleaned by us mods and banned them
  - Some are their employees trolled with incorporated organization that makes us annoyed.
- Foundation was not so upset to sue those fake ‘copies’
  - But upset to ‘Raspberry Pi compatible’ as those folks say

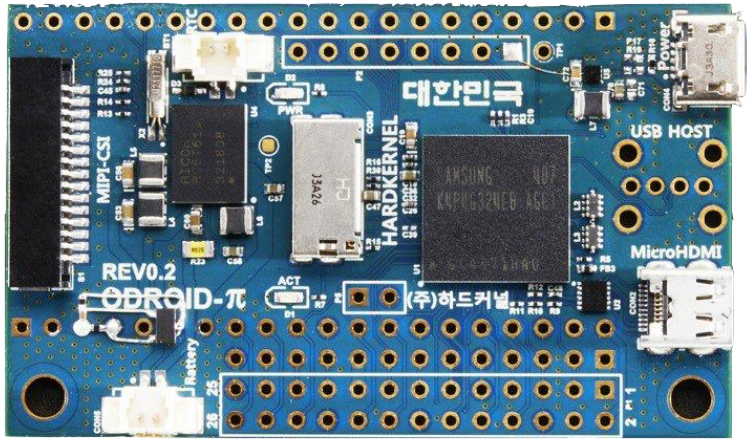
‘(Those fakes) should be flattered but not really not’


orange pi
PC V1.2
SANSUNG
K4B4G1646Q-HYK0
H3


A20201406110966B


GPIO
RUN
TV
MICRO SD CARD
USB
PWR IN
Kingston


GPIO
BPI-M2-ZERO_V1.0
H2+
ALLWINNER TECH
HDMI
OTG
DC_IN


대한민국
MIPI-CSI
HARDKERNEL
REV0.2
ODROID-π
(주)하드커널
USB HOST
MicroHDMI
Power

Many name-card-sized was in bloom

Most of the boards are inspired by Raspberry Pi

- Adapteva Parallella is fpga-based board to learn how HPC cores on fpga works.
- ODROID-C2 is a bit high-spec than Raspberry Pi 3, which has bigger memory and gigabit ethernet.
- 96 boards are reference board by Linaro, which is standard ARM64 Liunx distributor
- ECS BAT-MINI is Intel x86-based board which supports Windows
- ASUS Tinkerboard and PINE is Rockchip-based and say ‘Raspberry Pi compatible”

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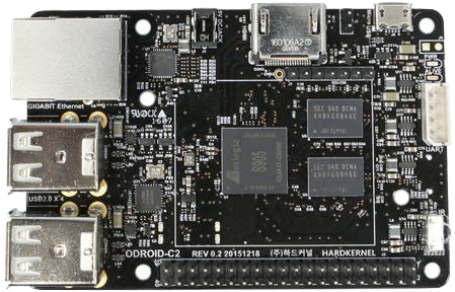
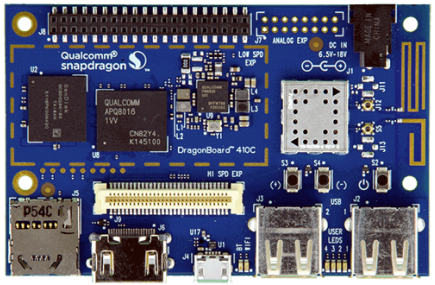
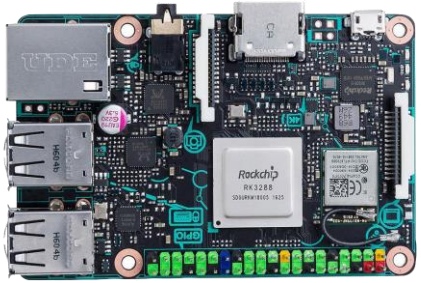
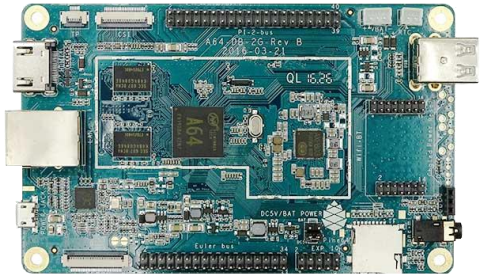
adapteva
ZYNQ
PARALLELLA


GIGABIT Ethernet
USB2.0 X2
ODROID-C2 REV 0.2 20151218 (주)하드커널 HARDKERNEL


Qualcomm snapdragon
QUALCOMM APQ8016 1VV
DragonBoard™ 410C
P54C

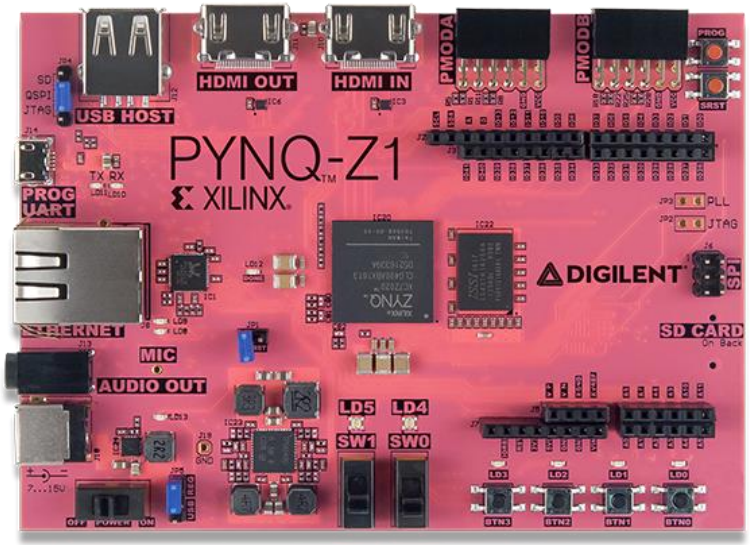

Rockchip
RK3288


A64-DB-2G-Rev.B
2016-03-21
A64
DC5V/BAT POWER

Various sized development boards are now

Various-sized hardware and software development boards now we can get to develop with but some are still expensive..

- Nvidia Jetson is quite high-spec for Deep learning/AI
  - It is used for self-driving and etc but quite expensive, it costs 2000US$.
- PYNQ is good for student to learn and evaluate how FPGA works.
  - There are many cheaper FPGA Evaluation Kit like MAX10 by Intel
  - Those education/evaluation kits cost under 50US$
- We can now make our original name-card-sized or smaller PC in Shenzhen as ‘fully customized PC’.
  - Some are unsatisfied ‘packaged Hardware’, they would love to make one from scratch.


