Public Notes

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Daniel's Public Notes

Reading list

1 Todo

- ☐ Do this
- ☒ Done that

2 Projects

- Projects
- Crudus MD Notes
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- Crudus Photos
- Maximus

3 3D Printing

- 3D printing

4 Electronics

- Electronics

5 Useful stuff

- [Markdown Cheatsheet](#)
- [Useful commands](#)

6 Reading List

- Elixir phoenix absinthe graphql react apollo https://schneider.dev/blog/elixir-phoenix-absinthe-graphql-react-apollo-absurdly-deep-dive/
- Uber design: http://simonpan.com/work/uber/
- Modern GPS Tracking Platform: https://www.traccar.org

6.1 Topics

6.1.1 Collision engine

- https://gamedev.stackexchange.com/questions/26501/how-does-a-collision-engine-work

6.1.2 The OAuth 2.0 Authorization Framework

- https://tools.ietf.org/html/rfc6749

6.1.3 Event Sourcing

- https://www.martinfowler.com/eaaDev/EventSourcing.html

6.1.4 Micro frontends

- https://www.martinfowler.com/articles/micro-frontends.html

6.1.5 Micro services

- https://www.martinfowler.com/microservices/

6.1.6 12 factor application

- https://12factor.net/

6.1.7 RabbitMQ RPC

- https://www.rabbitmq.com/tutorials/tutorial-six-python.html

6.2 Check out

- My business card runs linux
- https://www.envoyproxy.io/docs/envoy/latest/start/start
- https://github.com/heptio/contour
- https://www.jaegertracing.io/
- https://istio.io/

6.3 Video course

- https://www.linkedin.com/learning/jhipster-build-and-deploy-spring-boot-microservices/welcome
- https://www.linkedin.com/learning/microservices-asynchronous-messaging/getting-work-done-in-microservices
- https://vimeo.com/74589816
- https://vimeo.com/99531595
- https://www.infoq.com/presentations/migration-cloud-native/

7 3D Printing

- Ultimaker
- Snapmaker

7.1 CNC

7.1.1 Laser cutter

- Lasersaur

7.2 Snapmaker

https://forum.snapmaker.com/t/reverse-engineering-the-module-wiring/3031

3D Printing Module:

```
1  PIN1: VCC, Heater Socket Pin 1, Fan+
2  PIN2: Stepper Coil A+
3  PIN3: Heater Socket Pin 2
4  PIN4: Stepper Coil A-
5  PIN5: Thermistor Socket Pin 1
6  PIN6: Stepper Coil B-
7  PIN7: GND, Fan-, Thermistor Socket Pin 2
8  PIN8: Stepper Coil B+
```

Heated Build Plate:

```
1  PIN1: Heating Element +
2  PIN2: UNUSED
3  PIN3: Heating Element -
4  PIN4: UNUSED
5  PIN5: Thermistor +
6  PIN6: Thermistor -
```

The heating element registered as 12Ohms so 48W at 24V. The Thermistor gave a reading of 80kOhm in my 90 degree F garage.

Linear Module:

```
1  PIN1: Coil A +
2  PIN2: Coil A -
3  PIN3: Coil B +
4  PIN4: Limit Switch +
5  PIN5: Coil B -
6  PIN6: Limit Switch -
```

7.3 Ultimaker

7.3.1 Repairs

7.3.1.1 Nozzle

Ultimaker 2 - Removing the Nozzle   https://www.youtube.com/watch?v=-1Nh0snHLYw
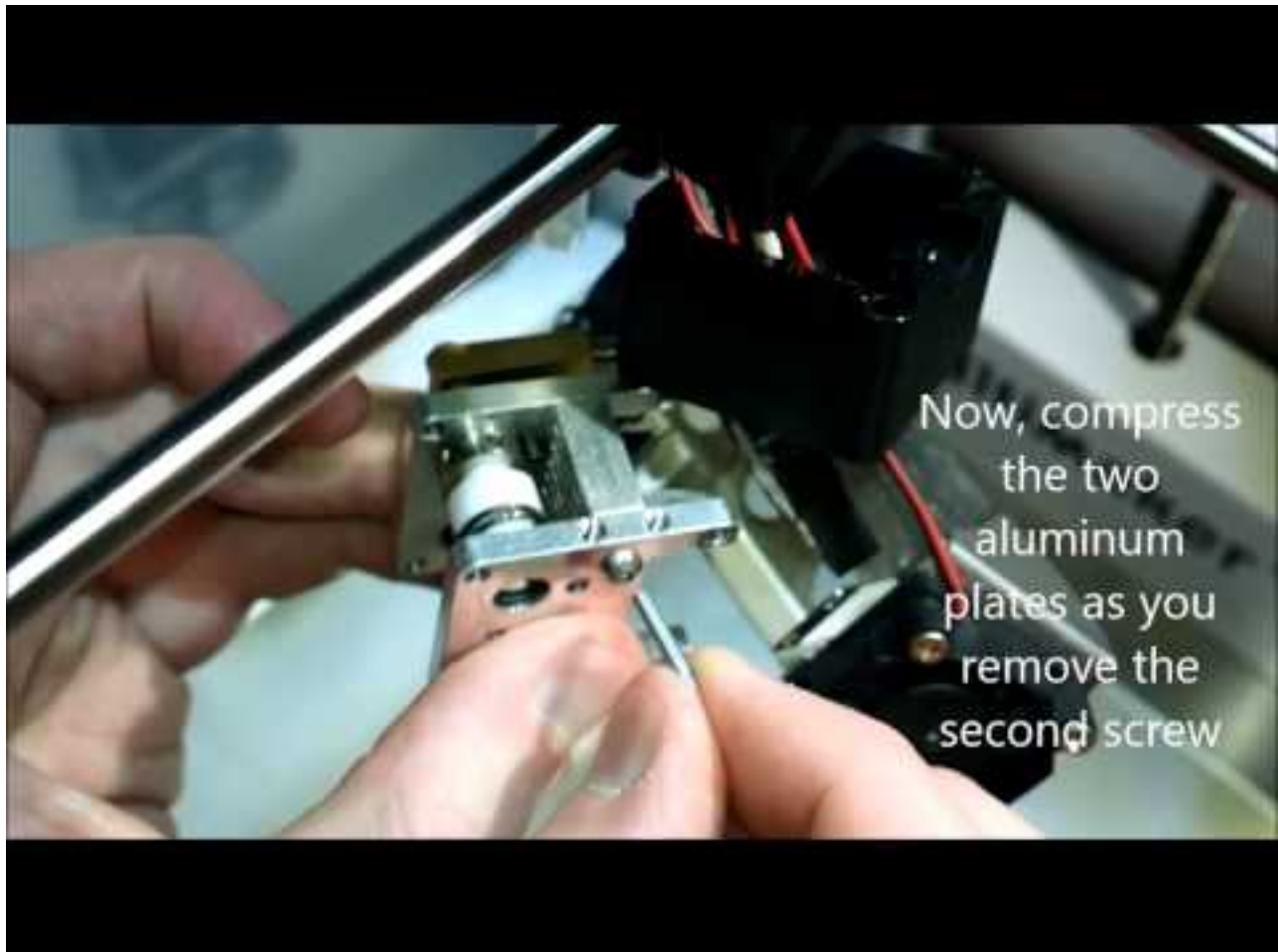
8 Amateur radio

8.1 RTLSDR

- RTLSDR

8.2 Articles

- Walkie Talkies
- NAME THAT UNKNOWN RF SIGNAL WITH A LITTLE FFT MAGIC
- ALL BAND RADIO USES ARDUINO AND SI4730

8.3 Links

- Ham radio Frequency Chart
- Norske Frekvenser

8.4 BaoFeng UV-5R

Figure 8.1: Baofeng

8.4.1 Features

25KHz/12.5KHz Switchable (Wide/Narrow Band)

FM Radio (65.0MHz-108.0MHz)

Large Inverted LCD Display

LED Flashlight

High /Low RF Power Switchable

VOX

50 CTCSS/ 104 DCS Tones

Tone searching/scanning

Dual standby

PC programmable

Transmitter time-out timer(TOT)

Busy channel lock-out(BCLO)

8.4.2 UV-5R SPECIFICATIONS

Frequency range:

[TX] 136 - 174MHz, 400 - 520MHz

[RX] 136 - 174MHz, 400 - 520MHz, 68-108MHz (FM Broadcast)

Channel Capacity:

128 Channels

Channel Spacing

25KHz (wide band)12.5KHz (narrow band)

Sensitivity

≤0.25μV (wide band) ≤0.35μV (narrow band)

Operation Voltage

7.4V DC ±20%

Battery:

1500mAh

Frequency step:

2.5, 5, 6.25, 10, 12.5, 20, 25, 30 and 50KHz

Antenna:

Antenna Connector: SMA-Female / Antenna Impedance: 50Ω

Accessory Connector:

Kenwood 2 Pin Standard

Stability:

±2.5ppm

Output power:

5W / 1W

Audio Power Output

700mW/10%

8.4.3 Links

- Manual

9 Electronics

Notes about electronics

9.1 Books

- [Ultimake Electronics](#) - Online book, interactive schematics & simulations.

9.2 Canbus

9.2.1 Tools

- https://github.com/eerimoq/cantools

9.2.2 Canbus addresses

- https://community.carloop.io/t/list-of-can-id-descriptions-from-opengarages-org/104
- http://www.loopybunny.co.uk/CarPC/can/267.html

9.3 FTDI

9.3.1 FT232

This version have 3.3V. The data signals are at 3V and the power line provides 5V. We suggest this for any product that needs FTDI cables. Because the cable is 5V-logic compliant, you can use it with 3v or 5v logic just fine - no level shifting required!.

[Adafruit product page](#)
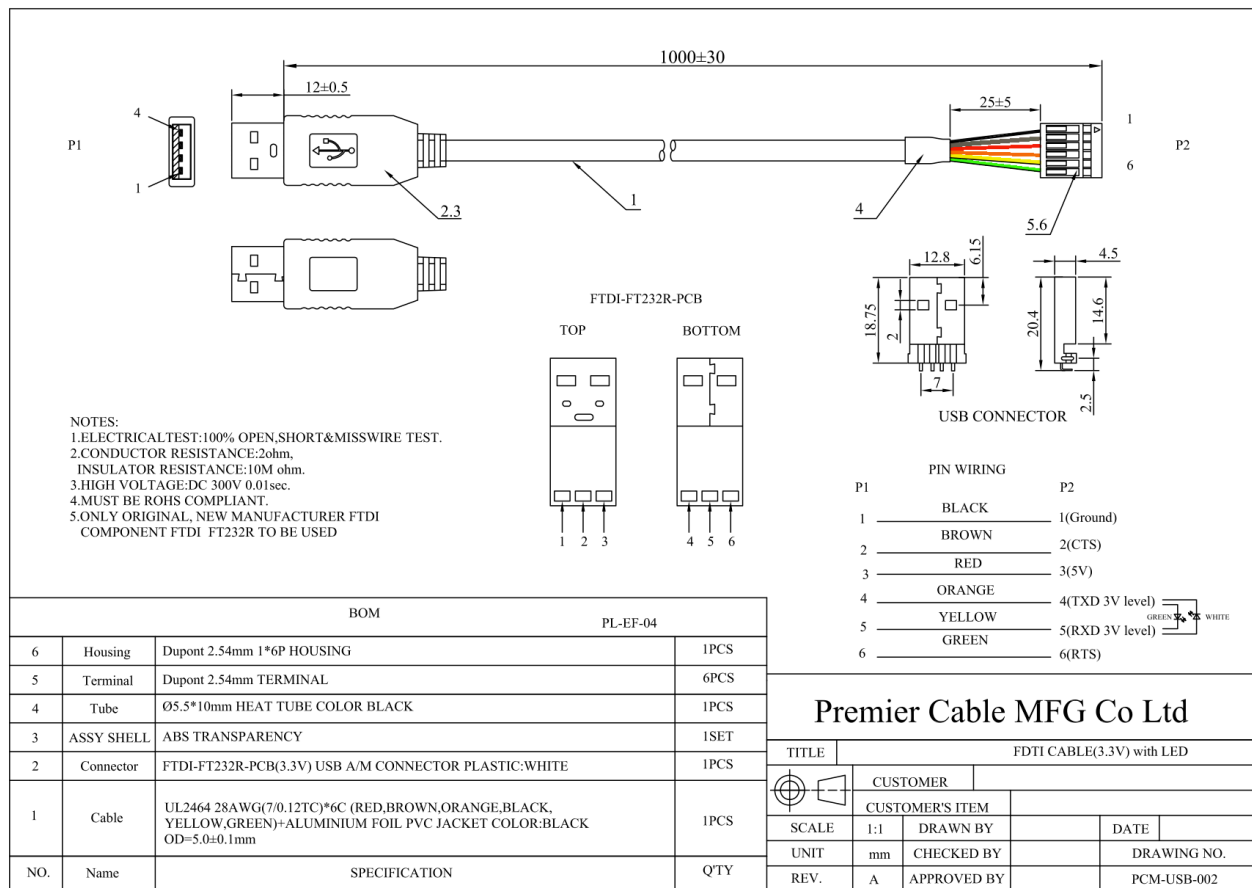
Figure 9.1: FTDI - FT232

