# FREE SOFTWARE FOR SAFE & HAPPY CHICKENS

By Adam Monsen, Senior Director of Engineering at C-SATS, Inc.


https://seagl.org


https://csats.com

Welcome!

Use space bar or PgDn to advance through slides.

Mobile? Swipe or touch arrow controls in the lower right.

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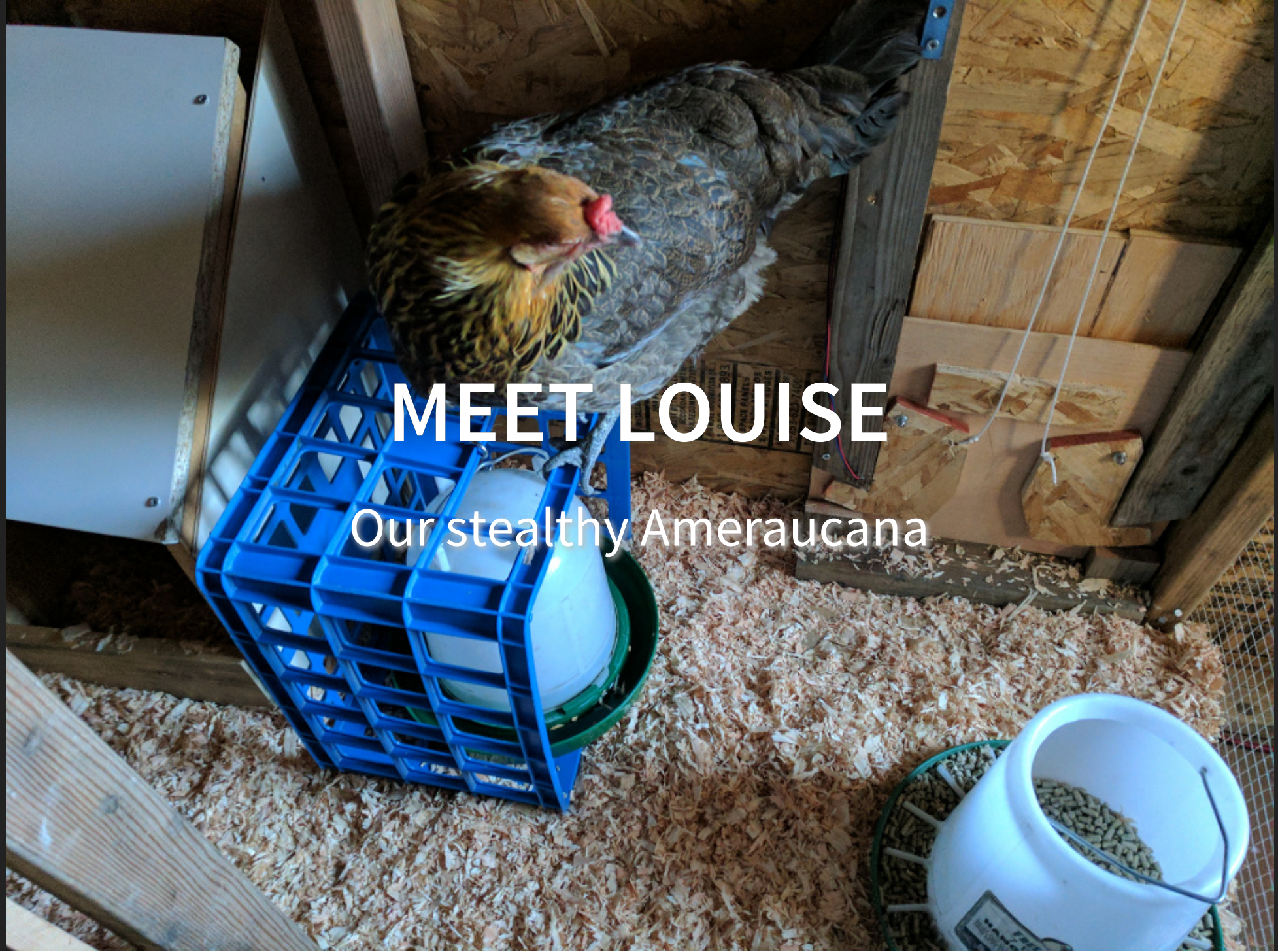
This is the story of four chickens

Who meet a hungry little furball

And quickly become a flock of one.

This is the story of...