HDMI OUT
HDMI IN
PMODA
PMODB
USB HOST
PYNQ-Z1
XILINX
PROG UART
DIGILENT
PLL
JTAG
SPI
SD CARD
ETHERNET
MIC
AUDIO OUT
LD5
LD4
SW1
SW0
BTN3
BTN2
BTN1
BTN0


ALTERA
MAX 10
aXelsys


NVIDIA
NVIDIA

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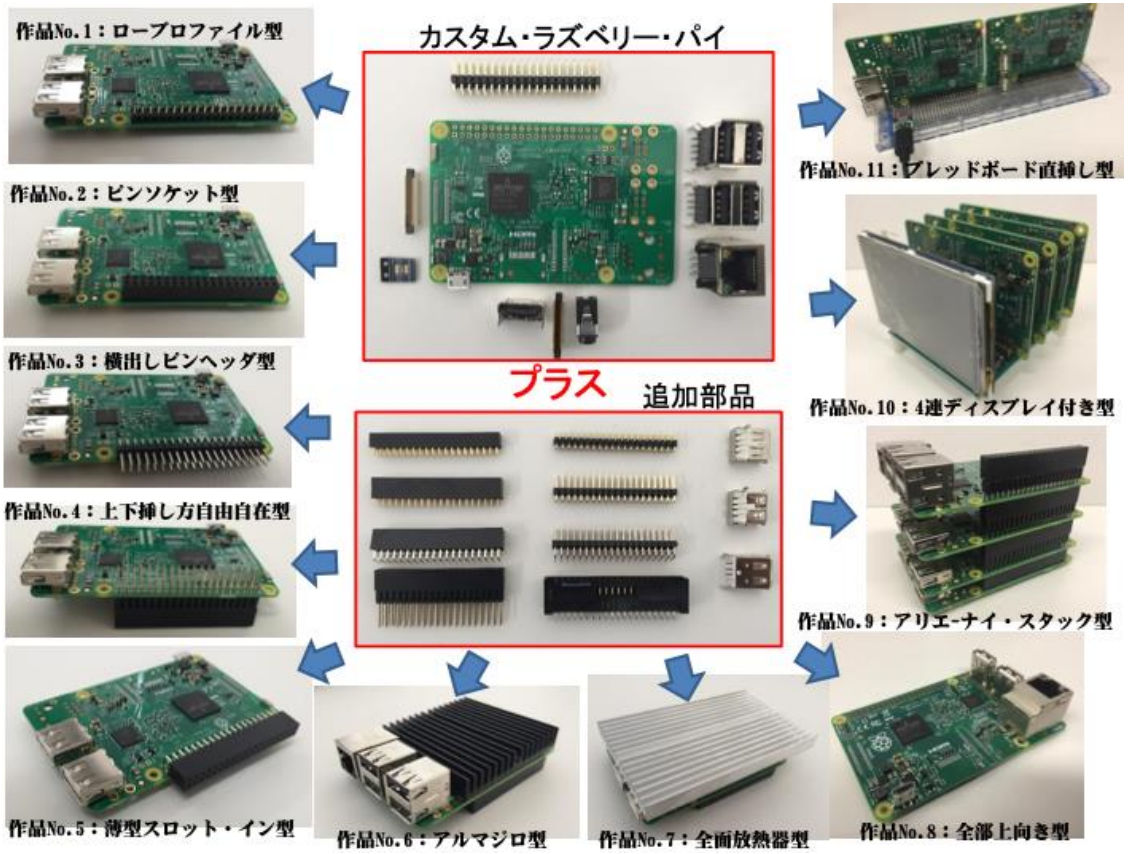

作品No.1：ローブロファイル型
カスタム・ラズベリー・パイ
作品No.11：ブレッドボード直挿し型
作品No.2：ピンソケット型
作品No.10：4連ディスプレイ付き型
作品No.3：横出しピンヘッダ型
プラス
追加部品
作品No.4：上下挿し方自由自在型
作品No.9：アリエ-ナイ・スタック型
作品No.5：薄型スロット・イン型
作品No.6：アルマジロ型
作品No.7：全面放熱器型
作品No.8：全部上向き型

Conclusion: The history of the board

Mobile CPU, Education, Full OS, Not flattered
but dare not stop,Various Boards in the various use

- Mobile GPU is now catching with Desktop/Laptop PC
  - it is very cheap and faster than we expected and useful for specific use.
- Eben Upton looked into mobile GPU to make cheap hardware
  to learn programmings for kids(the students) in 2006
  - it is very cheap and the same speed as old PCs(PC98/BBC Micro)
- Eben found he could run Full distro OS on cheaper hardware
  - It is sufficient to use it like an old PC
- The more Raspberry Pi is sold, the more (fake) copies are sold
  - Raspberry Pi Foundation wasn't flattered but dare not to stop
  - It is the opportunity why those name-card-sized in bloom
- There are various sized factor PCs to use in various way.
  - Nvidia Jetson is for HPC and Deep learning
  - FPGA boards is more cheap and useful to learn how it works.

Use cases an Tips

hobby, education, industrial business, IoT and etc

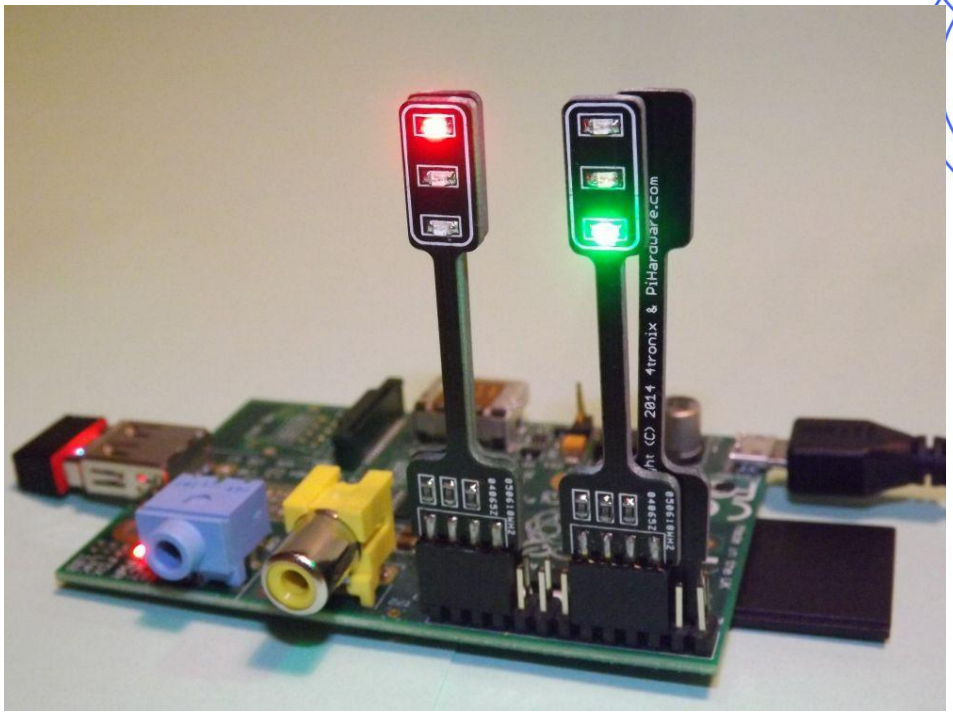
‘Ton’ of use cases and tips

Many of name-card-sized boards are made for education..