Figure 9.2: Cable

9.3.1.1 Links

- DS_TTL-232R_CABLES_V201.pdf

9.4 i2c

9.4.1 Articles

- I2C in a nutshell

9.5 Led
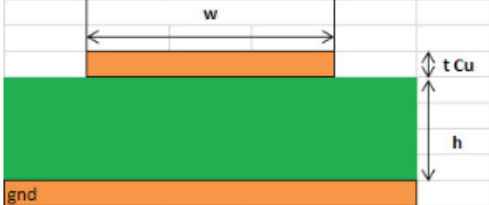
9.5.1 Links

- https://www.instructables.com/id/WiFi-LED-Light-Strip-Controller/

9.6 433mHz

9.6.1 Tools

Figure 9.3: Surface Microstrip

Strip line impedance calculator: https://www.multi-circuit-boards.eu/en/pcb-design-aid/impedance-calculation.html
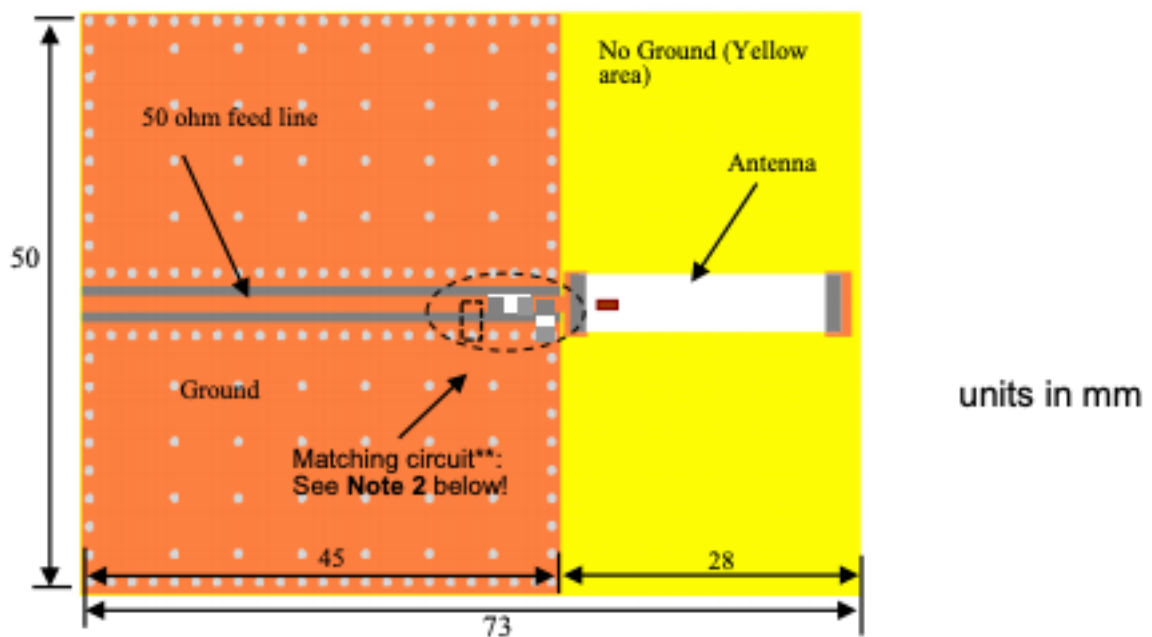
Figure 9.4: Feed line

50 ohm impedance feed line: https://www.disk91.com/2015/technology/hardware/design-a-50ohm-impedance-net-for-rf-signals/

9.6.2 PDF's

- 433 MHz ISM Antenna SMD.pdf

9.7 Audio

9.7.1 Articles

- How to build a Microphone Amplifier Circuit

9.7.2 Microphone Array

9.7.2.1 Links

- Quad op-amp LM3900 (PDF)
- Multi-channel audio mixer circuit using LM3900

9.7.3 Synthesizers

9.7.3.1 Atari Punk Console

Modification (changed speaker to line output) of the Stepped Tone Generator taken from the "Engineer's Mini-Notebook - 555 Circuits" by Forrest M. Mims, III (Siliconcepts, 1984)

Figure 9.5: APC

Links

- https://compiler.kaustic.net/machines/apc.html
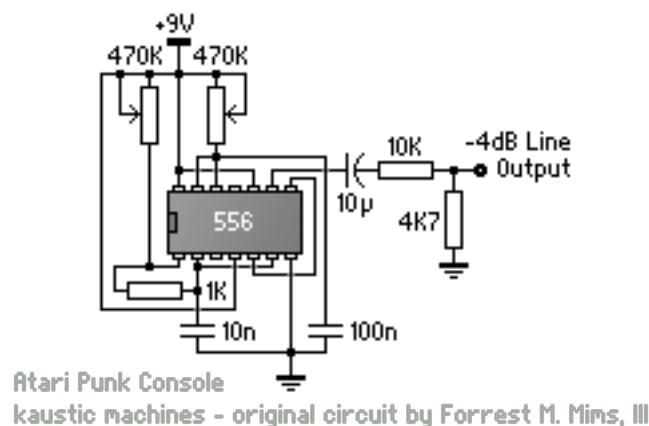
9.8 MAX3107

The MAX3107 is an advanced universal asynchronous receiver-transmitter (UART) with 128 words each of receive and transmit first-in/first-out (FIFO) that can be controlled through I²C or high-speed SPI™. The 2x and 4x rate modes allow a maximum of 24Mbps data rates. A phase-locked loop

(PLL), prescaler, and fractional baud-rate generator allow for high-resolution baud-rate programming and minimize the dependency of baud rate on reference clock frequency.
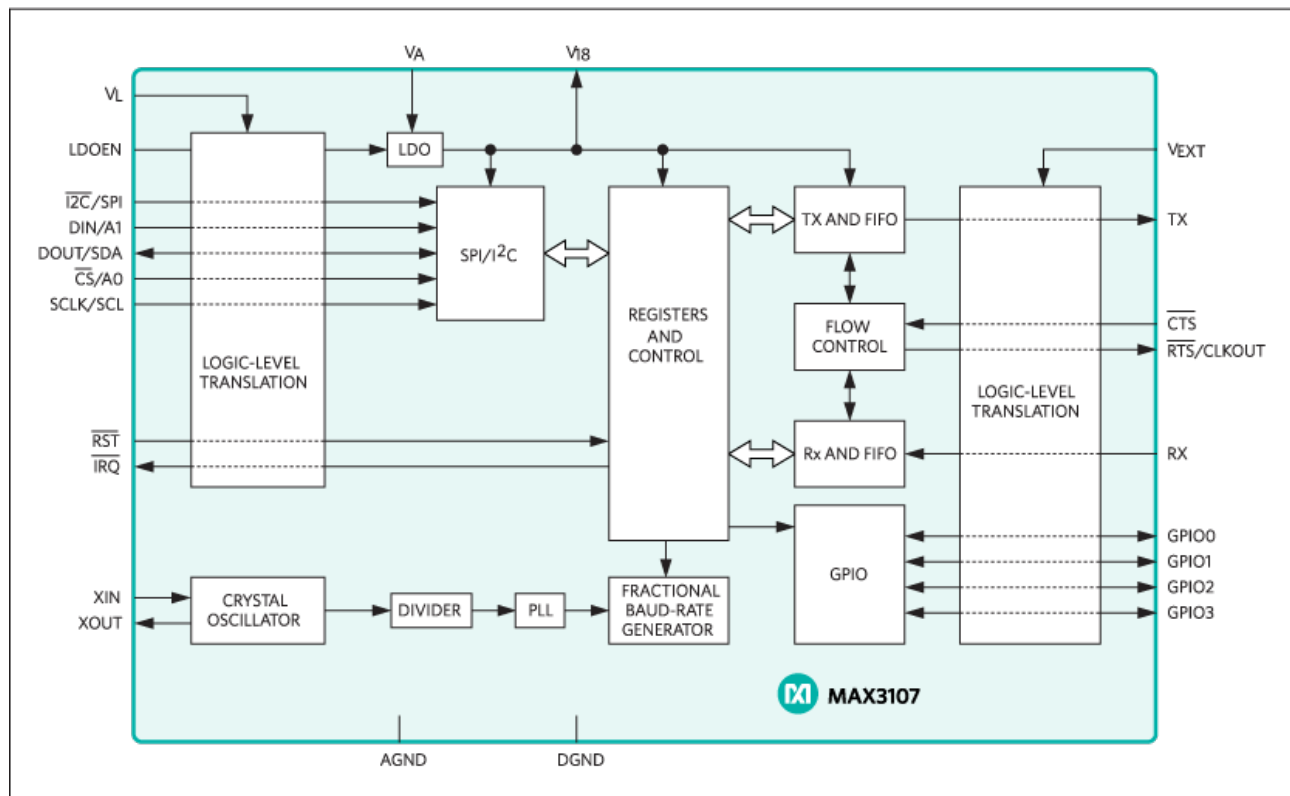
Figure 9.6: MAX3107

9.8.1 Datasheets

- MAX3107.pdf

9.9 Espressif

9.9.1 ESP 32

9.9.1.1 Encryption

- https://limitedresults.com/2019/11/pwn-the-esp32-forever-flash-encryption-and-sec-boot-keys-extraction/
- Emulating a bluetooth keyboard with ESP32

9.9.2 ESP 8266

9.10 GSM Modules

9.10.1 Adafruit Fona 3g cellular breakout

- Quad-band 850MHz GSM, 900MHz EGSM, 1800MHz DCS, 1900MHz PCs - connect onto any global GSM network with any 2G SIM.
- This is the European Version - with dual-band UMTS/HSDPA 900/2100MHz WCDMA + HSDPA
- Fully-integrated GPS (Qualcomm PM8015 GPS) that can be controlled and query over the same serial port
- Make and receive voice calls using a headset or an external 8Ω speaker + electret microphone
- Send and receive SMS messages
- Send and receive GPRS data (TCP/IP, HTTP, etc.)
- AT command interface can be used with 300, 600, 1200, 4800, 9600, 19200, 38400, 57600, 115200, 230K, 461K, 961K, 3.2M, 3.7M and 4.0Mbps
- Native USB support - plug it into a computer and you'll get serial ports for AT commands, GPS NMEA as well as a modem (note we've only tried out the AT&NMEA ports on Windows)

Cool fact: The Fona also has a built-in GPS.

Not-so-cool fact: The Pi can only make one serial connection. Checkout article *Sending AT commands to SIM900 whilst pppd is active*

Figure 9.7: Adafruit fona 3g

9.10.1.1 GPS specifications

- 16 acquisition channels
- GPS L1 C/A code
- Sensitivity

    – Tracking: -157 dBm
    – Cold starts : -144 dBm

- Time-To-First-Fix

    – Cold starts: 100s (typ.)
    – Hot starts: 1s (typ.)

- Accuracy: approx 2.5 meters

9.10.1.2 Implementation

9.10.1.3 Setup

Edit */boot/config.txt*

```
1   enable_uart=1
```

Install dependencies

```
1   sudo apt-get update
2
3   sudo apt-get install ppp screen
```

Try it out

```
1   sudo screen /dev/serial0 115200
```

Celluar

```
1   sudo -i
2
3   cd /etc/ppp/peers/
4
5   wget https://raw.githubusercontent.com/adafruit/FONA_PPP/master/fona
```

Open that file to view PPPD settings when "fona" is called. Read more about chat and chatscripts
here.

```
1   vim fona
```

You should see this:

```
1   ### Example PPPD configuration for FONA GPRS connection on Debian/Ubuntu.
2
3   ### MUST CHANGE: Change the -T parameter value **** to your network's APN value.
4   ### For example if your APN is 'internet' (without quotes), the line would look like:
5   ### connect "/usr/sbin/chat -v -f /etc/chatscripts/gprs -T internet"
6   connect "/usr/sbin/chat -v -f /etc/chatscripts/gprs -T telia"
7
8   ### MUST CHANGE: Uncomment the appropriate serial device for your platform below.
9   ### For Raspberry Pi use /dev/ttyAMA0 by uncommenting the line below:
10  /dev/ttyUSB0
11  ###/dev/ttyAMA0
12  ### For BeagleBone Black use /dev/ttyO4 by uncommenting the line below:
13  ###/dev/ttyO4
14
15  ### Speed of the serial line.
16  115200
17
18  ### Assumes that your IP address is allocated dynamically by the ISP.
19  noipdefault
20
21  ### Try to get the name server addresses from the ISP.
22  usepeerdns
23
24  ### Use this connection as the default route to the internet.
25  defaultroute
26
27  ### Makes PPPD "dial again" when the connection is lost.
28  persist
29
30  ### Do not ask the remote to authenticate.
31  noauth
32
33  ### No hardware flow control on the serial link with FONA
34  nocrtscts
35
36  ### No modem control lines with FONA.
37  local
```

connect to internet:

```
1   sudo pon fona
```

disconnect

```
1   sudo poff fona
```

Realtime clock   Set the realtime clock see Forum.