# *THE CHICKEN WHO LIVED*


MEET LOUISE
Our stealthy Ameraucana

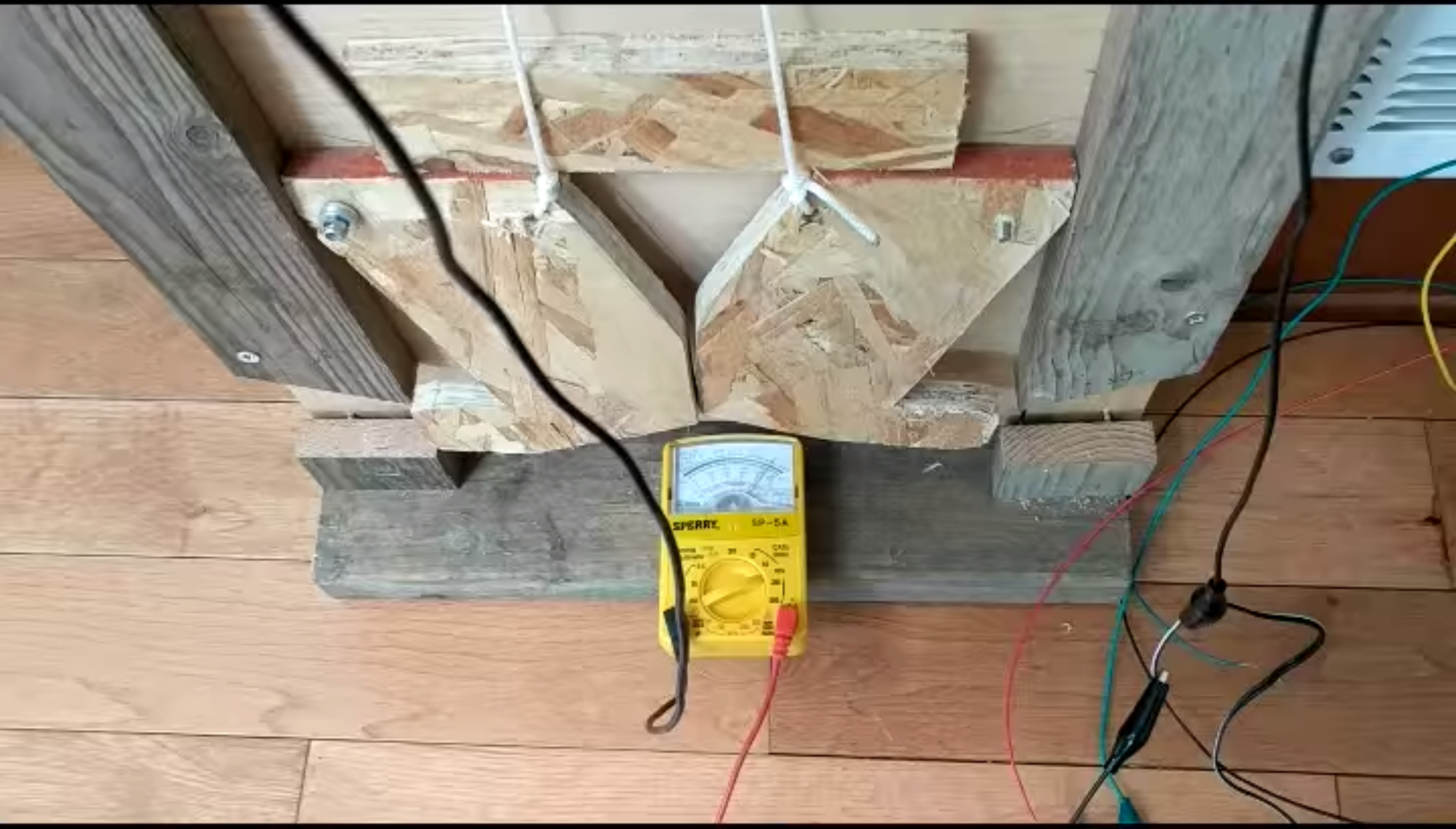
Louise wants to live and wants a new flock.

First she needs a safer home. 

One with an automatic door!

This of course requires the following:

- hardware interleave gravity lock mechanism
- instant-read photoresistor poll door actuation trigger
- photoresistor signal analog to digital conversion
- worm gear 12V DC motor controlled via L9110 motor driver chip
- dual hall-effect magnetic door position sensors
- fallback door status mitigating magnetic sensor failure
- night-vision wide-angle camera with motion-triggered video capture
- C + bash + python polyglot control code with standardized output convention
- offline operation with 2.4Ghz wifi for monitoring and maintenance


SPERRY
SP-5A


ChickenCam
2017-09-30
17:19:55-00


ChickenCam
2017-08-17
09:45:10-00

Louise likes the new coop but when it comes to the door she is...


SUSPICIOUS!

She'll get over it.

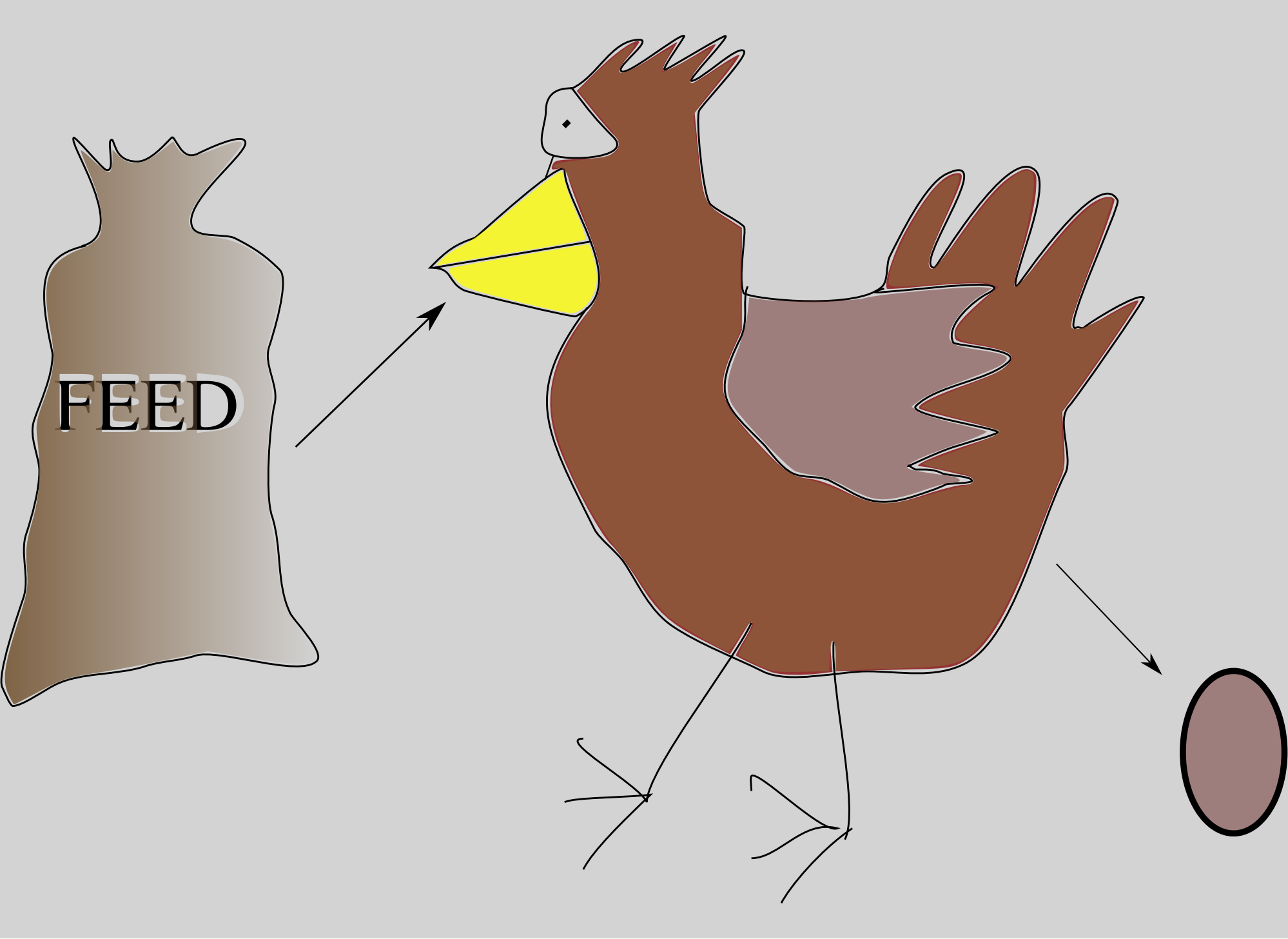
Let's talk about chickens.