- Those boards are made for programing education, learning hardware and prototyping…
  - But most of users for those boards are used for hobby
  - Lately those boards are applied to Enterprise business, many of them are applied to production phase directly.
- Textbooks, resources and stuff are getting developed by education organizations with bottom-up approaches (CoderDojo, CodeClub and etc..)
- Kits and packages make stuff easier

First step for studying hardware

LED blinker is basic usage to try such boards

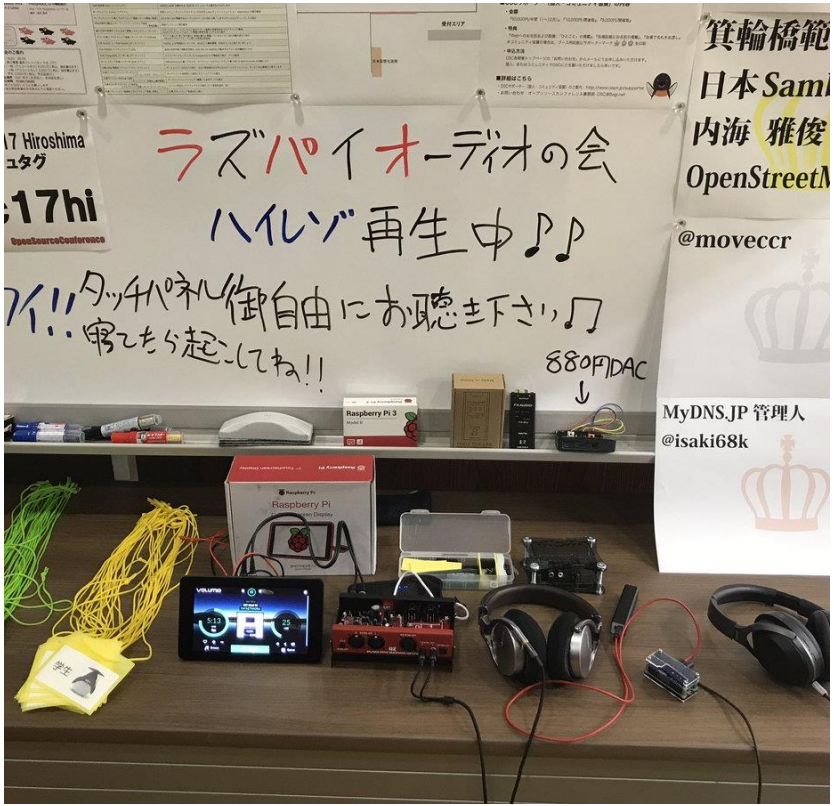


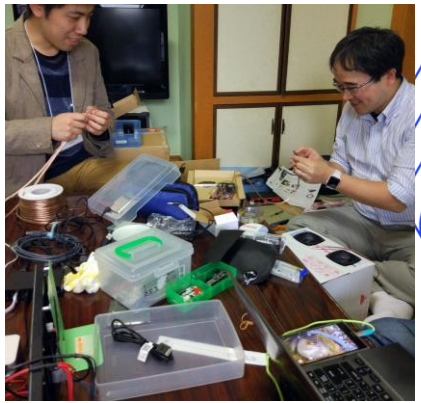
Case DIY is the first step you love your boards

Easy to make with LEGO and 3D printing stuff for it

Easy to start Audio+Raspberry Pi Project

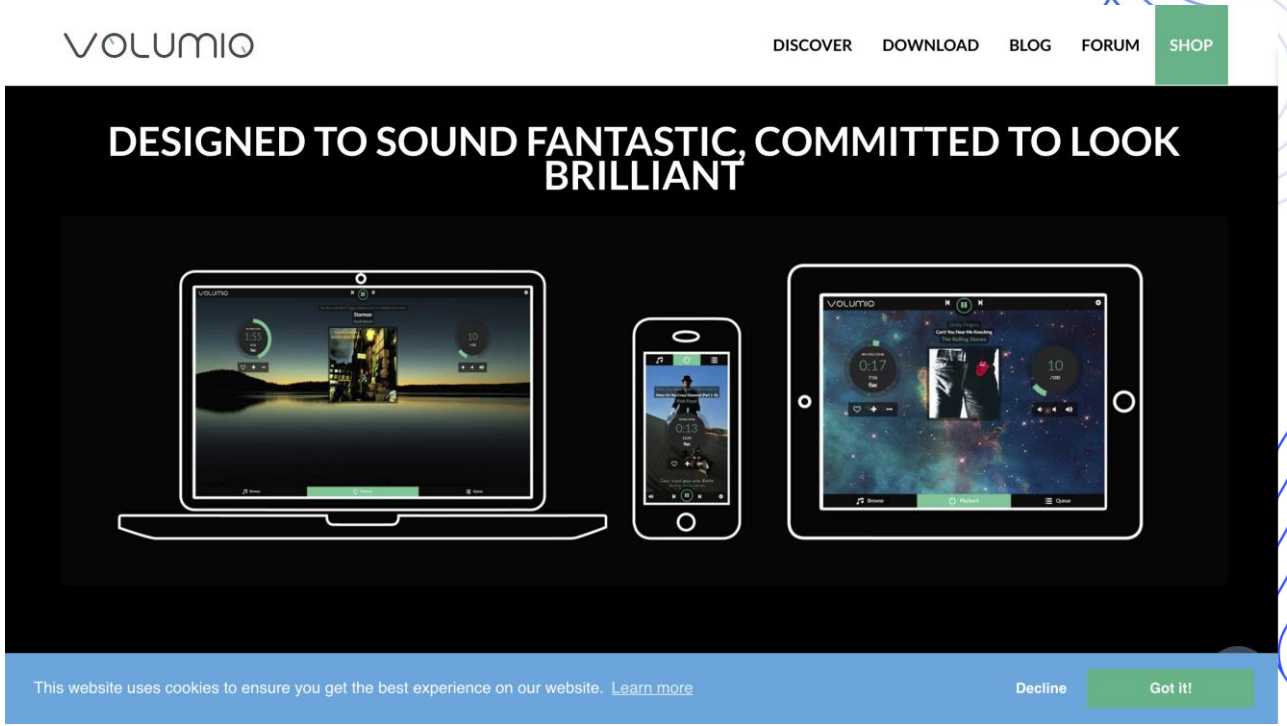
But audio devices are quite expensive..