> AT+CLTS? You will get this if it is disabled:
>
> +CLTS: 0
>
> To enable it enter this:
>
> AT+CLTS=1
>
> CLTS=1 must be saved in the SIM800's nonvolatile memory so it will be enabled when the module powers up and registers on the network.
>
> Since this setting is not automatically saved in nonvolatile memory, you must save it with:
>
> AT&W
>
> (This saves all writeable settings)
>
> Now restart your SIM800
>
> After it registers AT+CCLK? will respond with the correct time, as in my case:
>
> +CCLK: "14/08/08,02:25:43-16"

Send SMS   Set in sms mode: AT+CMGF=1

Send message

```
1   AT+CMGS="+4799999999"<ENTER>
2   > your message<CTRL+Z>
```

Data sim phone number: +47 580009700018

Commands log (02.02.2020)

```
1    AT+CCLK="02/02/20,23:19:00+01"
2
3
4    AT+CMGS="+4794835300"
5
6    AT+CMGR=ALL
7
8    AT+CSCA="+47580009700018"
9
10
11
12   ATD + +4794835300;
13
14   AT+CMGF=0
15
16   AT+CREG
17
18   AT+CMGF=1
19
20   AT+CHTTPSOPSE="google.com",443,2
21
22   AT+CGDCONT=1,"IP","telia"
23
24   AT+CGDCONT?
```

Important note

> I 2019 startet utfasingen av 3G fylke for fylke. Utfasingen startet med 900MHz-båndet, mens 2100MHz fases ut i 2020. En hovedårsak til utfasingen er at 4G-nettet i 2019 var fullt utbygd og kunne overta de fleste funksjonene 3G-nettet hadde, samt at frekvensene til 3G etter en utfasing kan brukes til andre funksjoner. Utstyr uten 4G-mulighet virker etter utfasingen via 2G, slik at telefonfunksjonene virker, mens dataoverføring via mobilnettet ikke lenger er mulig. I følge Telia gikk 4G-hastighetene i Hedmark opp da 3G-nettet ble slukket. ref. Wikipedia

9.10.1.4 Articles

- Cellular & GPS Enabled Pi 3: Fona + Pi 3
- FONA Tethering to Raspberry Pi or BeagleBone Black
- Sending AT commands to SIM900 whilst pppd is active

9.10.2 Sierra Wireless WP7607-1

Reliable Cat-1 LTE connectivity for 4G networks with 3G and 2G fallback in EMEA The WP7607-1 module is part of the WP Series offering a secure device-to-cloud architecture enabling IoT developers to build a Linux-based product on a single module – reducing overall system complexity and time-to-market.

This LTE Cat-1 wireless module is ideal for low-bandwidth IoT applications that require real-time communication along with the longevity and network quality that 4G LTE networks bring.

Delivering up to 10Mbps download speed, many organizations are using Cat-1 networks as a stepping stone to low-power wide-area (LPWA) networks as 4G LTE can provide a superior user experience over 2G and 3G technologies.

Figure 9.8: WP Series

9.10.2.1 Links

- Digikey - WP7607-1
- Sierra Wireless - Embedded solutions
- AirPrime WP7607-1 IoT Module

9.11 Modbus

Tutorial: https://www.renesas.com/eu/en/www/doc/whitepapers/interface/rs-485-transceiver-tutorial.pdf

Chip brukt i kontroller: SN65HVD485E Half-Duplex RS-485 Transceiver (http://www.ti.com/lit/ds/symlink/sn65hvd485e.pdf)

RS-485 til UART https://www.sparkfun.com/products/10124

Anbefalt modbus usb driver: https://www.sparkfun.com/products/9822

Datasheets: https://www.sparkfun.com/datasheets/BreakoutBoards/USB-to-RS485-Breakout-v11.pdf

For "end of line" motstand kjøp både 120 og 220ohm

10 Hardware

10.1 Oculus Rift

10.1.1 Oculus Rift + Steam VR + Linux

Article: https://steamcommunity.com/app/221410/discussions/0/1696046342850651740/

10.1.2 Links

- OpenHMD

10.2 SDR

10.2.1 LimeSDR

- LimeSDR Mini

10.2.2 SDRPlay

- SDRPlay

11 Machine learning

11.1 Articles

- Contrastive Self-Supervised Learning
- Dopamine and temporal difference learning: A fruitful relationship between neuroscience and AI

11.2 Chat bots

11.2.1 Alternatives

- Wit.ai
- Botpress
- Botkit
- Dialogflow

11.2.2 On premise

- ai-chatbot-framework

11.3 Chaos

-
- Chaos visual example

12 Physics

12.1 Articles

- Gears

13 Productivity

13.1 Articles

- Remote software developer productivity
- Want to know the easiest way to save time? Use `make`!

14 Programming

- Rust

14.1 Sorting

- Flash sort algorithm

14.2 Hexagonal architecture

The **hexagonal architecture**, or **ports and adapters architecture**, is an architectural pattern used in software design. It aims at creating loosely coupled application components that can be easily connected to their software environment by means of ports and adapters. This makes components exchangeable at any level and facilitates test automation.

Read more

14.3 Frameworks

14.3.1 Firebase

14.3.1.1 Alternatives

- Sapphire

14.3.2 Sapphire

Open source alternative to firebase https://sapphire-db.com/start/main

14.3.3 Spring boot

14.3.3.1 Quarkus

The JHipster Quarkus demo app

- https://quarkus.io/

14.4 Programming languages

14.4.1 C++

14.4.1.1 Articles

- Datastructure APIs in C++

14.4.1.2 Videos

- Bjarne Stroustrup – The Essence of C++ (2014)

14.4.2 Golang

14.4.2.1 Tips and tricks

Vendors

```
1  go mod init
2  go mod vendor
```

14.4.2.2 Links

Web framework

- Gin gonic

ORM

- http://gorm.io/

GUI

- https://hackernoon.com/how-to-add-a-gui-to-your-golang-app-in-5-easy-steps-c25c99d4d8e0
- https://github.com/andlabs/ui
- https://github.com/therecipe/qt

Web

- GraphQL Schema Language Cheat Sheet
- Learn Golang + GraphQL + Relay #1
- Learn Golang + GraphQL + Relay #2
- https://github.com/mingrammer/go-web-framework-stars

Div

- Awesome Go - A curated list of awesome Go frameworks, libraries and software.

14.4.2.3 Articles

- [Example of Golang CRUD using MySQL from scratch](#)
- [Real-Time Maps with a Raspberry Pi, Golang, and HERE XYZ](#)
- [Reverse Geocoding NEO 6M GPS Positions with Golang and a Serial UART Connection](#)

14.4.2.4 Serial UART

- [Go Serial](#)
- [Tarm Serial](#)

14.4.3 Hammerspoon

This is a tool for powerful automation of OS X. At its core, Hammerspoon is just a bridge between the operating system and a Lua scripting engine. What gives Hammerspoon its power is a set of extensions that expose specific pieces of system functionality, to the user.

https://www.hammerspoon.org/

14.4.4 Rust

14.4.4.1 Links

Web

- https://rocket.rs/

GUI

- https://github.com/PistonDevelopers/conrod
- http://relm.ml/relm-intro

ORM

- http://diesel.rs/guides/getting-started/

ESP32

- https://mabez.dev/blog/posts/esp32-rust/

14.5 Software as a Service

14.5.1 Auth0

Auth0 is free with up to 7,000 active users, unlimited logins. No credit card required.

- Auth0

15 Projects

- [Crudus MD Notes](#)
- [Maximus](#)

15.1 Inspiration aka others awesome projects

- [Rotary Cellphone](#)

15.2 Status Light

15.2.1 iOS app

- https://stackoverflow.com/questions/23535355/how-to-detect-call-incoming-programmatically
- https://www.raywenderlich.com/150015/callkit-tutorial-ios

15.3 BMW Media Center

- BMW Connected Apps Protocol https://hufman.github.io/stories/bmwconnectedapps
- [Shopping list](#)

15.3.1 Articles

- https://hackaday.io/project/161745-can-bus-hacker
- https://hackaday.com/2019/05/09/sniffing-can-to-add-new-features-to-a-modern-car/

15.3.2 Shoppinglist for BMW

15.3.2.1 Bmw controller

- https://www.cubietruck.com/products/cubieboard4-cc-a80-high-performance-mini-pc-development-board
- https://www.96boards.org/product/hikey960/

15.4 Crudus Markdown Notes

En markdown applikasjon som kan synkronisere med git.

15.4.1 Platform

15.4.1.1 iOS / Android

- Nativescript
- https://libgit2.org/
- https://github.com/libgit2/objective-git
- https://github.com/Raekye/ObjectiveGit-iOS-Example

15.4.1.2 Desktop

- Electron

15.4.2 Links

- https://libgit2.org/
- https://cocoapods.org/pods/libgit2
- https://github.com/libgit2/libgit2#android

15.4.3 Libraries

15.4.3.1 JavaScript

- Marked
- Remarkable
- PageDown (and PageDown Extra)
- markdown-it
- Gitdown: GitHub markdown preprocessor
- reMarked.js: HTML-to-Markdown processor
- Kramed: Fork of Marked

15.4.4 Other Editors

- StackEdit: In-browser MD document editor
- Minimalist Online Markdown Editor
- Mou: macOS editor
- Haroopad: Cross-platform editor

15.5 Crudus Photos

15.5.1 Tensor flow

A person on a beach flying a kite.

A black and white photo of a train on a train track.

A person skiing down a snow covered slope.

A group of giraffe standing next to each other.

Image to text

https://github.com/tensorflow/models/tree/master/research/im2txt

15.5.2 Articles

Building a private, local photo search app using machine learning https://towardsdatascience.com/building-a-private-local-photo-search-app-using-machine-learning-8aeeef8d245c

A step by step guide to Caffe http://shengshuyang.github.io/A-step-by-step-guide-to-Caffe.html

15.5.3 Photo History

Histogram in photography https://www.phototraces.com/photography-basics/histogram-in-photography/

Histogram basics https://docs.opencv.org/3.1.0/d1/db7/tutorial_py_histogram_begins.html

15.5.4 Tools

- Tagbox
- NVIDIA docker support

15.5.4.1 Ubuntu

```
1  sudo apt install exiftran libjpeg-turbo-progs
```

15.5.5 Links

15.5.5.1 Caffe

- https://caffe.berkeleyvision.org/

15.5.5.2 Model zoo

- https://github.com/BVLC/caffe/wiki/Model-Zoo

15.5.5.3 Docker image

- https://github.com/BVLC/caffe/tree/master/docker

15.5.5.4 Diff image

- https://stackoverflow.com/questions/5132749/diff-an-image-using-imagemagick

15.5.5.5 Image Fingerprint

- https://realpython.com/fingerprinting-images-for-near-duplicate-detection/

15.5.5.6 Frame Hash

- https://github.com/sschnug/pyVideoHash/blob/master/frame_hash.pyx

15.5.5.7 Image recognition

- https://www.learnopencv.com/image-recognition-and-object-detection-part1/

15.5.5.8 Duplicate images

- https://github.com/philipbl/duplicate-images
- https://blog.iconfinder.com/detecting-duplicate-images-using-python-cb240b05a3b6
- https://www.youtube.com/watch?v=AIyJSGmkFXk

15.5.5.9 OpenCV Line detection

- https://www.codepool.biz/opencv-line-detection.html
- https://docs.opencv.org/3.4/dd/dd7/tutorial_morph_lines_detection.html

15.5.5.10 Detect horizon

- https://stackoverflow.com/questions/4705837/horizon-detection-algorithm

15.5.5.11 OpenCV Auto-level / histogram

- https://docs.opencv.org/2.4/modules/imgproc/doc/histograms.html?highlight=equalizehist#cv2.equalizeHist

15.5.5.12 OpenCV rotate images

- https://www.pyimagesearch.com/2017/01/02/rotate-images-correctly-with-opencv-and-python/

15.5.5.13 MIT Deep learning

- https://github.com/lexfridman/mit-deep-learning

15.5.5.14 Tensorflow and docker

- https://www.sicara.ai/blog/2017-11-28-set-tensorflow-docker-gpu
- https://stackoverflow.com/questions/47068709/your-cpu-supports-instructions-that-this-tensorflow-binary-was-not-compiled-to-u
- https://github.com/lakshayg/tensorflow-build

15.5.5.15 OpenCV 4

https://www.pyimagesearch.com/2018/08/17/install-opencv-4-on-macos/

15.6 Crudus Sense

15.6.1 BLE device configuration specification

Name	Type	R/W	Key	UUID	Comment
Device name	String	R/W	deviceName	5759f8cc-69ee-11e9-8a12-1681be663d3e	
WiFi Mac	String	R		51ecb1ca-6b85-11e9-a923-1681be663d3e	Read from ESP and register device to Crudus sense backend
WiFi SSID	String	R/W	wifi-ssid	51ecb440-6b85-11e9-a923-1681be663d3e	
WiFi passwd	String	W	wifi-pwd	51ecb594-6b85-11e9-a923-1681be663d3e	
Room	String	R/W	loc-room	51ecb6ca-6b85-11e9-a923-1681be663d3e	
Floor	Integer?	R/W	loc-floor	51ecb7f6-6b85-11e9-a923-1681be663d3e	
Compound	String	R/W	Loc-comp	51ecb922-6b85-11e9-a923-1681be663d3e	
MQTT topic	String	R/W	mqtt-topic	51ecba4e-6b85-11e9-a923-1681be663d3e	Only if MQTT-host is changed
MQTT host	String	R/W	mqtt-host	51ecbf26-6b85-11e9-a923-1681be663d3e	Disables default mqtt host
MQTT port	Integer	R/W	mqtt-port	51ecc156-6b85-11e9-a923-1681be663d3e	Only if MQTT-host is changed
MQTT username	String	R/W	mqtt-user	51ecc2c8-6b85-11e9-a923-1681be663d3e	Only if MQTT-host is changed
MQTT password	String	W	mqtt-pwd	51ecc3fe-6b85-11e9-a923-1681be663d3e	Only if MQTT-host is changed

Name	Type	R/W	Key	UUID	Comment
Crudus Accounts username	String	W	crudus-user	51ecc52a-6b85-11e9-a923-1681be663d3e	For setting default MQTT topic and MQTT username
Crudus Accounts token	String	W	crudus-token	51ecc6d8-6b85-11e9-a923-1681be663d3e	For OTA downloads and MQTT password / token
Calibration temperature	String (comma separated)	R/W	cali-temp	51ecca5c-6b85-11e9-a923-1681be663d3e	For calibrate temperature
Calibration humidity	String (comma separated)	R/W	cali-hum	51eccbb0-6b85-11e9-a923-1681be663d3e	For calibrate humidity
Soft reset	boolean	W	soft-reset	51eccd18-6b85-11e9-a923-1681be663d3e	For clearing preferences