# CHICKEN PRIMER

1. Never get wet
2. Never expose to sunlight
3. Never feed after midnight

# REAL CHICKEN PRIMER

1. Food → Chicken → Egg
2. Chicken not smart
3. Must be locked in at night


FEED

# FUN FACTS: CHICKEN EYES

- Right: near-sighted
- Left: far-sighted

# FUN FACTS: CHICKEN EYES

- Right: near-sighted
- Left: far-sighted
- Large eyes 👀

# FUN FACTS: CHICKEN EYES

- Right: near-sighted
- Left: far-sighted
- Large eyes 👀
- Poor night vision 🌃

MUST BE LOCKED IN AT NIGHT

Chickens get in the coop before dusk.

They are pros at this.

All you need to do is lock up the coop at night

*Every night*

And open it in the morning

*Every morning*

*even in the summer when that sun comes up really early and the chickens really really wanna get out at the buttcrack of dawn*

Yeah no. Let's automate it!

# TL;DR 

1. Plan project
2. Buy parts
3. Practice mini-projects
4. Prototype
5. Install
6. Celebrate

# HARDWARE

# PARTS SUMMARY

1. Little computer, motor, sensors
2. Scrap wood, string, magnets

# PARTS DETAIL

| Item | Source | Cost |
|---|---|---|
| Raspberry Pi | Amazon | $50 |
| Soldiering kit | Radio shack | $35 |
| Starter kit | Amazon | $30 |
| Camera | Amazon | $24 |
| Wires | Amazon | $15 |
| 12V DC motor | Amazon | $14 |

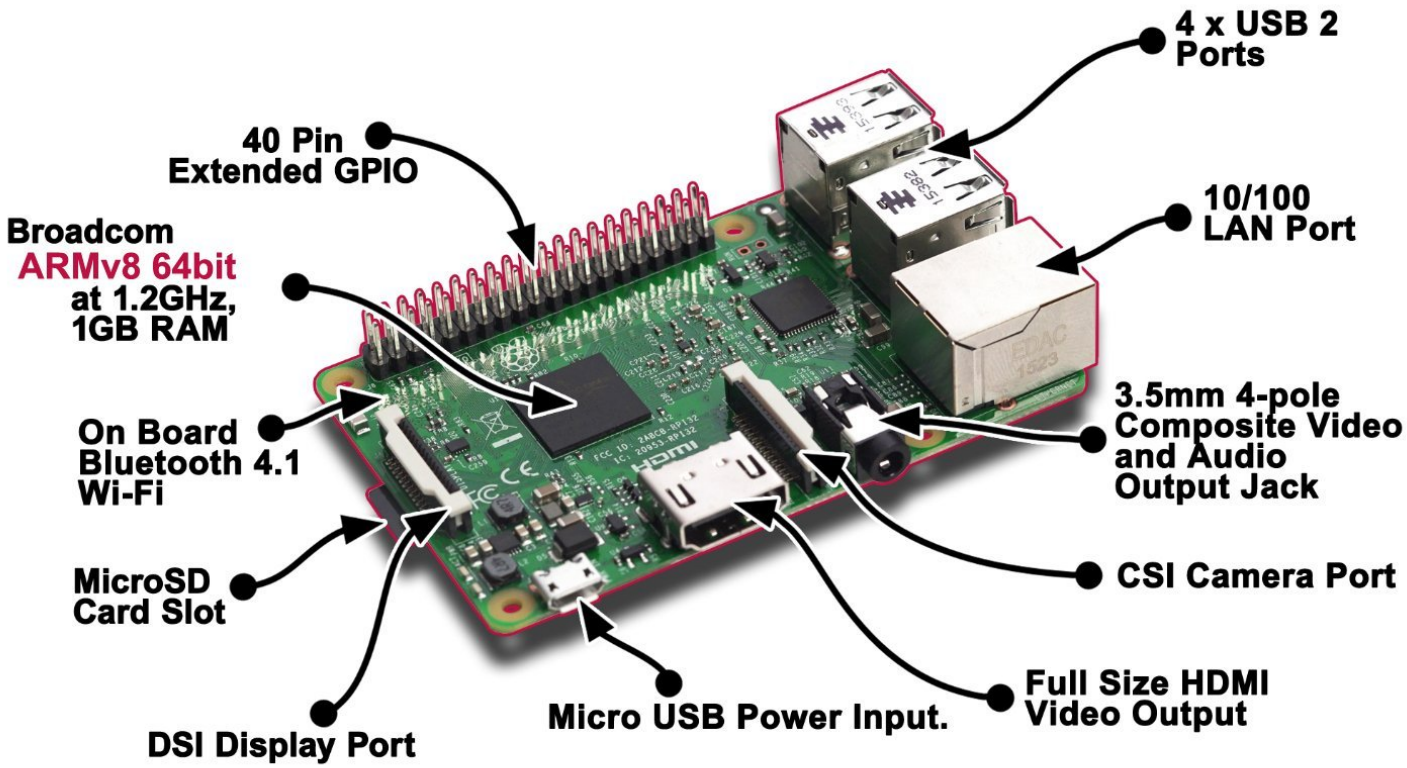
(continued)