Volumio is audio Appliance OS

Volume supports many boards and hackable.



One board Audio Consortium is for business

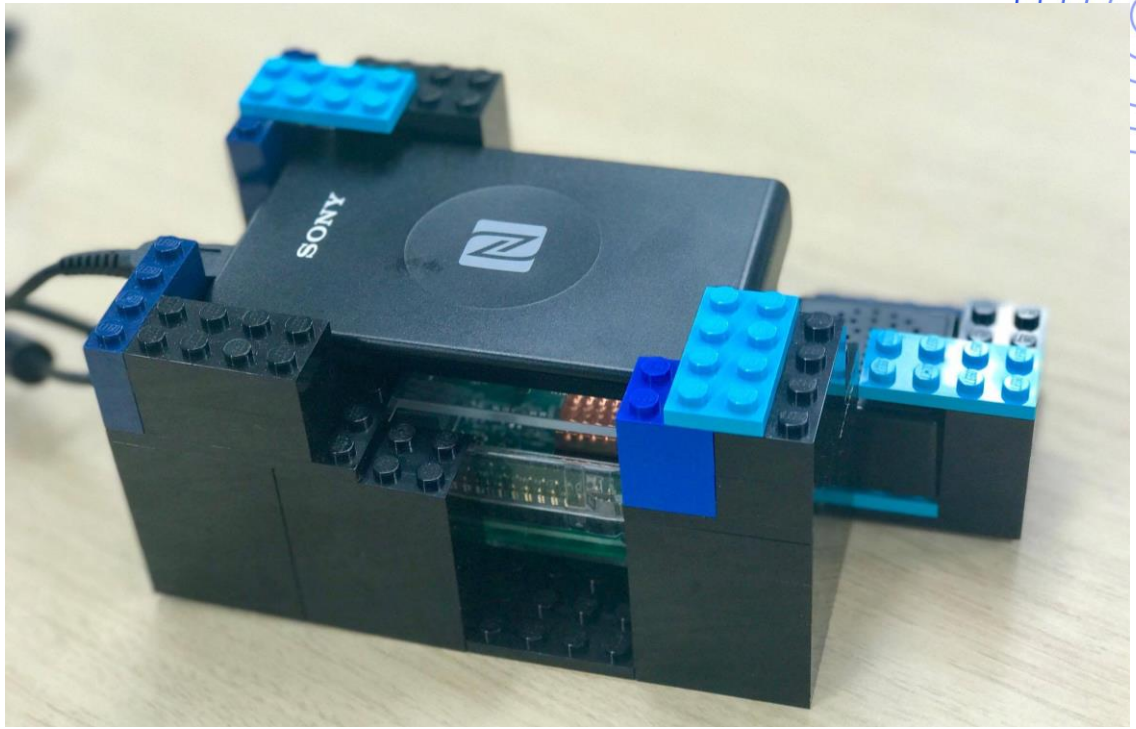
Shunobu Unakami collaborate
with Audio concerned manufacturers in Japan

Music streaming system at Ryuku bank

Raspberry Pi music receiver to receive from music server

Time recorder system with NFC

Simple to make Raspberry Pi+ NFC

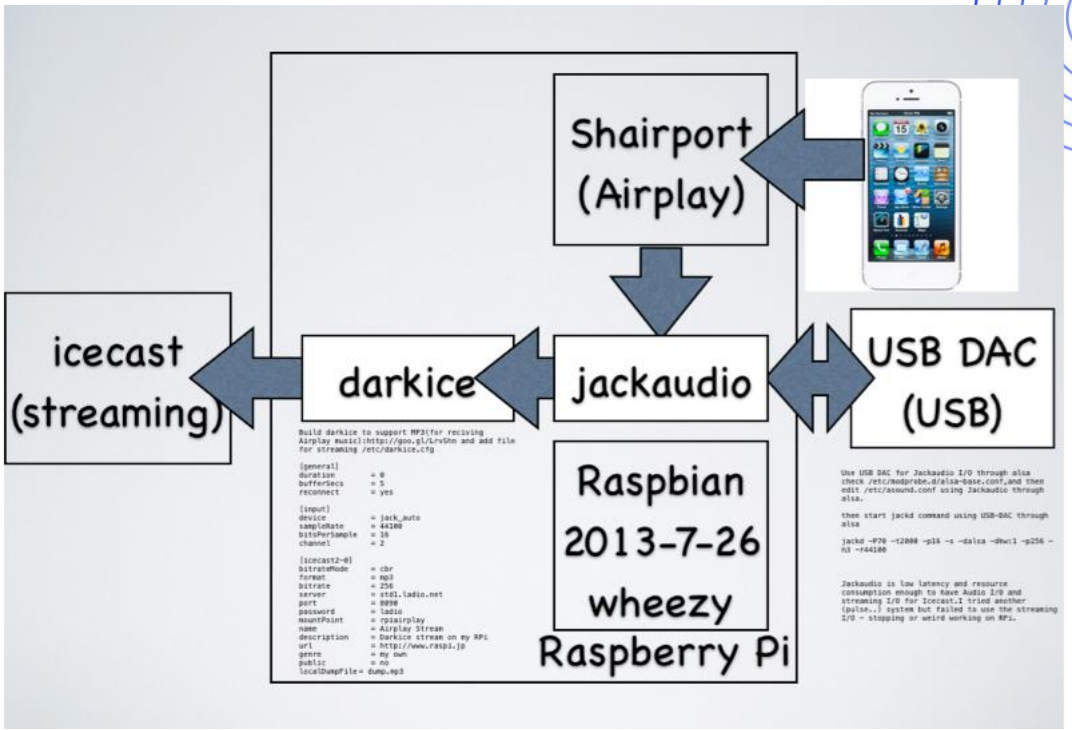


Crystal Signal Pi is monitoring tool

Infinite Loop has made monitoring tool with Raspberry Pi
It signals with several colors to check something health status.