15.6.2 MQTT publish Topics

Topic	Payload	Comment

15.6.3 MQTT Subscribe Topics

Topic	Payload	Action	Comment
/sense/ota		Calls OTA for update	

15.6.4 Extensions

Sleep Tracking using an Arduino https://duino4projects.com/sleep-tracking-using-an-arduino/

Reset: https://www.esp8266.com/viewtopic.php?t=9558&start=8

Chip: CCS811 (indoor air quality sensor)

15.7 Kaldheim.org

15.7.1 Links

- https://themes.getbootstrap.com/product/milo-magazineblog-theme/

15.8 Maximus

15.8.1 Components

- Stereo Pi
- Configure BNO055

15.8.2 Robotics

- Robotics

15.8.3 Articles

- Comparing Gyroscope Datasheets

15.8.4 Artificial Intelligence

- AI Notes

15.8.5 BNO055

15.8.5.1 Installation

- BNO055 - Python & CircuitPython

```
1  pip3 install RPI.GPIO
2  pip3 install adafruit-blinka
```

i2c configuration

- I2C Clock Stretching

In order to use certain I2C sensors, such as the BNO055, you'll need to enable I2C clock stretching 'support' by greatly slowing down the I2C clock on the Raspberry Pi using the device tree overlay.
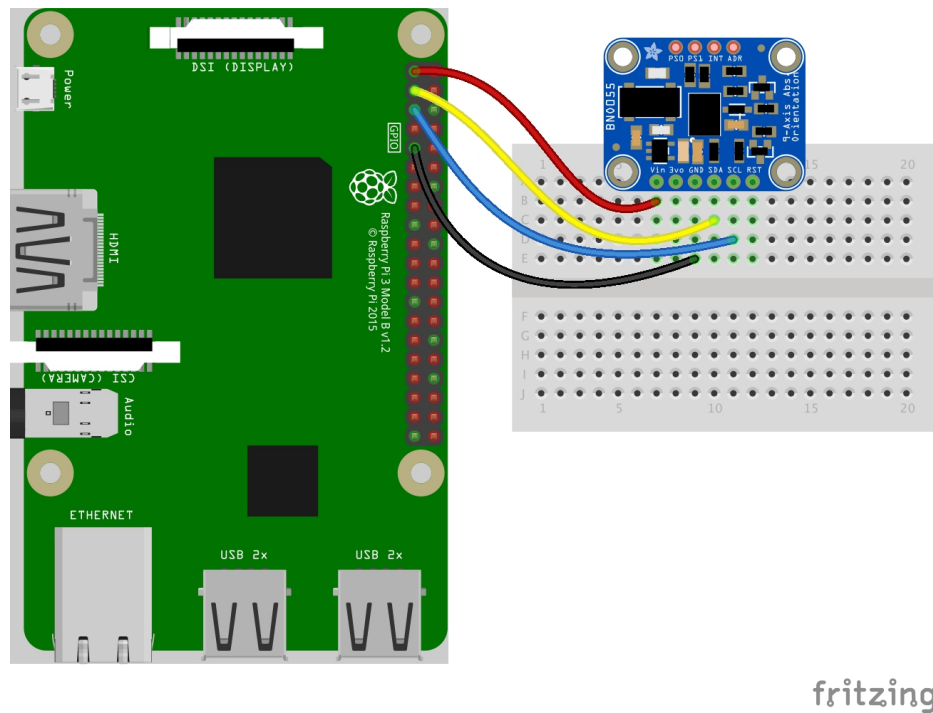
Figure 15.1: Raspberry pi Configuration

Edit */boot/config.txt*

```
1   ### Uncomment some of all of these to enable the optional hardware interfaces
2   dtparam=i2c_arm=on
3   dtparam=i2s=on
4   dtparam=spi=on
5
6   ### Clock stretching by slowing down to 10KHz
7   dtparam=i2c_arm_baudrate=10000
```

Reboot the device

```
1   sudo reboot
```

Check for i2c devices:

```
1   $ i2cdetect -y 1
2        0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
3   00:          -- -- -- -- -- -- -- -- -- -- -- -- --
4   10: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
5   20: -- -- -- -- -- -- -- -- 28 -- -- -- -- -- -- --
6   30: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
7   40: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
8   50: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
9   60: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
10  70: -- -- -- -- -- -- -- --
```

Create new project
```
1   mkdir Maximus && cd Maximus
2   python3 -m venv .env
3   source .env/bin/activate
4   pip3 install adafruit-circuitpython-bno055
```

Example data from sensor:

```
1   Temperature: 28 degrees C
2   Accelerometer (m/s^2): (-0.2, -0.07, -9.77)
3   Magnetometer (microteslas): (-27.75, -4.0625, 32.5)
4   Gyroscope (rad/sec): (-0.001090830782496456, -0.004363323129985824, 0.0)
```

```
5  Euler angle: (None, None, None)
6  Quaternion: (0.011474609375, -0.3623046875, 0.9320068359375, 0.0)
7  Linear acceleration (m/s^2): (1.28, 0.0, -0.01)
8  Gravity (m/s^2): (-0.21, -0.08, -9.8)
```

15.8.5.2 PID controller

- Arduino BNO055 PID Gyro sensor
- PID Control for multiple linear actuators

15.8.5.3 Videos

- How to Implement an Inertial Measurement Unit (IMU) Using an Accelerometer, Gyro, and Magnetometer
- How to Merge Accelerometer with GPS to Accurately Predict Position and Velocity

15.8.5.4 Links

- Adafruit BNO055
- Adafruit BNO055 absolute orientation sensor

15.8.5.5 Documents

- An introduction and tutorial for PID controllers (PDF)

15.8.5.6 Books

- Technician's Guide to Programmable Controllers
- PID Controllers: Theory, Design, and Tuning
- PID Control Fundamentals
- Model-Reference Robust Tuning of PID Controllers (Advances in Industrial Control)
- HANDBOOK OF PI AND PID CONTROLLER TUNING RULES (3RD EDITION)

15.8.6 Development board

Figure 15.2: Schematics
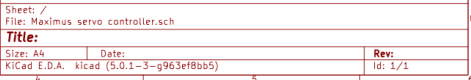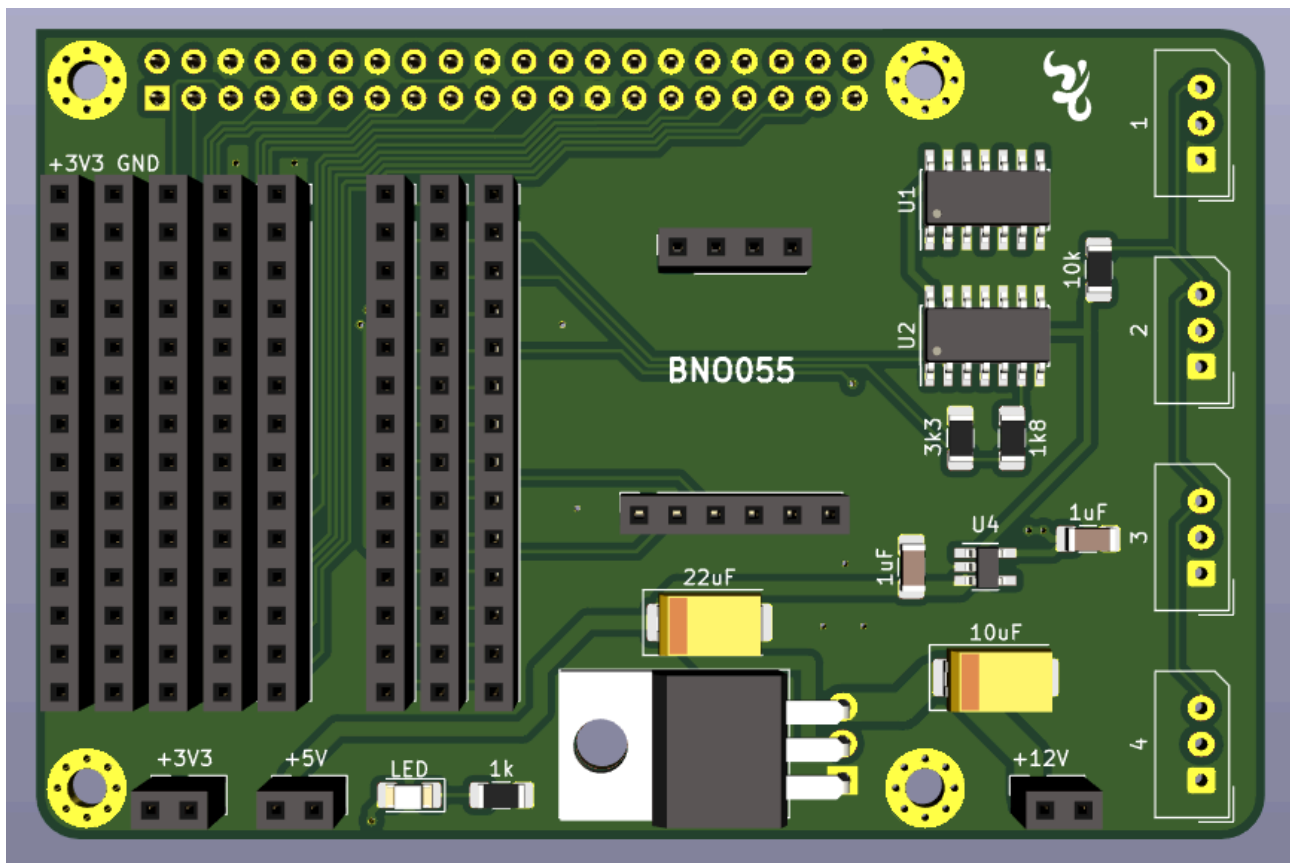
Figure 15.3: Dev board 3d
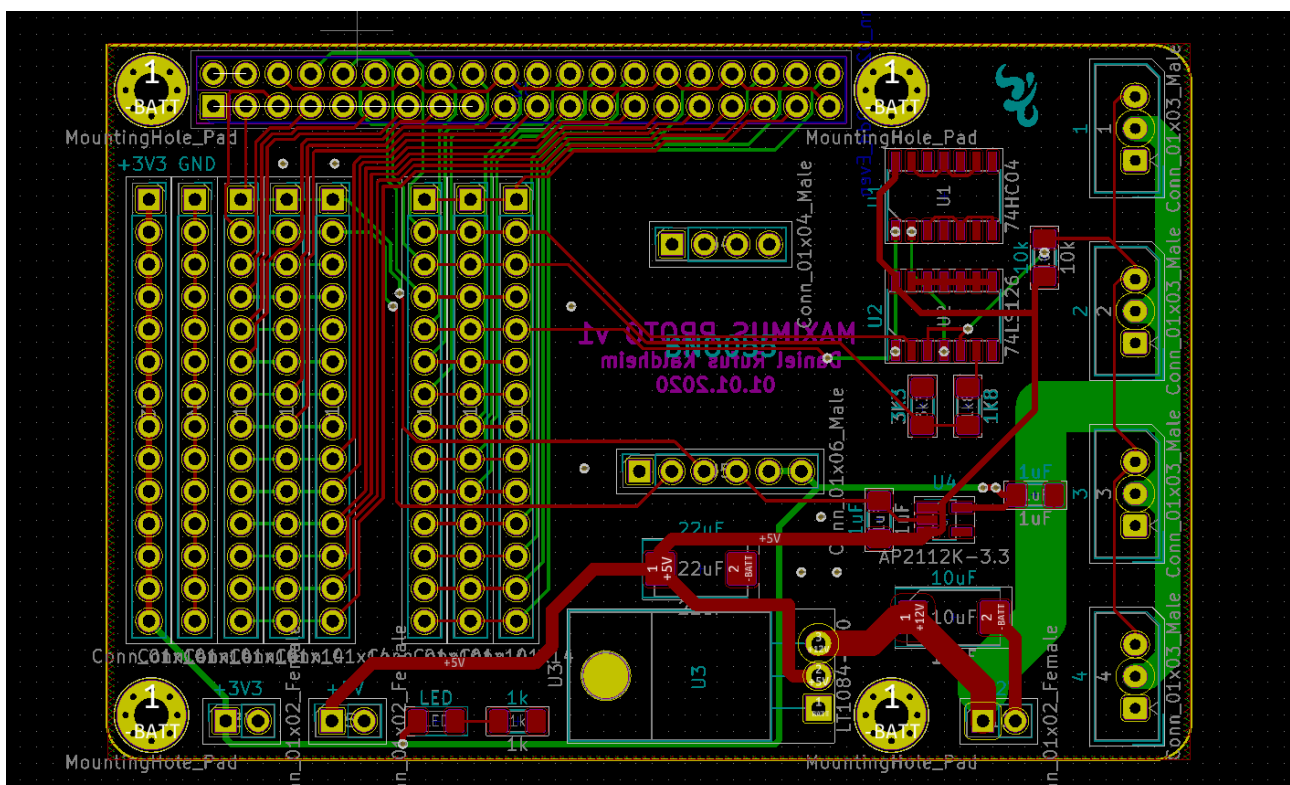
Figure 15.4: Dev board pcb