| Item | Source | Cost |
|---|---|---|
| Fuses & holder | Amazon | $13 |
| 32GB SD card | Amazon | $13 |
| Mag sensors | Amazon | $7 |
| Test leads | Amazon | $6 |
| Power supply | SparkFun | $6 |

**TOTAL: $213**

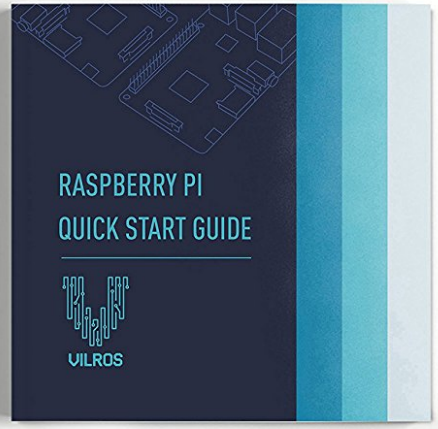
# Raspberry Pi 3

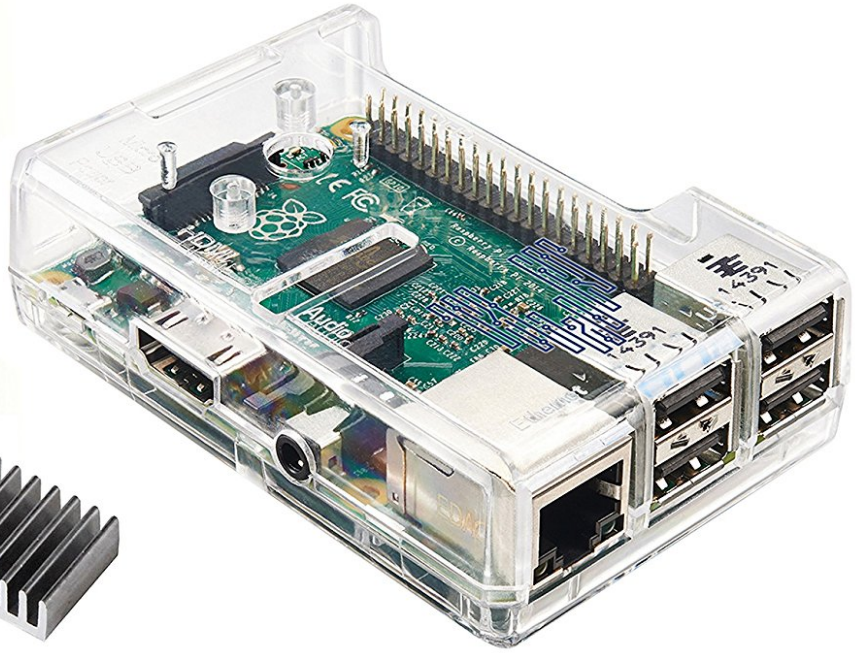
**Model B | 1 GB RAM | 1.2Ghz | Quad-Core CPU**

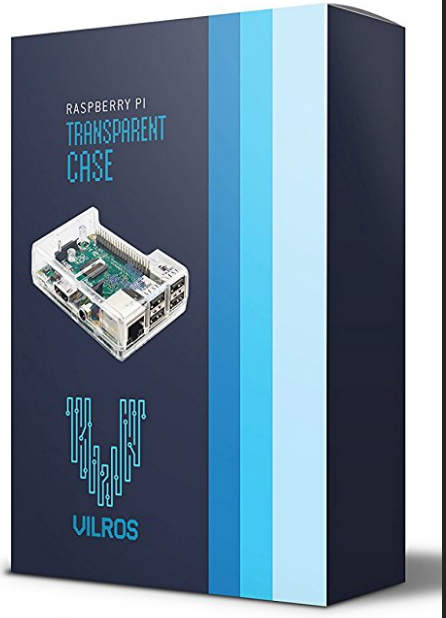


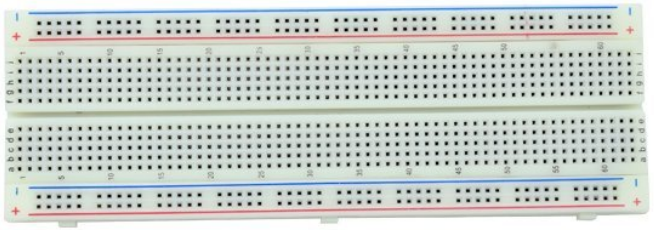

Wi Fi™ Bluetooth®

**Latest Model - 10X FASTER !**


RASPBERRY PI
QUICK START GUIDE
VILROS



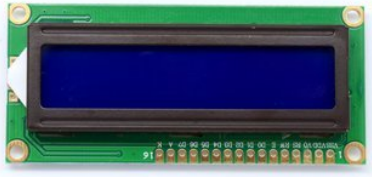

RASPBERRY PI
TRANSPARENT
CASE
VILROS



Breadboard

40 pin GPIO Cable

Breadboard Power



LCD1602


GPIO Extension Board

Button(Large)

RGB LED

Button Cap

Button(small)

Red LED

Green LED

Blue LED

Yellow LED

Header(40pin)

Potentiometer(10KΩ)