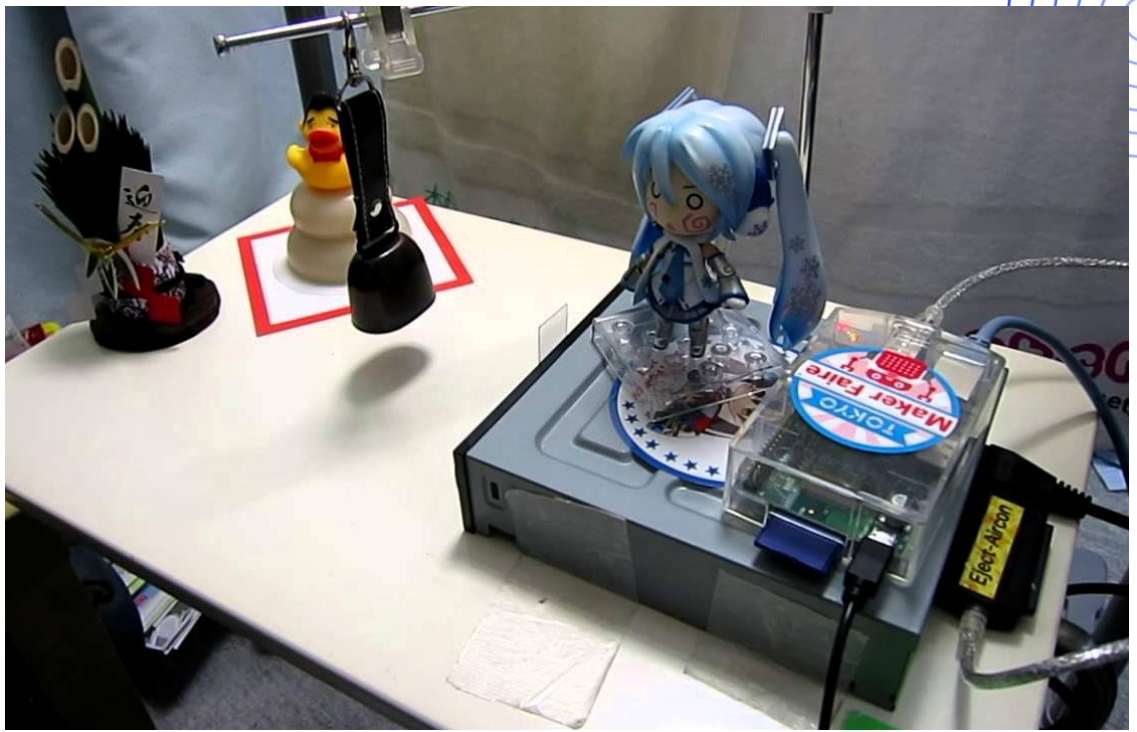
Music broadcast station with iPhone

It was my first project with Raspberry Pi in 2013.
It was to stream music on VR Game like Secondlife



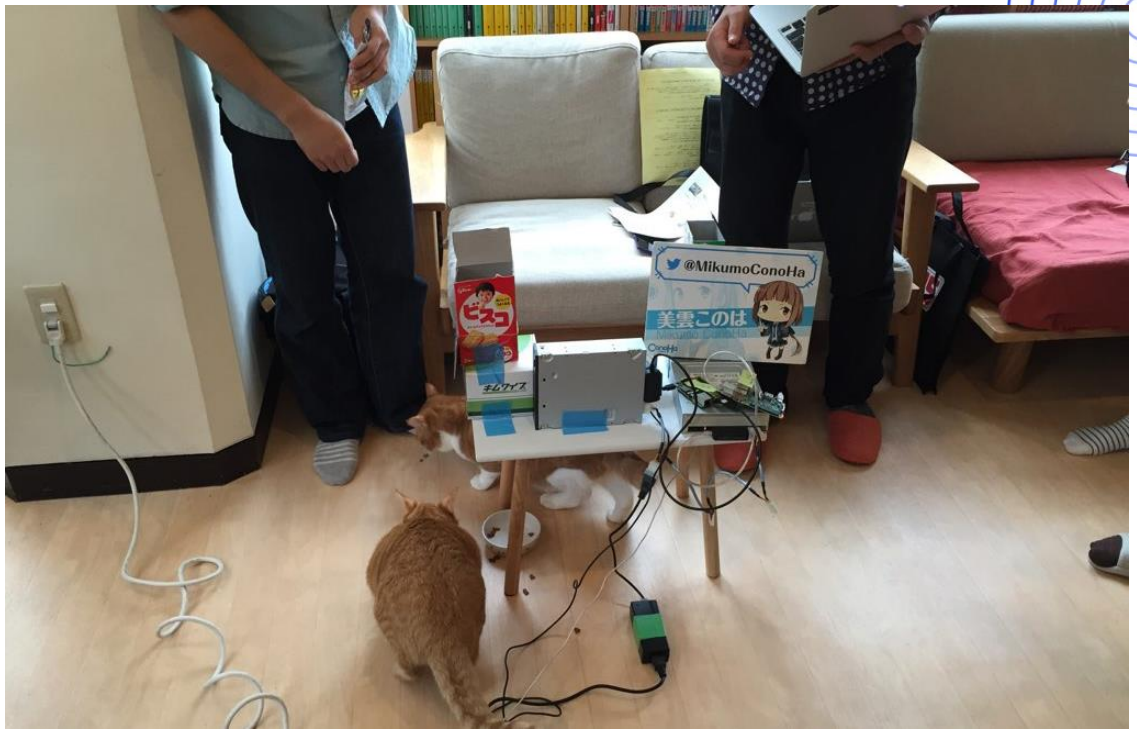
Play with ‘eject command’ for simple use

My community member Akira Ouchi owns this project
Pulling the CD-ROM drive to ‘push’ something to do..