15.8.6.1 Raspberry Pi pinout
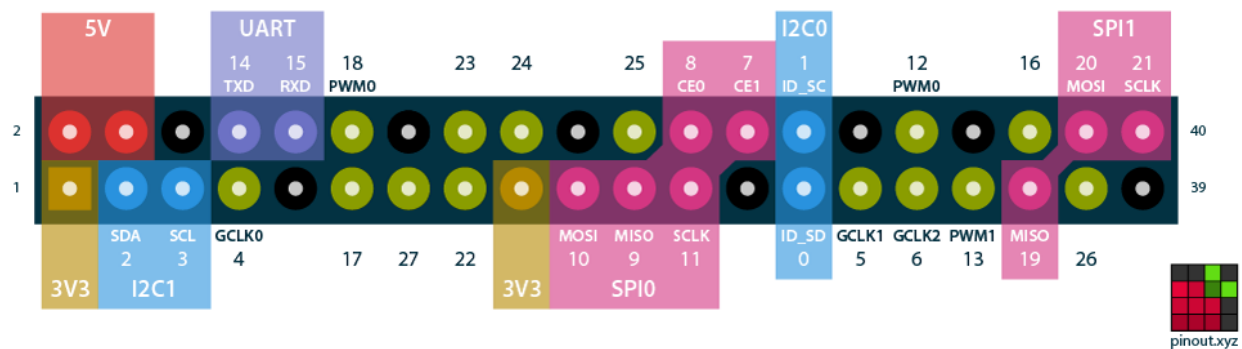
Figure 15.5: Pinout

15.8.7 Dynamixel AX-12A

DYNAMIXEL is a robot exclusive smart actuator with fully integrated DC Motor + Reduction Gearhead + Controller + Driver + Network in one DC servo module.
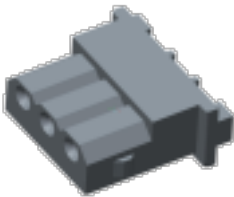
Figure 15.6: Dynamixel AX-12A

15.8.7.1 Specification

Item	Specification
Baud Rate	7843 bps ~ 1 Mbps
Resolution	0.29 [°]
Running Degree	0 [°] ~ 300 [°] Endless Turn
Weight	53.5g(AX-12, AX-12+), 54.6g(AX-12A)
Dimensions (W x H x D)	32mm x 50mm x 40mm
Gear Ratio	254 : 1
Stall Torque	1.5 N*m (at 12V, 1.5A)
No Load Speed	59rpm (at 12V)
Operating Temperature	-5 [°C] ~ +70 [°C]
Input Voltage	9.0 ~ 12.0V (**Recommended** : 11.1V)
Command Signal	Digital Packet
Protocol Type	Half Duplex Asynchronous Serial Communication (8bit, 1stop, No Parity)
Physical Connection	TTL Level Multi Drop Bus
ID	0 ~ 253
Feedback	Position, Temperature, Load, Input Voltage, etc
Material	Engineering Plastic

15.8.7.2 Wiring

Item	TTL
Pinout	1 GND2 VDD3 DATA
Diagram	
Housing	MOLEX 50-37-5033

Item	TTL
PCB Header	MOLEX 22-03-5035
Crimp Terminal	MOLEX 08-70-1039
Wire Gauge	21 AWG

15.8.7.3 TTL communications

To control the DYNAMIXEL actuators, the main controller needs to convert its UART signals to the half duplex type.

The recommended circuit diagram for this is shown below.
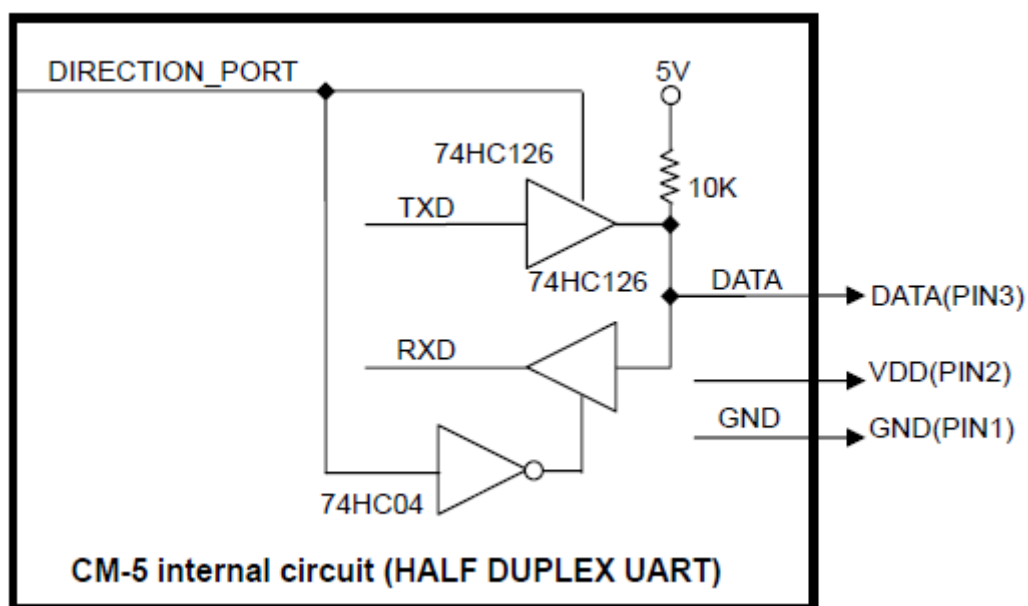
Figure 15.7: TTL

15.8.7.4 Drawings
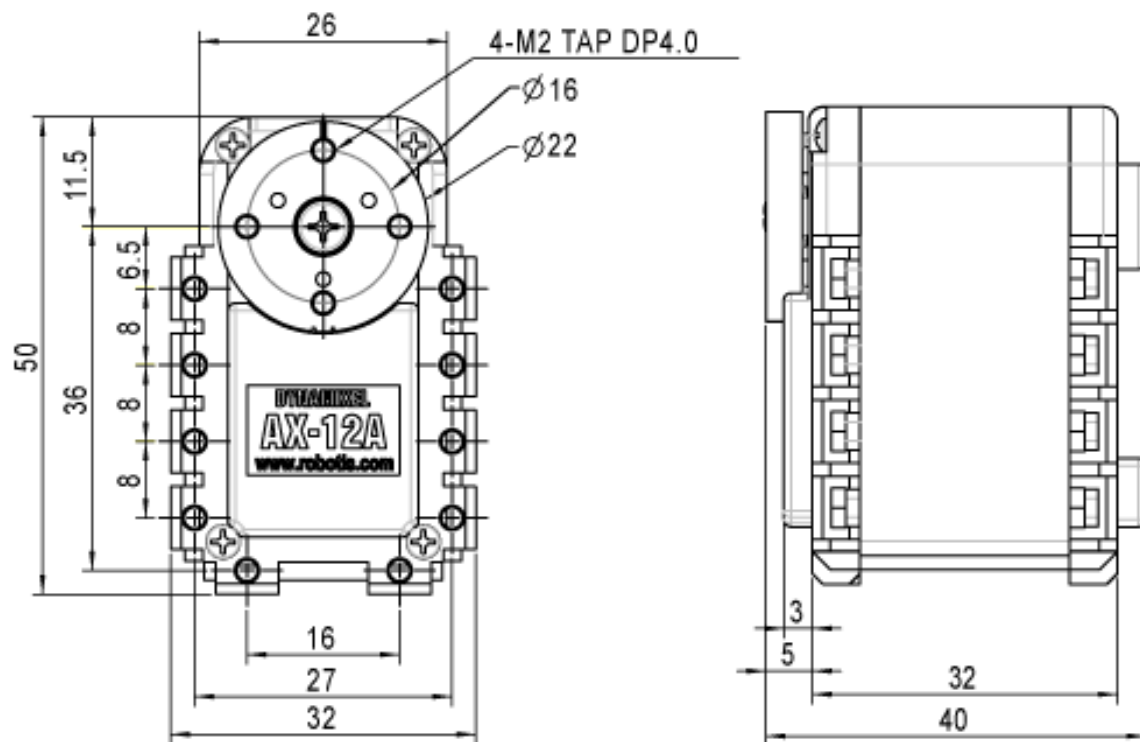
Figure 15.8: Drawings

15.8.7.5 Links

- E-manual
- Dynamixel SDK

15.8.8 GPS

15.8.8.1 Adafruit ultimate GPS breakout

- -165 dBm sensitivity, 10 Hz updates, 66 channels
- 5V friendly design and only 20mA current draw
- Breadboard friendly + two mounting holes
- RTC battery-compatible
- Built-in datalogging
- PPS output on fix
- Internal patch antenna + u.FL connector for external active antenna
- Fix status LED
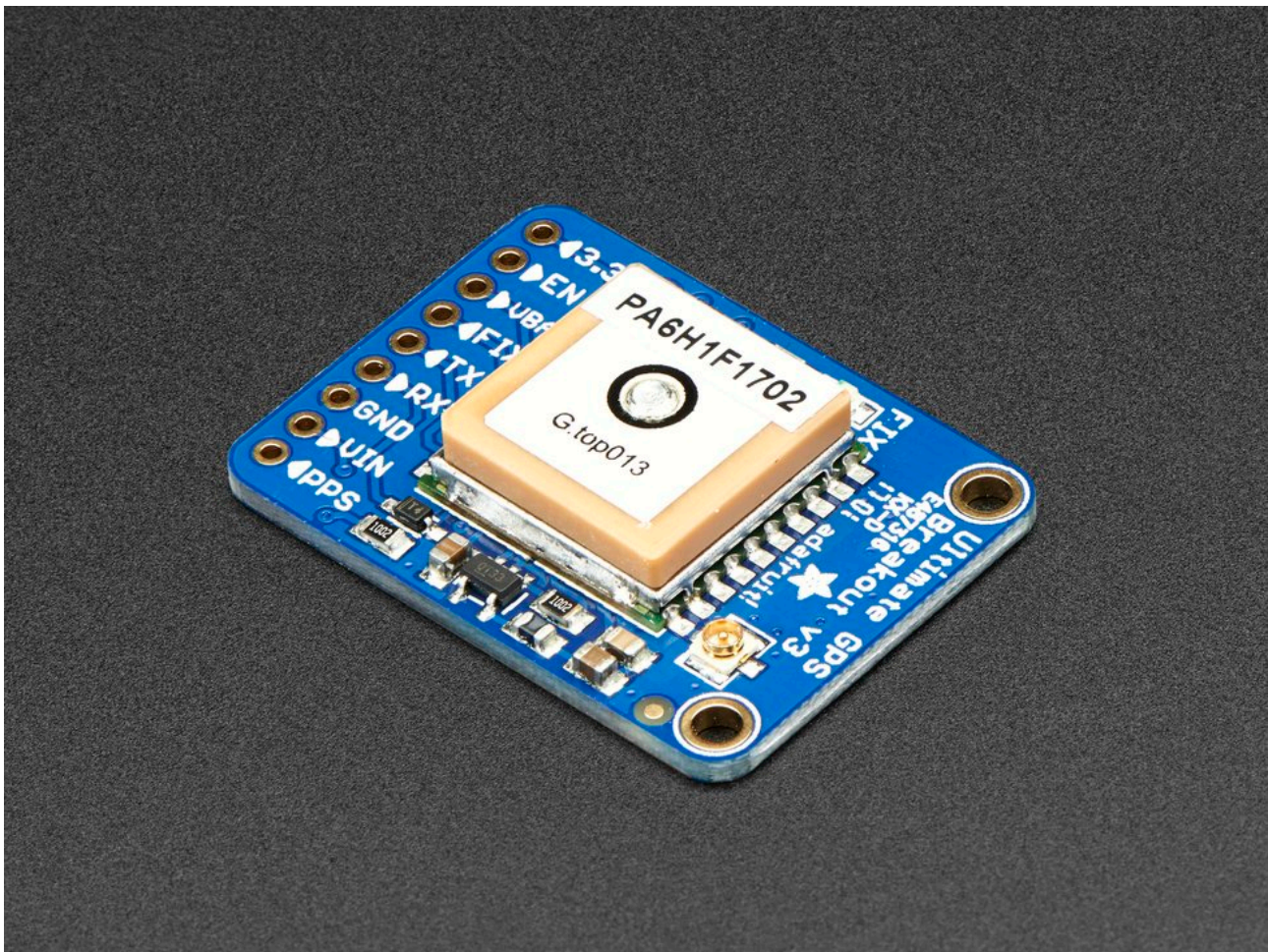
Figure 15.9: Adafruit ultimate GPS breakout

Technical details

- Satellites: 22 tracking, 66 searching
- Patch Antenna Size: 15mm x 15mm x 4mm
- Update rate: 1 to 10 Hz
- Position Accuracy: < 3 meters (all GPS technology has about 3m accuracy)
- Velocity Accuracy: 0.1 meters/s
- Warm/cold start: 34 seconds
- Acquisition sensitivity: -145 dBm
- Tracking sensitivity: -165 dBm
- Maximum Velocity: 515m/s
- Vin range: 3.0-5.5VDC
- MTK3339 Operating current: 25mA tracking, 20 mA current draw during navigation
- Output: NMEA 0183, 9600 baud default, 3V logic level out, 5V-safe input
- DGPS/WAAS/EGNOS supported
- FCC E911 compliance and AGPS support (Offline mode : EPO valid up to 14 days)
- Up to 210 PRN channels
- Jammer detection and reduction
- Multi-path detection and compensation