7-Segment Display

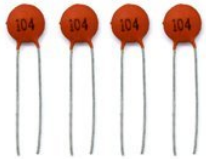
DC Motor

Thermistor


Active Buzzer

1N4148 Diode

Photoresistance




Capacitor(104)

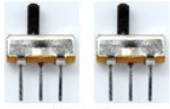
Capacitor(10uF)

74HC595

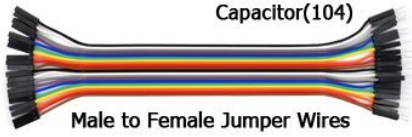
ADC0832


L9110 Motor Driver

1N4001 Diode



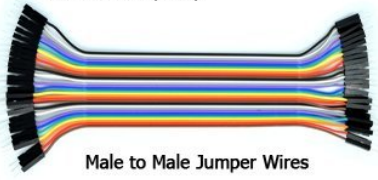
Switch



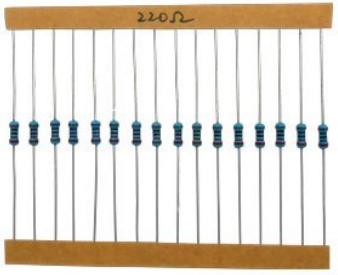
Male to Female Jumper Wires

NPN Transistor(8050)

PNP Transistor(8550)



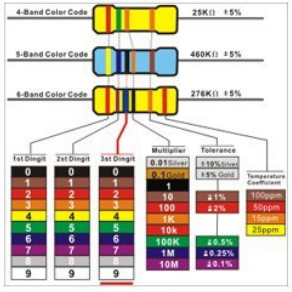
Male to Male Jumper Wires



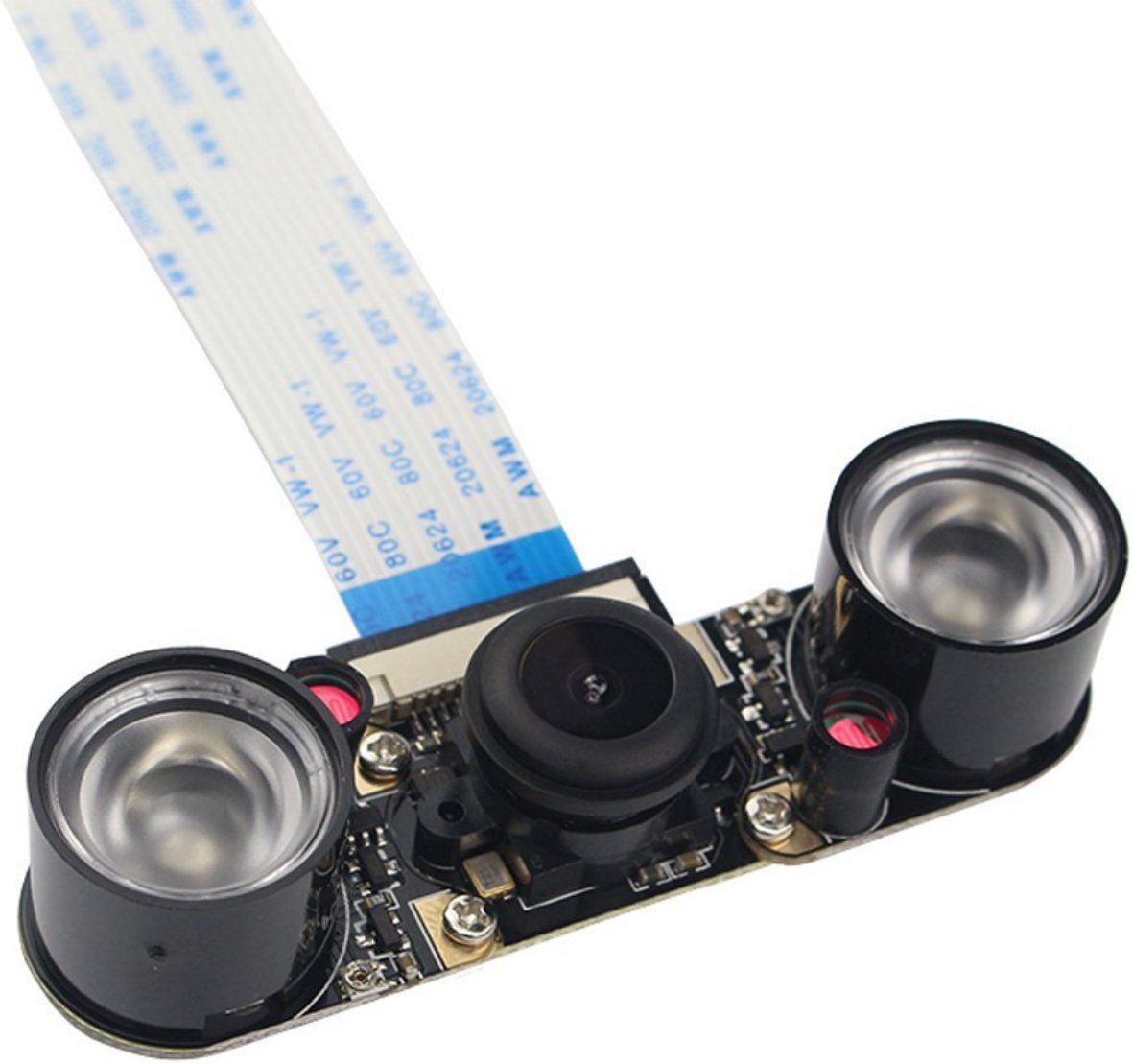

Resistor(220Ω)


Resistor(1kΩ)


Resistor(10kΩ)