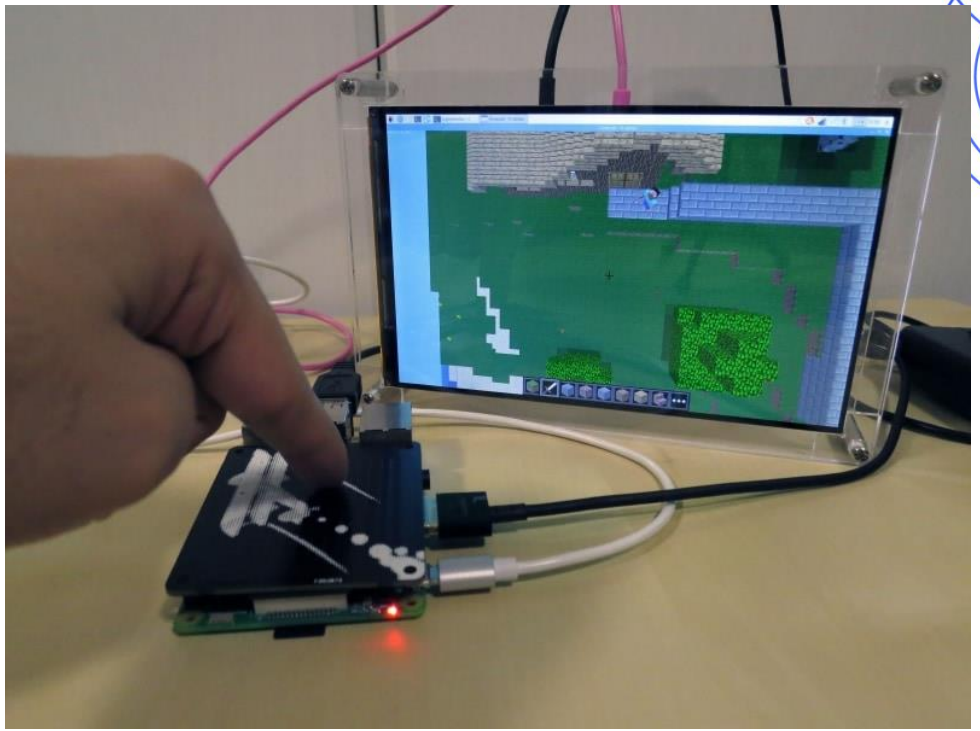
‘eject’ CD-ROM Drive to feed cats

Another use case to pull the tray to push the cat foods and then fall down to cat.



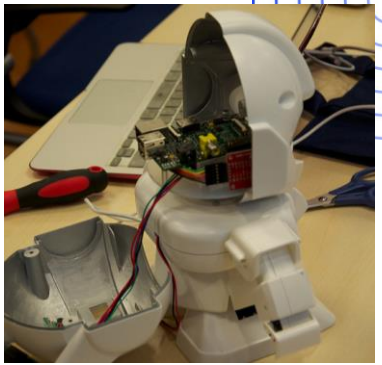
Play Minecraft with 3D gesture sensor

3D gesture sensor makes the direction in the VR world



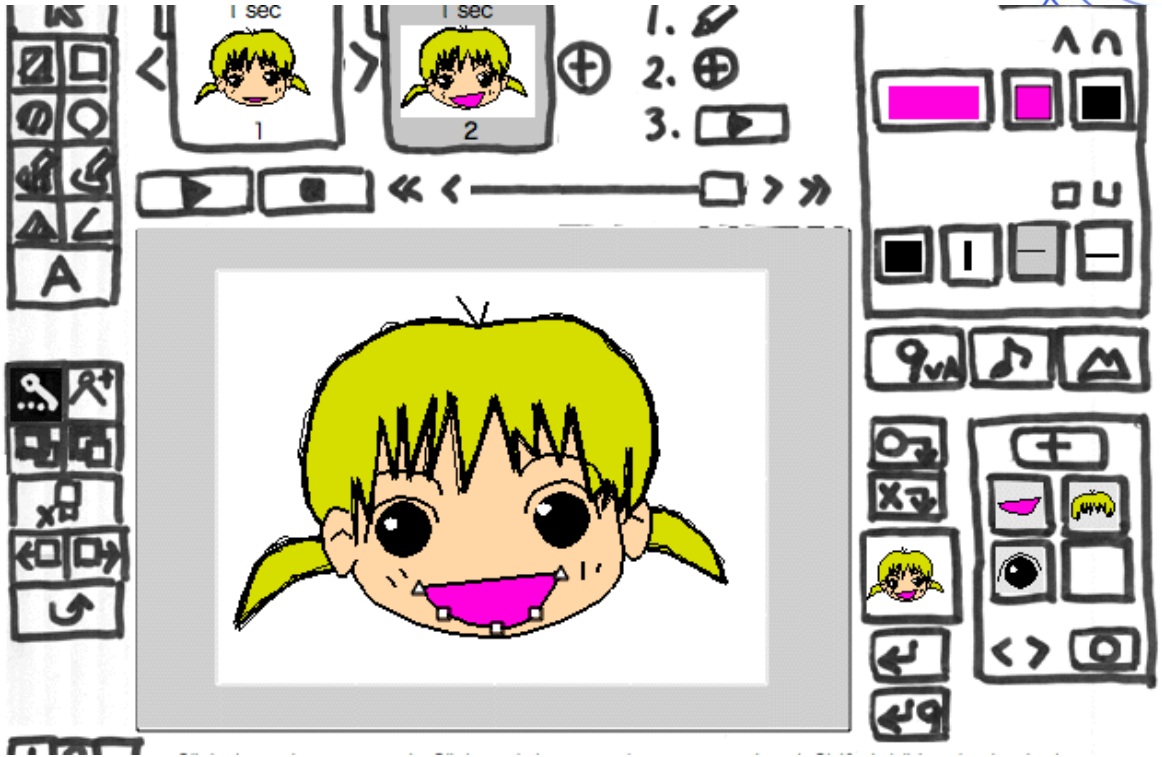
RAPIRO is the robot with Raspberry Pi

It is programmable Robot to learn how Robot works
(it is my first time to help the project for Crowdfunding)