Links

- Adafruit product page
- Adafruit Overview

15.8.8.2 GPS antenna

Recommended GPS antenna
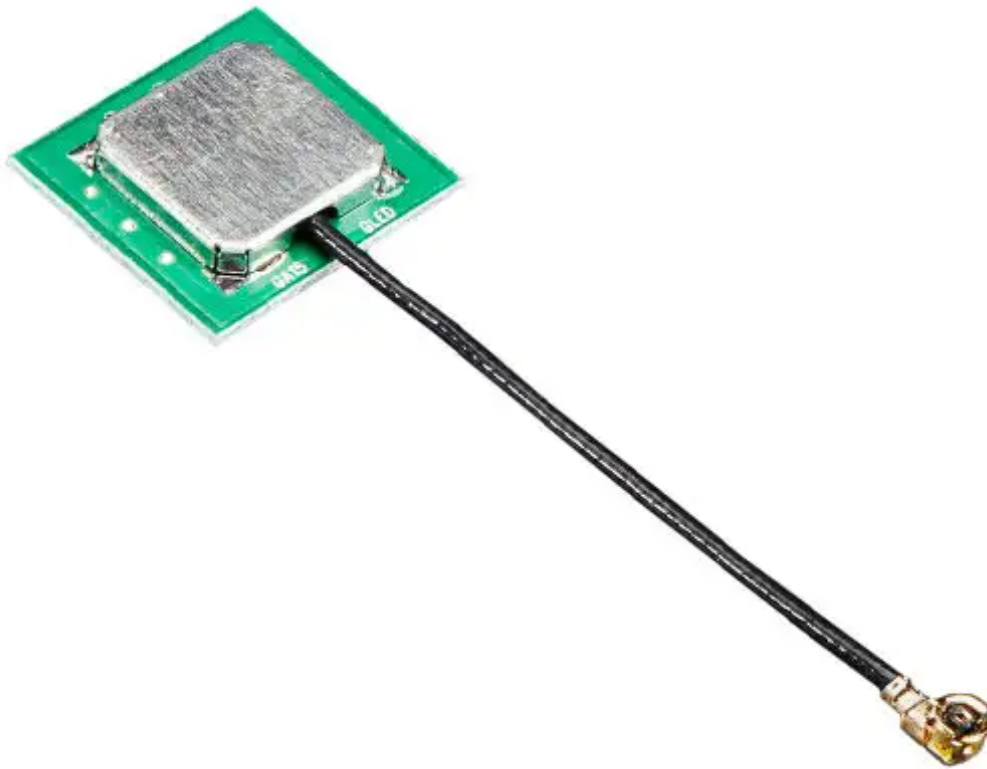
Figure 15.10: GPS Antenna

Links

- RF ANT 1.575GHZ CER PATCH CAB

Datasheets

- Passive GPS Antenna uFL - 15mm x 15mm 1 dBi gain

15.8.9 Hardware

15.8.9.1 Jetson Nano

NVIDIA Jetson Nano enables the development of millions of new small, low-power AI systems. It opens new worlds of embedded IoT applications, including entry-level Network Video Recorders (NVRs), home robots, and intelligent gateways with full analytics capabilities.

Figure 15.11: Jetson nano

Links:

- https://www.nvidia.com/en-us/autonomous-machines/embedded-systems/jetson-nano/

15.8.9.2 Raspberry Pi 4 - Model B

The speed and performance of the new Raspberry Pi 4 is a step up from earlier models. For the first time, we've built a complete desktop experience. Whether you're editing documents, browsing the web with a bunch of tabs open, juggling spreadsheets or drafting a presentation, you'll find the experience smooth and very recognisable — but on a smaller, more energy-efficient and much more cost-effective machine.
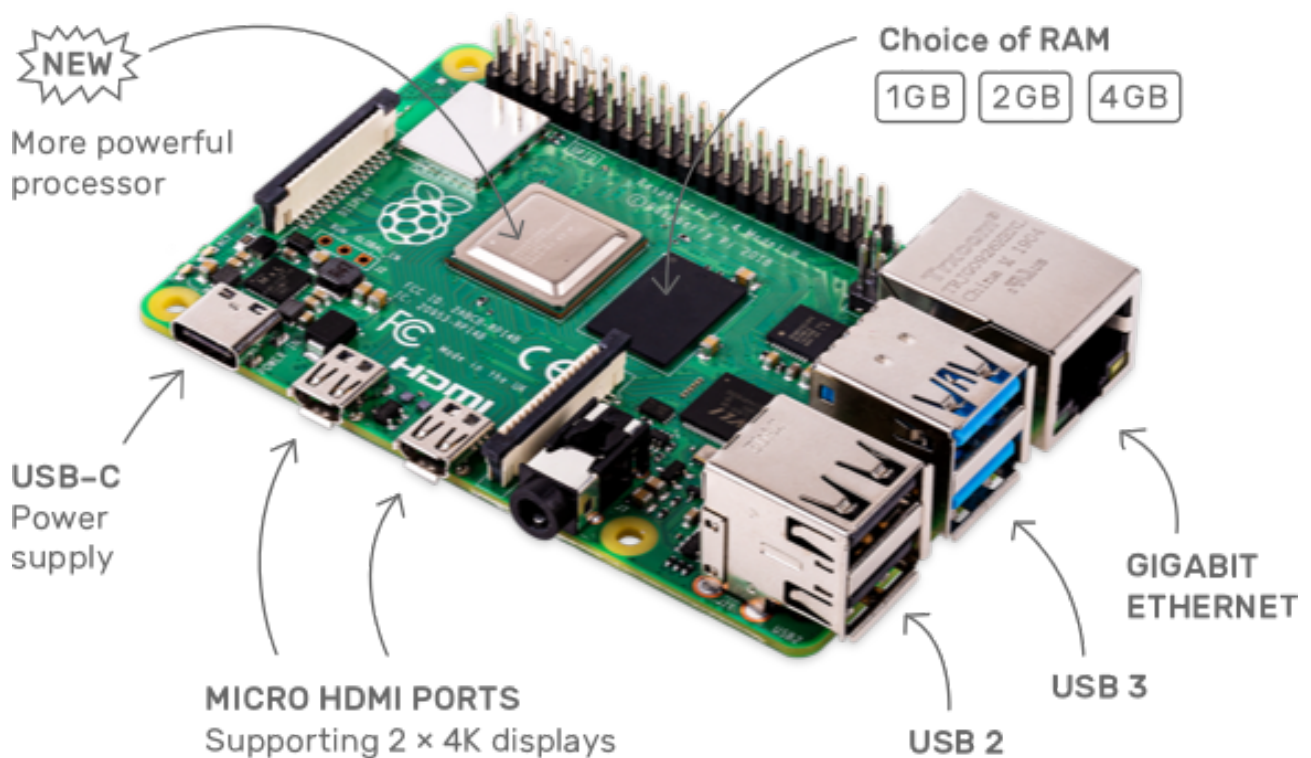
Figure 15.12: Raspberry Pi 4

Links:

- [Raspberry Pi 4](#)

15.8.10 Maximus AI

15.8.10.1 For termial conversations

- http://www.methods.co.nz/asciidoc/

15.8.10.2 AIML

- http://www.alicebot.org/aiml.html
- https://www.tutorialspoint.com/aiml/
- http://www.devdungeon.com/content/ai-chat-bot-python-aiml
- https://github.com/pandorabots/rosie/tree/master/lib/aiml

15.8.10.3 Unicode

hex: "\xf0\x9f\x90\xb6"

15.8.10.4 Artificial Intelligence

- http://blog.hackerearth.com/2015/12/artificial-intelligence-101-how-to-get-started.html

15.8.10.5 Words, spelling and so on

- https://market.mashape.com/wordsapi/wordsapi
- https://github.com/montanaflynn/Spellcheck-API/
- https://market.mashape.com/sentity/sentity-text-analytics
- https://market.mashape.com/aylien/text-analysis
- https://market.mashape.com/textanalysis/text-summarization
- https://www.meaningcloud.com/developer/
- https://market.mashape.com/faceplusplus/faceplusplus-face-detection
- http://developers.answers.com/

15.8.10.6 Grammar

- https://learnenglish.britishcouncil.org/en/
- https://github.com/markfullmer/grammark/tree/Version-3
- https://github.com/languagetool-org/languagetool (http://wiki.languagetool.org/public-http-api)

15.8.10.7 NLP / NER

- Part-of-speech tagging (POS)

- Chunking (CHK)

- Name entity recognition (NER)

- Info: http://nlp.stanford.edu/software/CRF-NER.shtml

- Download: http://nlp.stanford.edu/software/stanford-ner-2016-10-31.zip

- https://github.com/agentile/PHP-Stanford-NLP (old) use patrickschur

- https://packagist.org/packages/patrickschur/stanford-nlp-tagger

- http://php-nlp-tools.com/

15.8.10.8 Intent parser

- https://github.com/MycroftAI/adapt

15.8.10.9 Object recognition (caffe)

- http://tutorial.caffe.berkeleyvision.org/caffe-cvpr15-detection.pdf

15.8.10.10 Image analyze

- https://github.com/Samshal/PHP-Photo-Information
- http://caffe.berkeleyvision.org/

15.8.10.11 Automatic speech recognition

- http://cmusphinx.sourceforge.net/
- http://kaldi-asr.org/

15.8.10.12 Questions / answers

- https://github.com/TScottJ/OpenEphyra
- https://cs.umd.edu/~miyyer/qblearn/
- https://github.com/brmson/yodaqa

15.8.10.13 Lucida

- http://lucida.ai/media/hpca-lucida-djinn-tutorial.pdf

15.8.10.14 Animations

- https://www.youtube.com/watch?v=_WlqMqXpyxA

15.8.10.15 OCR / Deep learning

- https://blogs.dropbox.com/tech/2017/04/creating-a-modern-ocr-pipeline-using-computer-vision-and-deep-learning/

15.8.10.16 Neural network (arduino)

- http://robotics.hobbizine.com/arduinoann.html

15.8.10.17 Other Links

- https://github.com/GokuMohandas/practicalAI
- http://www.aicheatsheets.com/

15.8.11 Inspiration

15.8.11.1 Read

- PyRobot

15.8.11.2 DyRET Robot

DyRET is a four legged (quadruped) robot designed to be a robust and versatile platform for evolutionary experiments with the unique capability of self-changing morphology. The robot runs on ROS, and uses Gazebo for simulated experiments.
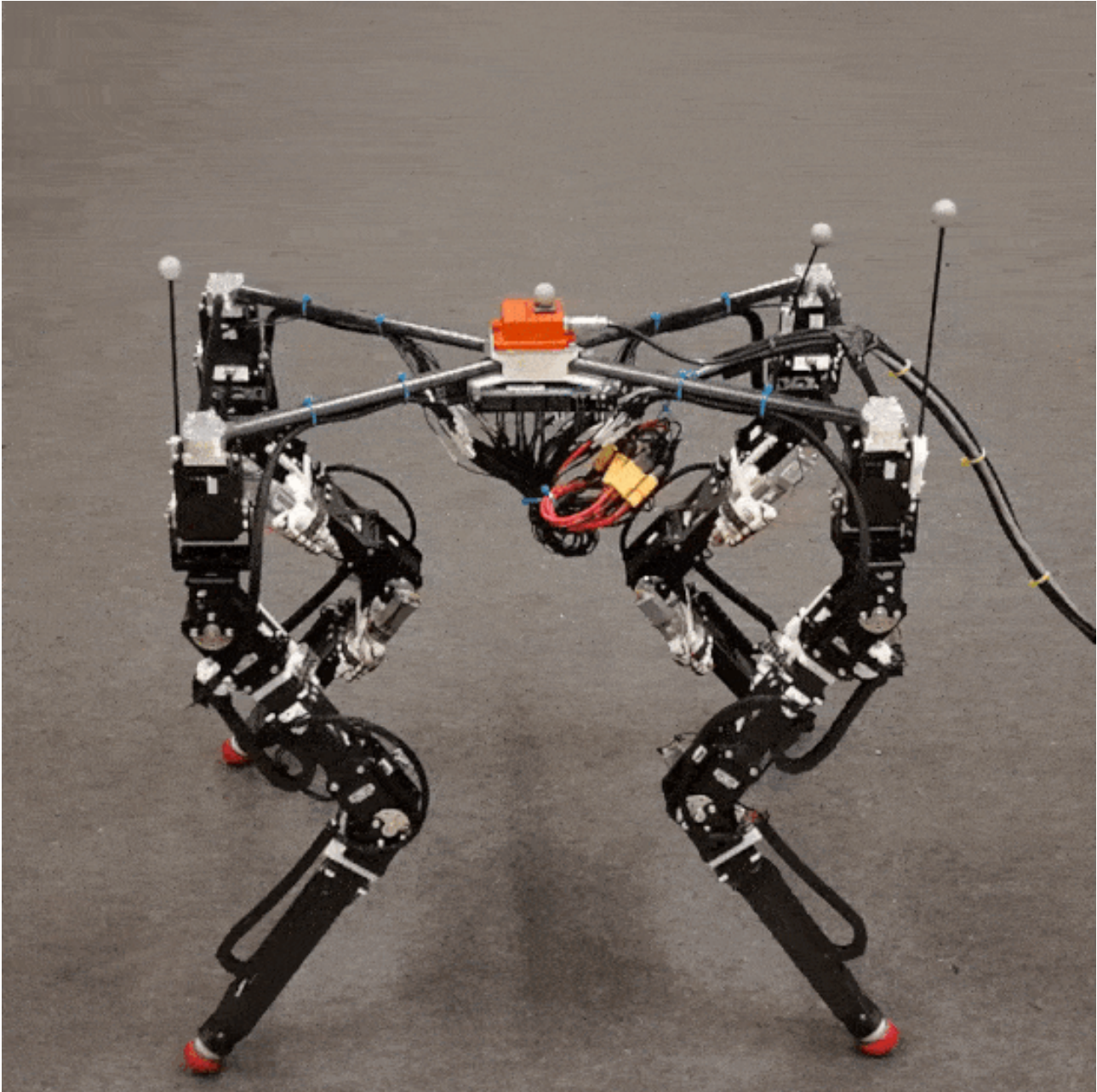
Figure 15.13: DyRET