Band Resistor Card




6 Spools
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6 Colors
RED
Part #: 884420
YELLOW
Part #: 884440
BLACK
Part #: 884410
WHITE
Part #: 884490
GREEN
Part #: 884450
BLUE
Part #: 884460
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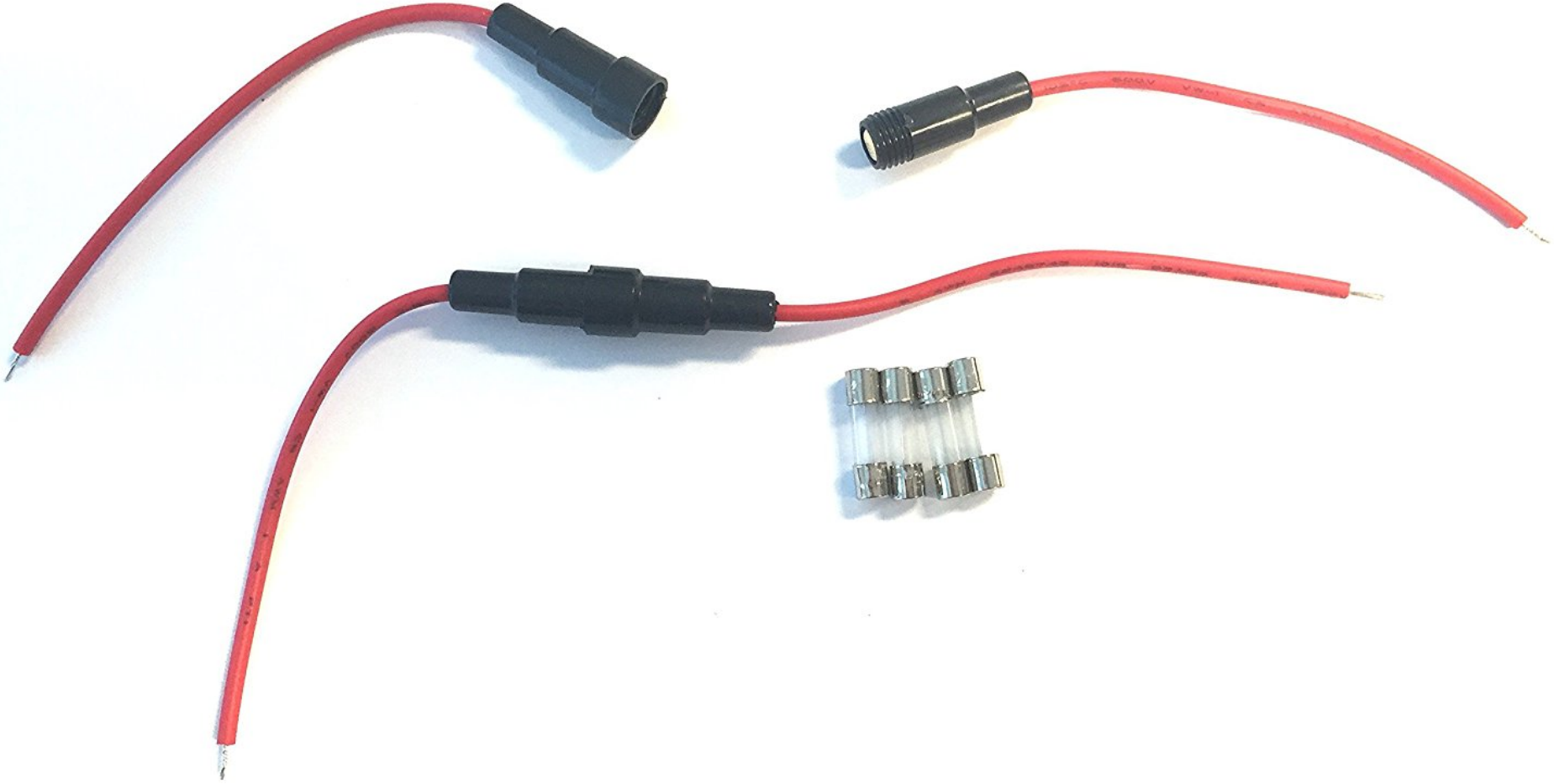
720032




SanDisk
microSD
microSDHC
microSDXC
ADAPTER


SanDisk
Ultra
32GB
micro
SD
HC I
10

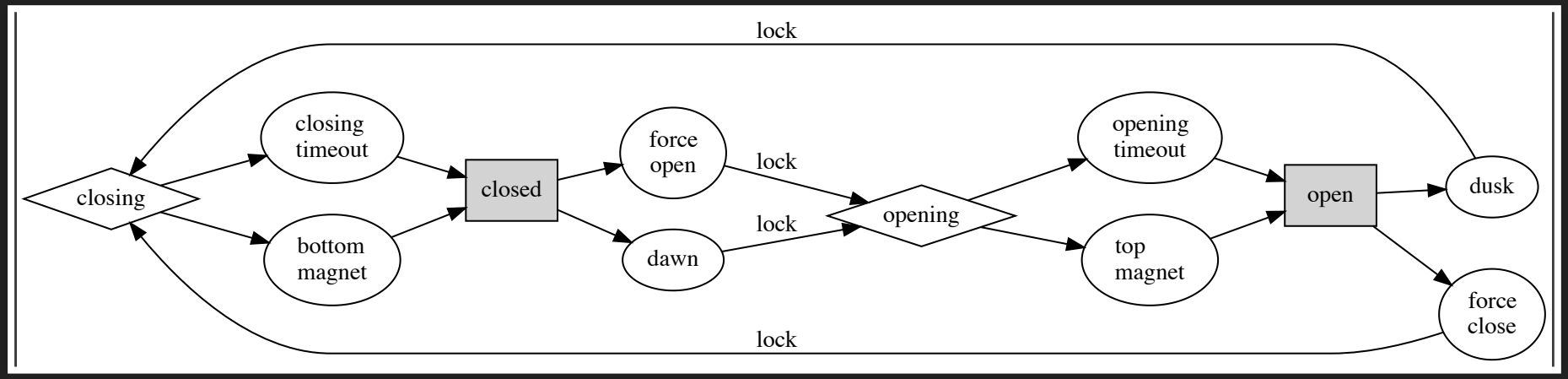
inches
cm
1
2
177
725z
cm
1
2
inches
1

# SOFTWARE

⏰ Cron job runs every 10 minutes.