9va-pi - Animation Creator Project

It is for kids learn drawing

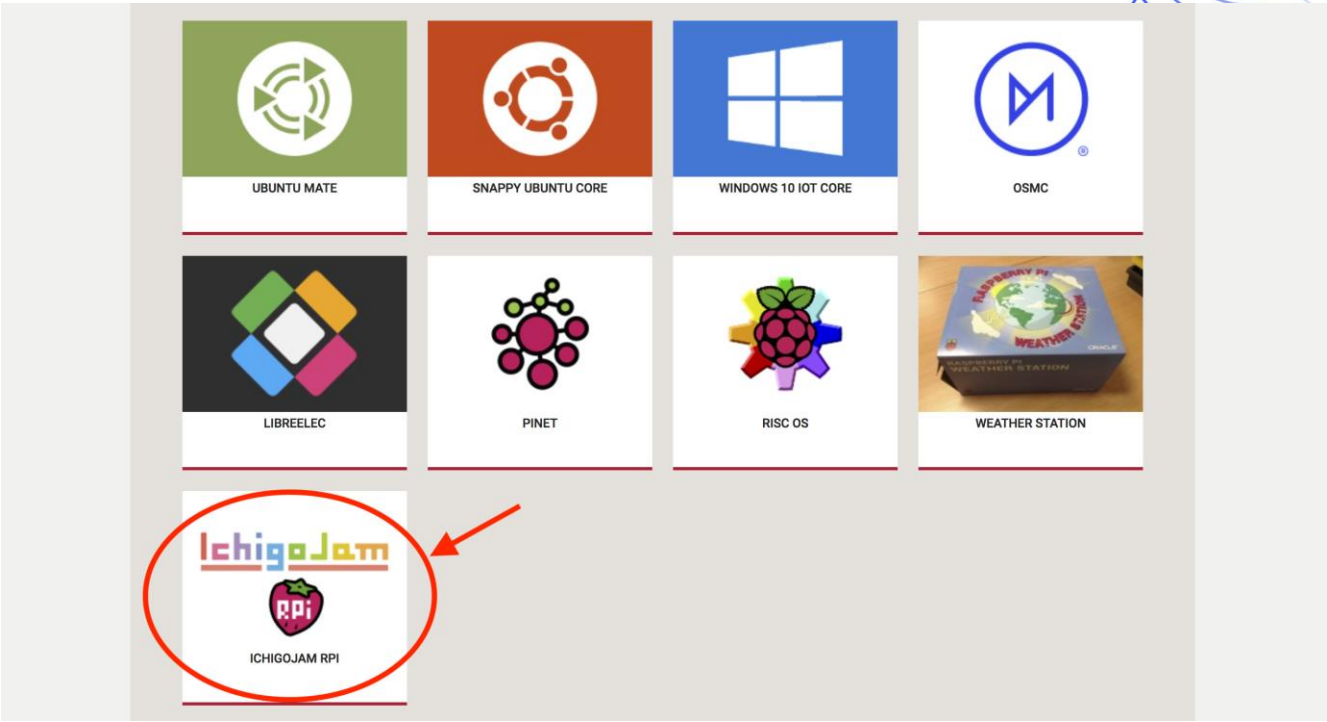


Ichigo Jam RPi OS is BASIC OS for education

BASIC is the another way to educate programming to kids

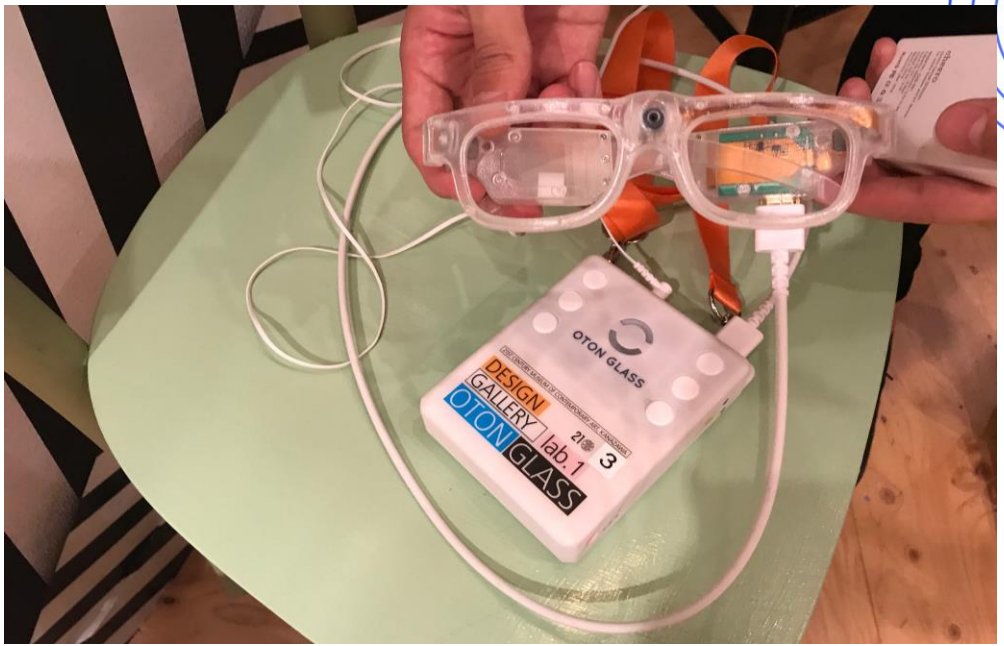
Download ichigoJam RPi OS from Official site

You can download to play with it :-)



OTON GLASS to read characters

OTON GLASS has been made for handicapped who cannot read characters

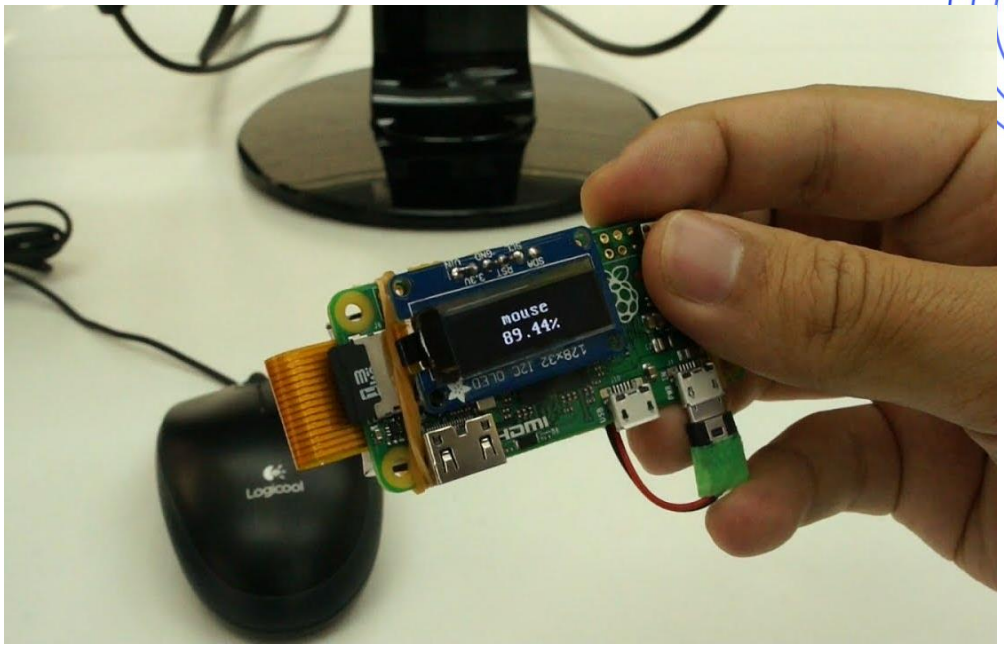


Cucumber recognition on Raspberry Pi

Check cucumbers shape for the quality
It is with Deep learning executed on Google Cloud