Links:

- DyRET Documentation

15.8.11.3 Open Cat

A programmable and highly maneuverable robotic cat for STEM education and AI-enhanced services.
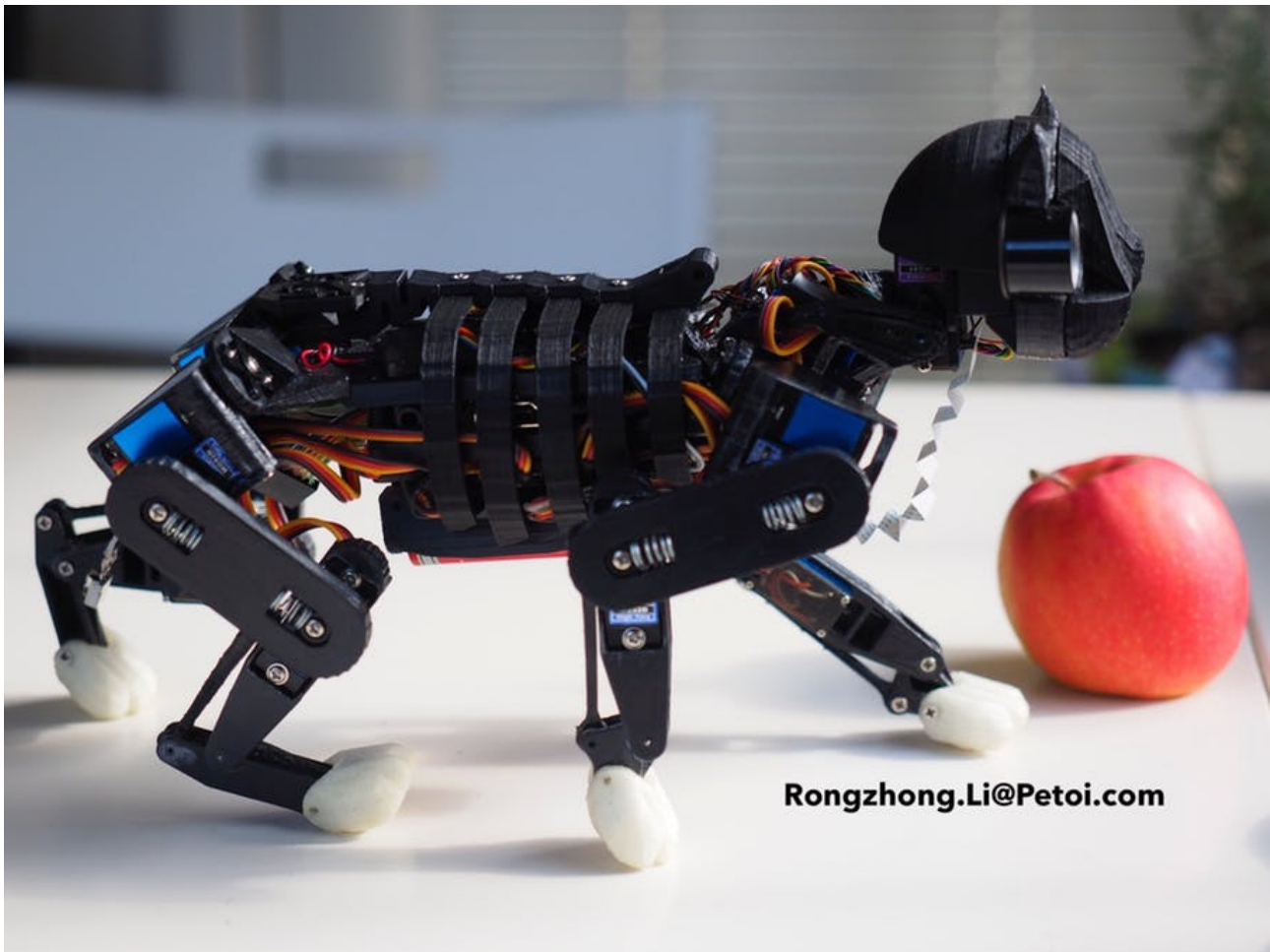
Figure 15.14: Open Cat

Article:

https://www.hackster.io/petoi/opencat-845129

15.8.11.4 Pet dog

A pet robot, just like Boston Dynamics makes
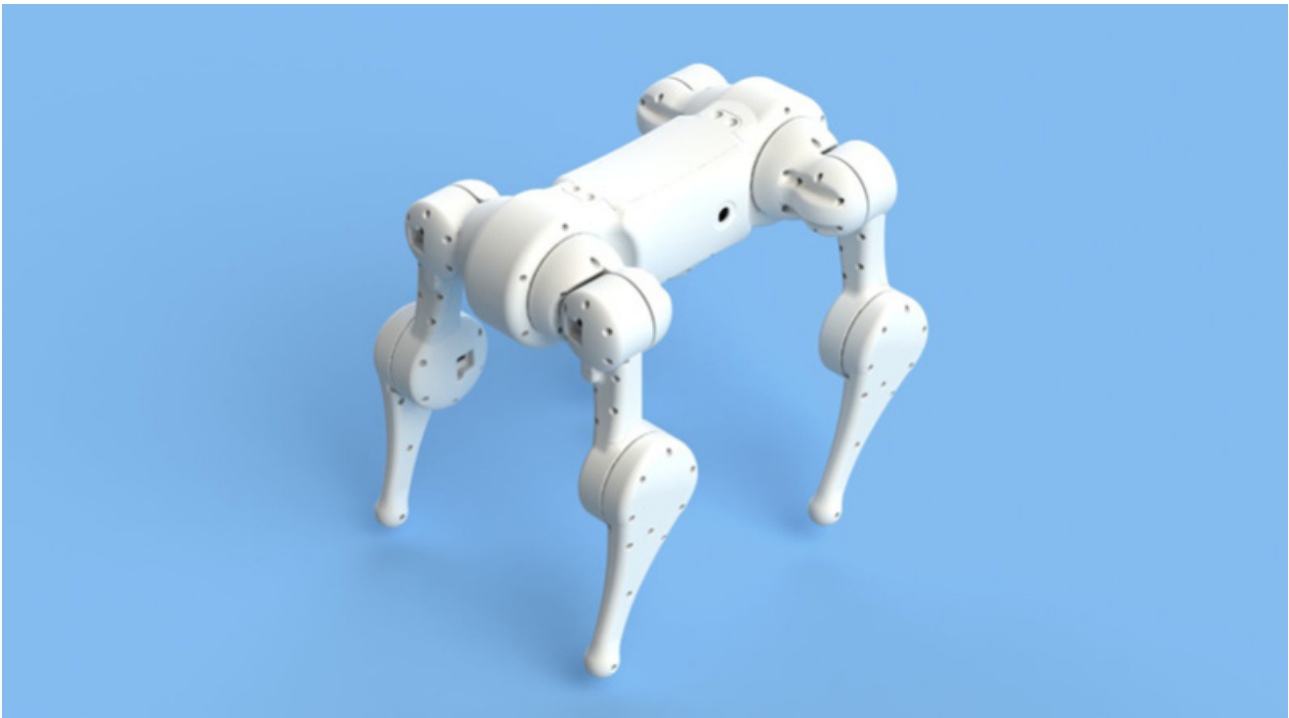
Figure 15.15: Pet dog

Articles:

- https://hackaday.com/2019/03/30/a-pet-robot-just-like-boston-dynamics-makes/
- https://hackaday.io/project/164493-dizzy-wolf

15.9 Mechanical keyboard

15.9.1 Inspiration

- https://github.com/ruiqimao/keyboard-pcb-guide
- https://imgur.com/gallery/fGa13nZ
- https://www.reddit.com/r/MechanicalKeyboards/wiki/customkeyboards

15.9.2 Tools

- Keyboard Layout editor
- Plate & Case Builder
- ai03 Plate Generator

15.10 Motorcycle App

- Profile

    - Navn

- epost
- område / by
- kommunikasjon (hjelm)

- Kjøretøy

    - model
    - årsmodel
    - merke
    - Bensin-logging

        * Stasjon / lokasjon
        * liter
        * tripteller
        * dato
        * drivstoff type (oktan)
        * drivstoff-pris
        * fulltank / ikke full tank

    - Vedlikehold

        * Sjekkliste
        * dekkbytte
        * bremseklosser
        * Diverse

- Venner
- Grupper

    - inviter venner til gruppe (lukket gruppe)
    - åpen gruppe
    - Åpen gruppe men begrenset godkjenning av admin

- Meldinger

    - venn til venn
    - gruppechat
    - turchat

- Ruter

    - Lag rute via kart
    - Lag rute ved å kjøre
    - Logg rute i bakgrunnen
    - legg til stopp punkt (pauser etc)

- Turer

    - planlegg rute via eksisterende rute
    - planlegg rute ved å lage via kart
    - inviter venner
    - inviter gruppe
    - kjør tur

* legg til møteplass
* legg til stopp (pauser etc)
* logg hvem som er med bassert på godkjenning og automatisk synkronisering av lokasjon
* logg faktisk kjørt rute
* logg tid
* logg tilfeldige forbipasserende (bassert på lokasjon og tid) (frivillig)

- statistikk

  – drivstoff forbruk
  – tid på sykkel
  – Avstand på sykkel

15.11 Pip-Boy

15.11.1 Montering

- https://ytec3d.com/pip-boy-3000-mark-iv-assembly/

15.11.2 LCD skjerm

- https://no.mouser.com/ProductDetail/Newhaven-Display/NHD-43-480272MB-ASXN-CTP?qs=sGAEpiMZZMu%2fRY1bNe3bO6wz7D657ZcEt%252bYkb7GRrgfkxyS4IARlZA%3d%3dx

15.12 Project Management System

15.12.1 Inspiration

- https://codetree.com/

15.13 RPI Security camera

15.13.1 Articles

- Raspberry Pi Live Streaming camera: like on Times Square

15.14 Reflow Oven

15.14.1 Links

Tutorial: http://www.whizoo.com/reflowoven

Ovn: https://www.skousen.no/hvitevarer/ovn/mini-ovn/product/royal-16-ltr/

Isolasjonsteip: https://www.skruvat.no/Isolasjonstape-Reflect-A-Gold-P418338.aspx

Isolasjonsteppe: https://bakerovner.no/produkt/keramisk-isolasjon-rull-1260-c/

Fugemasse / lim: https://coop.no/sortiment/obs-bygg/maling-og-tilbehor/lim-fug-sparkel/casco-heat#product-info

15.15 USB Media Controller

15.15.1 Dimensions

Høyde: 35mm x Bredde: 70 - 100mm

16 Security

16.1 Articles

- Exploiting WiFi stack on Tesla Model S

16.2 LoRaWAN

LoRaWAN Encryption Keys Easy to Crack, Jeopardizing Security of IoT Networks

17 Shopping lists

17.1 Shopping list for home office

17.1.1 Keyboard

- https://www.daskeyboard.com/daskeyboard-4-ultimate/
    - https://www.teknikmagasinet.no/produkter/data-o-tv-spill/tastatur/varemerker/das-keyboard/das-keyboard-4-ultimate-with-cherry-mx-blue
- https://mechanicalkeyboards.com/shop/index.php?l=product_detail&p=3901
- http://www.wasdkeyboards.com/index.php/products/mechanical-keyboard/wasd-v2-105-key-iso-custom-mechanical-keyboard.html

17.1.2 Network

- https://mikrotik.com/product/RB3011UiAS-RM
    - https://www.eurodk.com/en/products/mt-rb/routerboard-3011uias-rm
    - https://freak.no/forum/showthread.php?t=219922&page=28

18 Software

- Rabbit MQ

18.1 Rabbit MQ

18.1.1 Security

- Rabbit MQ access control: http://www.rabbitmq.com/access-control.html
- Multi-tenant SaaS AD: https://vincentlauzon.com/2016/03/10/multi-tenant-saas-with-azure-active-directory-b2b-b2c/

18.2 Ubuntu

18.2.1 Articles

- Building a Linux Desktop for Cloud Native Development

18.2.2 Ubuntu + Windows dual boot

Installing Windows **after** Ubuntu.

From https://help.ubuntu.com/community/WindowsDualBoot:

18.2.2.1 Recovering GRUB after reinstalling Windows

Please refer to the Reinstalling GRUB2 guide.

18.2.2.2 Master Boot Record backup and replacement

This method does not work for computers with UEFI boot. In consequence, it won't work for pre-installed Windows 8 and some pre-installed with Windows 7.