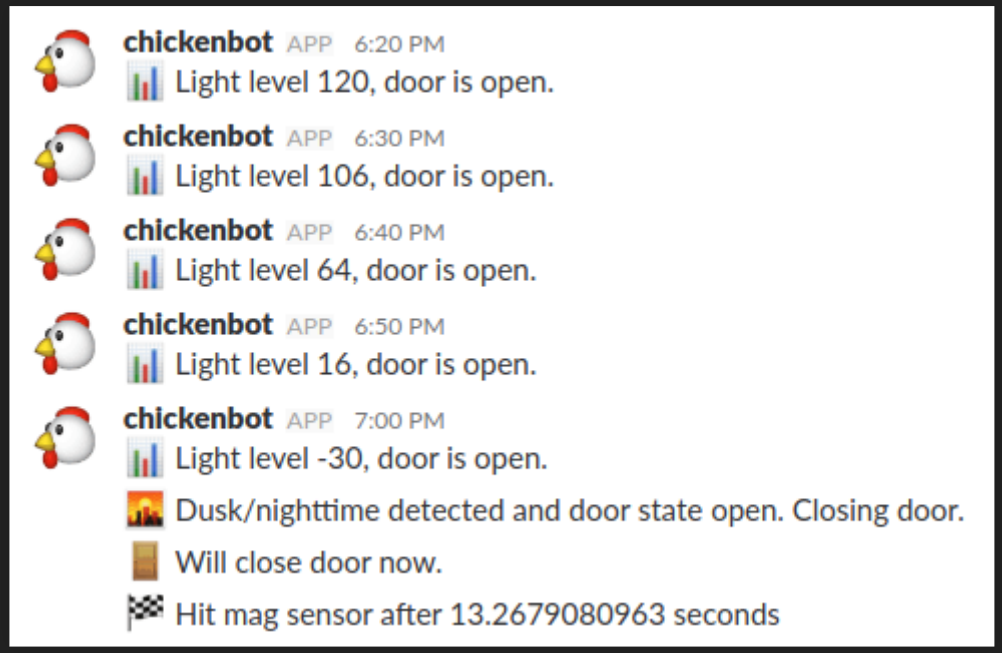
1. Poll 📊 light level and 🚪 door state.
2. 🐣 Door closed & sun up? → `open door`.
3. 🌇 Door open & sun down? → `close door`.

# DOOR CONTROL FLOW




- shaded rectangle: resting state
- diamond: active state
- ellipse: trigger to/from active state
- "lock" enforces atomic opening/closing

# LOGMOJI




```
18:20 Light level 120, door is open.
18:30 Light level 106, door is open.
18:40 Light level 64, door is open.
18:50 Light level 16, door is open.
19:00 Light level -30, door is open.
19:00 Dusk/nighttime detected and door state open. Closing
19:00 Will close door now.
19:00 Hit mag sensor after 13.2679080963 seconds
```