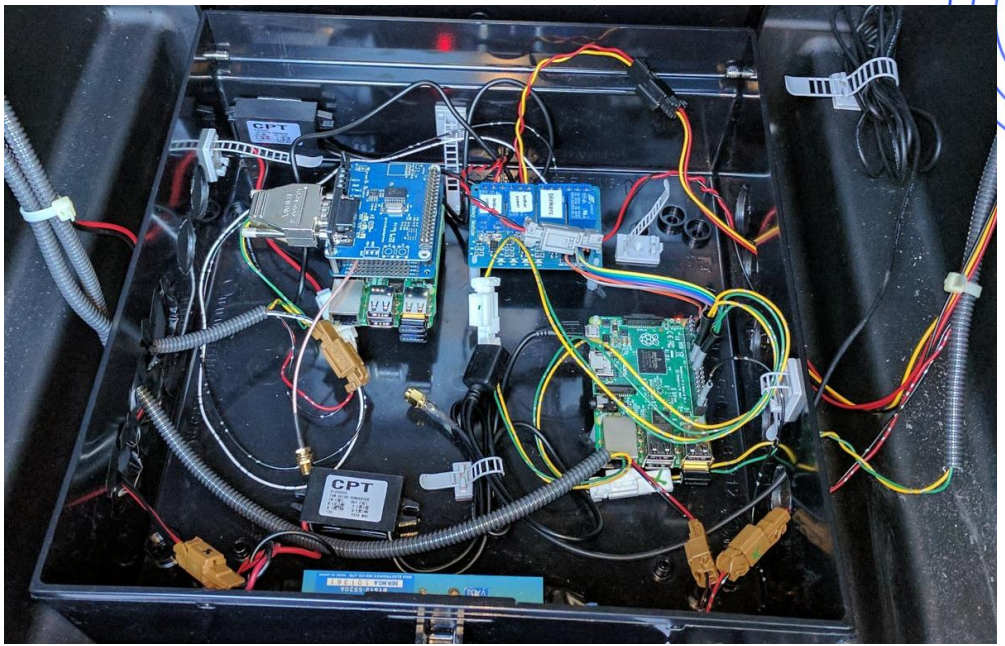
Raspberry Pi, CPU+GPU with Tensorflow

An AI vendor Idein has made image recognition system runs PiZero and it works very faster.



Raspberry Pi on CAN-Bus Board

Some automotive companies trying Raspberry Pi
as prototyping use for their connected car project



Small prototype use for learning IT

Atsushi Inoue is the professor at Eastern Washington Univ using RPi for IT+Major and 'mini-startup' studies..

Atsushi Inoue, PhD
Eastern Washington University, Spokane, WA 99202
Email: ainoue@ewu.edu, Web: http://www.inoueatsushi.net/

Curriculum.

Courses required:

- Business Core (70 credits)
  - Accounting
  - Economics
  - Analytics
  - Communication & presentations
  - Law
  - Organizational Theory & Behavior
  - Operational Management
  - Finance
  - Marketing
  - Information Technologies
- Public Health Administration (20 credits)
  - Administration & supervision
  - Process improvement
  - Insurance
  - Policies, standards & regulations
  - Human resource
- Information Technology (20 credits)
  - Networking
  - Database
  - System analysis & design
  - Information security management
  - **Health information technology**
- Internship or cooperative education (5 credits)

Features:

- AACSB International accredited.
- Goal: IT management in healthcare industries.
- Close relation with local industries.
  - Hospitals
  - Related services (medical images such as Inland Imaging, speech recognition such as NextIT, etc.)

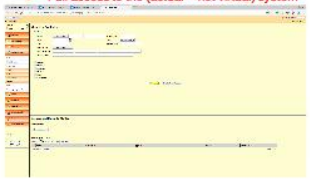
Hands-on materials.

Raspberry Pi -- open source hardware.

- Raspbian OS on Raspberry Pi 3.
  - (Optional) Raspberry Pi zero+USB only.
- Internet Connection Sharing (via direct wiring).
  - (Optional) WiFi AP+an Internet router.
- USB power supply.
- MicroSD as a disk.

OpenEMR -- open source web-based EHR.

- ONC certified complete EHR (2014 edition).
- Easy installation from the Internet -- LAMP.
- Full access to the (actual -- not virtual) system



Students

- install and configure the server.
- generate mock medical records and users.
  - (optional) phpmyadmin

Simulated healthcare practice.

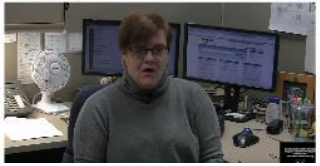
A small group to play a skit.

- Nurse triage (picture below)
- Clark -- scheduling, check-in, etc.
- Billing and accounting
- Lab -- ECG, EEG, using other IoT devices
- Medical imaging (radiology)

AND/OR

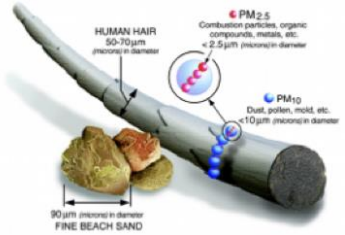
A small group to develop a video of expertise in health information technologies (WHIIEC Expert Series).

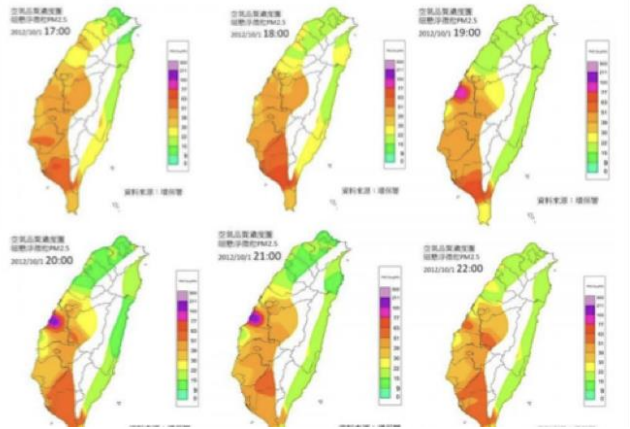
- Interview
- Panel



Airbox project to check PM2.5

Taiwan has serious problem about PM2.5
Check PM2.5 with Raspberry Pi





Ask a favor..

Please introduce your project and activities

Please introduce your project and activities

Tell me your project and activities!

- Raspberry Pi Foundation/Trading is looking for good project
  - They think there are good projects in asian area but can't look.
- Please tell me your project
  - Please tell me project in detail
  - I could introduce to Raspberry Pi Foundation/Trading to help some.
- Please tell me your activities with Raspberry Pi
  - It is very far from UK here in Korea/Japan
  - We should 'shout' more so that Raspberry Pi Foundation/Trading could hear and check
  - If something lack (e.g. there are no AIYKit dealer in Korea) please let me know

THANK YOU!

mailto:masafumi@pid0.org
tweet:@masafumiohta