Back-up the existing MBR, install Windows, replace your backup overwriting the Windows boot code:

1. Create an NTFS partition for Windows (using fdisk, GParted or whatever tool you are familiar with)

2. Backup the MBR e.g. `dd if=/dev/sda of=/mbr.bin bs=446 count=1`

3. Install Windows

4. Boot into a [LiveCD](#)

5. Mount your root partition in the LiveCD

6. Restore the MBR e.g. `dd if=/media/sda/mbr.bin of=/dev/sda bs=446 count=1`

7. Restart and Ubuntu will boot

8. Setup GRUB to boot Windows

18.3 tmux shortcuts & cheatsheet

start new:

```
1   tmux
```

start new with session name:

```
1   tmux new -s myname
```

attach:

```
1   tmux a  #  (or at, or attach)
```

attach to named:

```
1   tmux a -t myname
```

list sessions:

```
1   tmux ls
```

kill session:

```
1   tmux kill-session -t myname
```

Kill all the tmux sessions:

```
1   tmux ls | grep : | cut -d. -f1 | awk '{print substr($1, 0, length($1)-1)}' | xargs kill
```

In tmux, hit the prefix `ctrl+b` (my modified prefix is ctrl+a) and then:

18.3.1 Sessions

```
1   :new<CR>  new session
2   s  list sessions
3   $  name session
```

18.3.2 Windows (tabs)

```
1  c  create window
2  w  list windows
3  n  next window
4  p  previous window
5  f  find window
6  ,  name window
7  &  kill window
```

18.3.3 Panes (splits)

```
 1  %  vertical split
 2  "  horizontal split
 3
 4  o  swap panes
 5  q  show pane numbers
 6  x  kill pane
 7  +  break pane into window (e.g. to select text by mouse to copy)
 8  -  restore pane from window
 9     space - toggle between layouts
10  <prefix> q (Show pane numbers, when the numbers show up type the key to goto that pane)
11  <prefix> { (Move the current pane left)
12  <prefix> } (Move the current pane right)
13  <prefix> z toggle pane zoom
```

18.3.4 Sync Panes

You can do this by switching to the appropriate window, typing your Tmux prefix (commonly Ctrl-B or Ctrl-A) and then a colon to bring up a Tmux command line, and typing:

```
1  :setw synchronize-panes
```

You can optionally add on or off to specify which state you want; otherwise the option is simply toggled. This option is specific to one window, so it won't change the way your other sessions or windows operate. When you're done, toggle it off again by repeating the command. tip source

18.3.5 Resizing Panes

You can also resize panes if you don't like the layout defaults. I personally rarely need to do this, though it's handy to know how. Here is the basic syntax to resize panes:

```
 1  PREFIX : resize-pane -D (Resizes the current pane down)
 2  PREFIX : resize-pane -U (Resizes the current pane upward)
 3  PREFIX : resize-pane -L (Resizes the current pane left)
 4  PREFIX : resize-pane -R (Resizes the current pane right)
 5  PREFIX : resize-pane -D 20 (Resizes the current pane down by 20 cells)
 6  PREFIX : resize-pane -U 20 (Resizes the current pane upward by 20 cells)
 7  PREFIX : resize-pane -L 20 (Resizes the current pane left by 20 cells)
 8  PREFIX : resize-pane -R 20 (Resizes the current pane right by 20 cells)
 9  PREFIX : resize-pane -t 2 20 (Resizes the pane with the id of 2 down by 20 cells)
10  PREFIX : resize-pane -t -L 20 (Resizes the pane with the id of 2 left by 20 cells)
```

18.3.6 Copy mode

Pressing PREFIX [places us in Copy mode. We can then use our movement keys to move our cursor around the screen. By default, the arrow keys work. we set our configuration file to use Vim keys for

moving between windows and resizing panes so we wouldn't have to take our hands off the home row. tmux has a vi mode for working with the buffer as well. To enable it, add this line to .tmux.conf:

```
1   setw -g mode-keys vi
```

With this option set, we can use h, j, k, and l to move around our buffer.

To get out of Copy mode, we just press the ENTER key. Moving around one character at a time isn't very efficient. Since we enabled vi mode, we can also use some other visible shortcuts to move around the buffer.

For example, we can use "w" to jump to the next word and "b" to jump back one word. And we can use "f", followed by any character, to jump to that character on the same line, and "F" to jump backwards on the line.

```
1    Function              vi            emacs
2    Back to indentation   ^             M-m
3    Clear selection       Escape        C-g
4    Copy selection        Enter         M-w
5    Cursor down           j             Down
6    Cursor left           h             Left
7    Cursor right          l             Right
8    Cursor to bottom line L
9    Cursor to middle line M             M-r
10   Cursor to top line    H             M-R
11   Cursor up             k             Up
12   Delete entire line    d             C-u
13   Delete to end of line D             C-k
14   End of line           $             C-e
15   Goto line             :             g
16   Half page down        C-d           M-Down
17   Half page up          C-u           M-Up
18   Next page             C-f           Page down
19   Next word             w             M-f
20   Paste buffer          p             C-y
21   Previous page         C-b           Page up
22   Previous word         b             M-b
23   Quit mode             q             Escape
24   Scroll down           C-Down or J   C-Down
25   Scroll up             C-Up or K     C-Up
26   Search again          n             n
27   Search backward       ?             C-r
28   Search forward        /             C-s
29   Start of line         0             C-a
30   Start selection       Space         C-Space
31   Transpose chars                     C-t
```

18.3.7 Misc

```
1   d  detach
2   t  big clock
3   ?  list shortcuts
4   :  prompt
```

18.3.8 Configurations Options

```
1   # Mouse support - set to on if you want to use the mouse
2   * setw -g mode-mouse off
3   * set -g mouse-select-pane off
4   * set -g mouse-resize-pane off
5   * set -g mouse-select-window off
6
7   # Set the default terminal mode to 256color mode
8   set -g default-terminal "screen-256color"
```

```
 9
10  # enable activity alerts
11  setw -g monitor-activity on
12  set -g visual-activity on
13
14  # Center the window list
15  set -g status-justify centre
16
17  # Maximize and restore a pane
18  unbind Up bind Up new-window -d -n tmp \; swap-pane -s tmp.1 \; select-window -t tmp
19  unbind Down
20  bind Down last-window \; swap-pane -s tmp.1 \; kill-window -t tmp
```

18.3.9 Resources

- [tmux: Productive Mouse-Free Development](#)
- [How to reorder windows](#)

18.4 Vim Cheat Sheet

18.4.1 Global

`:help keyword` - open help for keyword

`:saveas file` - save file as

`:close` - close current pane

`K` - open man page for word under the cursor

18.4.2 Cursor movement

`h` - move cursor left

`j` - move cursor down

`k` - move cursor up

`l` - move cursor right

`H` - move to top of screen

`M` - move to middle of screen

`L` - move to bottom of screen

`w` - jump forwards to the start of a word

`W` - jump forwards to the start of a word (words can contain punctuation)

`e` - jump forwards to the end of a word

`E` - jump forwards to the end of a word (words can contain punctuation)

`b` - jump backwards to the start of a word

`B` - jump backwards to the start of a word (words can contain punctuation)

`%` - move to matching character (default supported pairs: '()', '{}', '[]' - use :h matchpairs in vim for more info)

`0` - jump to the start of the line

`^` - jump to the first non-blank character of the line

`$` - jump to the end of the line

`g_` - jump to the last non-blank character of the line

`gg` - go to the first line of the document

`G` - go to the last line of the document

`5G` - go to line 5

`fx` - jump to next occurrence of character x

`tx` - jump to before next occurrence of character x

`Fx` - jump to previous occurence of character x

`Tx` - jump to after previous occurence of character x

`;` - repeat previous f, t, F or T movement

`,` - repeat previous f, t, F or T movement, backwards

`}` - jump to next paragraph (or function/block, when editing code)

`{` - jump to previous paragraph (or function/block, when editing code)

`zz` - center cursor on screen

`Ctrl + e` - move screen down one line (without moving cursor)

`Ctrl + y` - move screen up one line (without moving cursor)

`Ctrl + b` - move back one full screen

`Ctrl + f` - move forward one full screen

`Ctrl + d` - move forward 1/2 a screen

`Ctrl + u` - move back 1/2 a screen

18.4.3 Insert mode - inserting/appending text

`i` - insert before the cursor

`I` - insert at the beginning of the line

`a` - insert (append) after the cursor

`A` - insert (append) at the end of the line

`o` - append (open) a new line below the current line

`O` - append (open) a new line above the current line

`ea` - insert (append) at the end of the word

`Esc` - exit insert mode

18.4.4 Editing

`r` - replace a single character

`J` - join line below to the current one with one space in between

`gJ` - join line below to the current one without space in between

`gwip` - reflow paragraph

`cc` - change (replace) entire line

`C` - change (replace) to the end of the line

`c$` - change (replace) to the end of the line

`ciw` - change (replace) entire word

`cw` - change (replace) to the end of the word

`s` - delete character and substitute text

`S` - delete line and substitute text (same as cc)

`xp` - transpose two letters (delete and paste)

`u` - undo

`Ctrl + r` - redo

`.` - repeat last command

18.4.5 Cut and paste

`yy` - yank (copy) a line

`2yy` - yank (copy) 2 lines

`yw` - yank (copy) the characters of the word from the cursor position to the start of the next word `y$` - yank (copy) to end of line

`p` - put (paste) the clipboard after cursor

`P` - put (paste) before cursor

`dd` - delete (cut) a line

`2dd` - delete (cut) 2 lines

`dw` - delete (cut) the characters of the word from the cursor position to the start of the next word `D` - delete (cut) to the end of the line

`d$` - delete (cut) to the end of the line

`x` - delete (cut) character

18.4.6 Marking text (visual mode)

`v` - start visual mode, mark lines, then do a command (like y-yank)

`V` - start linewise visual mode

`o` - move to other end of marked area

`Ctrl + v` - start visual block mode

`O` - move to other corner of block

`aw` - mark a word

`ab` - a block with ()

`aB` - a block with {}

`ib` - inner block with ()

`iB` - inner block with {}

`Esc` - exit visual mode

18.4.7 Visual commands

`>` - shift text right

`<` - shift text left

`y` - yank (copy) marked text

`d` - delete marked text

`~` - switch case

18.4.8 Registers

`:reg` - show registers content

`"xy` - yank into register x

`"xp` - paste contents of register x

18.4.9 Search and replace

`/pattern` - search for pattern

`?pattern` - search backward for pattern

`\vpattern` - 'very magic' pattern: non-alphanumeric characters are interpreted as special regex symbols (no escaping needed)

`n` - repeat search in same direction

`N` - repeat search in opposite direction

`:%s/old/new/g` - replace all old with new throughout file

`:%s/old/new/gc` - replace all old with new throughout file with confirmations

`:noh` - remove highlighting of search matches

18.4.10 Search in multiple files

`:vimgrep /pattern/ {{file}}` - search for pattern in multiple files e.g.

```
1   :vimgrep /foo/ **/*
```

`:cn` - jump to the next match

`:cp` - jump to the previous match

`:copen` - open a window containing the list of matches

18.4.11 Working with multiple files

`:e file` - edit a file in a new buffer

`:bnext` or `:bn` - go to the next buffer

`:bprev` or `:bp` - go to the previous buffer

`:bd` - delete a buffer (close a file)

`:ls` - list all open buffers

`:sp file` - open a file in a new buffer and split window

`:vsp file` - open a file in a new buffer and vertically split window

`Ctrl + ws` - split window

`Ctrl + ww` - switch windows

`Ctrl + wq` - quit a window

`Ctrl + wv` - split window vertically

`Ctrl + wh` - move cursor to the left window (vertical split)

`Ctrl + wl` - move cursor to the right window (vertical split)

`Ctrl + wj` - move cursor to the window below (horizontal split)

`Ctrl + wk` - move cursor to the window above (horizontal split)

18.4.12 Tabs

`:tabnew` or `:tabnew {page.words.file}` - open a file in a new tab

`Ctrl + wT` - move the current split window into its own tab

`gt` or `:tabnext` or `:tabn` - move to the next tab

`gT` or `:tabprev` or `:tabp` - move to the previous tab

`#gt` - move to tab number #

`:tabmove #` - move current tab to the #th position (indexed from 0)

`:tabclose` or `:tabc` - close the current tab and all its windows

`:tabonly` or `:tabo` - close all tabs except for the current one

`:tabdo command` - run the command on all tabs (e.g. :tabdo q - closes all opened tabs)

18.4.13 Exiting

`:w` - write (save) the file, but don't exit

`:w !sudo tee %` - write out the current file using sudo

`:wq` or `:x` or `ZZ` - write (save) and quit

`:q` - quit (fails if there are unsaved changes)

`:q!` or `ZQ` - quit and throw away unsaved changes

`:wqa` - write (save) and quit on all tabs

19 UX - UI

- Colors

19.1 Methods

- https://material.io/design/
- http://www.designkit.org/methods

19.2 Colors

19.2.1 Links

- https://www.canva.com/colors/color-palette-generator/

20 Useful stuff

20.1 Github CLI

Github command line tool CLI Github

20.1.1 Install

```
1   brew install github/gh/gh
```

20.1.2 Usage

To view detail on any command, use `gh [command] [subcommand] --help`

```
1   gh pr [status, list, view, checkout, create]
2   gh issue [status, list, view, create]
3   gh help
```

20.2 Useful Commands

20.2.1 Terminal recording

Asciinema

20.2.1.1 1. Install

```
1   brew install asciinema
```

20.2.1.2 2. Record

```
1   asciinema rec filename.cast
```

20.2.1.3 3. Play

```
1   asciinema play filename.cast
```

20.2.2 WiFi QR-code

```
1   qrencode -o wifi.png "WIFI:T:WPA;S:<SSID>;P:<PASSWORD>;;"
```

20.2.3 Rsync

[Rsync cheatsheat](#)

```
1   ## syncing folder src into dest:
2   rsync -avzP ./src /dest
3   ## syncing the content of src into dest:
4   rsync -avzP ./src/ /dest
```

20.2.4 Unite PDF documents

20.2.4.1 Install

```
1   brew install poppler
```

20.2.4.2 Usage

```
1   pdfunite file1.pdf file2.pdf output.pdf
```