# STARTER KIT

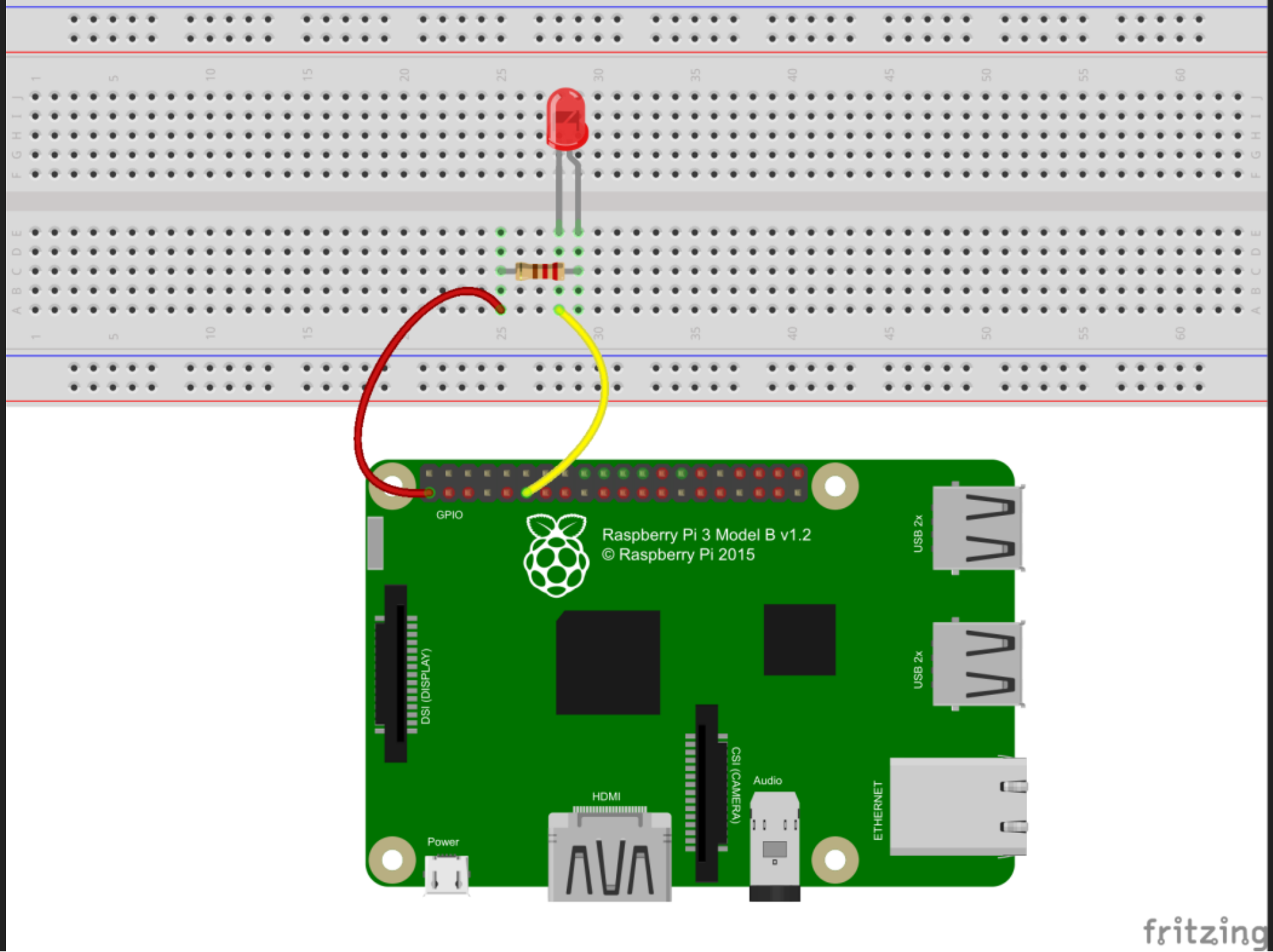
 Easy, fun

📖 Beginner-friendly manual with 13 projects

✔ Background info, diagrams, photos, code

 Email support

Helps you bridge the gap where hardware meets software.


GPIO
Raspberry Pi 3 Model B v1.2
© Raspberry Pi 2015
USB 2x
USB 2x
DSI (DISPLAY)
CSI (CAMERA)
Audio
HDMI
ETHERNET
Power
fritzing

# MORE IDEAS

- Try Raspian OS with a Raspberry Pi 📣
  - "stretch with desktop and recommended software"
- Try the camera: do a time-lapse video 🎬
- Try a project from a Starter Kit (e.g. Adeept) 🛠️
- Free hardware: check out EOMA68 and others

(continued)

- Ask for help! 💭
- Try combining sensors / lights / camera 📷
- Use lots of emoji
  - 🐔📊🛠️🚪🚦🎬😓⏰🏁🐣🌇📡🚧
  - seriously 🗞️
  - one per unique log event 🌲

# LESSONS LEARNED

- If the Raspberry Pi won't boot, unplug all peripherals and try again. If USB ports are full, peripherals may draw too much power. 🔋
- Get help, ask around. Call friends. Pair up. Find a local maker space. 🛠️
- I'm incredibly lucky to have a brilliant, patient partner who is great at woodwork and code. 👩

(continued)

- Use a 32GB flash card. I bricked a 64GB card. 🚧
- Easy: camera. Plug & play! 📷
- Easy: loose tolerance for software (slow door, 10min between light checks).
- Hard: door actuator: spindle, dealing with drag/resistance. Tight tolerance. 🚪
  - Temperature and humidity affect (wooden) door operation. 📊
- Hard: 12V DC motor. L9110 controller is tricky to wire. Software is complex. Wasted time on PWM.

(continued)

- Easy: magnetic (hall effect) sensor. 👍
- Hard: Adeept Python photoresistor code didn't work, but C code did.
- Easy: posting messages to IRC or Slack.
- Motion alerts for all chicken movement? 🐔 no
- Adeept source is on GitHub
- Nocturnal predators may also hunt during the day, and there are other daytime predators too. 🐕

(continued)

- Saw the effect of the near-total eclipse. 🌑
- Always start with a MLP and iterate. ✨
- Use Free Software. 🎯

# Adam Monsen, your content violated YouTube's Community Guidelines and has been removed

**YouTube** <no-reply@youtube.com>
to me

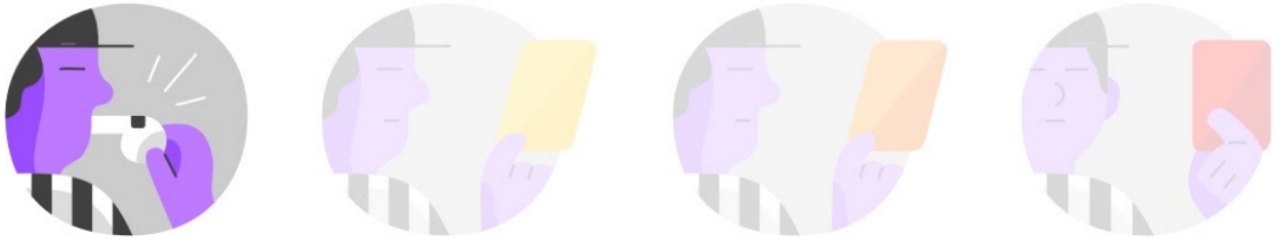
Sun, Mar 3, 7:30 AM

YouTube

Hi Adam Monsen,

Our team has reviewed your content, and, unfortunately, we think it violates our spam, deceptive practices and scams policy. We've removed the following content from YouTube:

Video: ChickenCam 2019-03-03 06:42:28



We know that this might be disappointing, but it's important to us that YouTube is a safe place for all. If content breaks our rules, we

# LINKS TO BUY PARTS

- Raspberry Pi 3 model B with clear case by Vilros
- Soldering iron, "helping hands", rosin-core soldier, desoldiering braid
- Adeept starter kit
- Fisheye night-vision camera
- Solid hook-up wire kit - 6 colors dispenser box
- 25rpm 12V DC worm gear motor

(continued)

- 0.3A glass fuse & holder
- bag o' hall effect (magnetic) sensors
- bag o' test leads (wires with alligator clips at ends)
- SanDisk Ultra 32GB microSDHC UHS-I Card
- 12VDC 600mA regulated power supply

# THANK YOU!

- Source https://github.com/meonkeys/rpi-chx-code
- Slides https://gitlab.com/meonkeys/2019-rpi-talk
- Blog http://adammonsen.com
- Email adam@adammonsen.com