Smarter Fridge

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The Problem

You’re on your way home from work, and you decide to stop by the grocery store because you remember you’re low on milk. But you can’t remember what else you need because you didn’t make a list that morning. You’ve considered buying a smart fridge for this very problem, but those cost around $4,000, and you already have a perfectly working fridge that won’t need replacing for the next several years.

The Solution

A device that can turn any fridge into a smart fridge. It would sit on the counter next to the fridge, and would be equppied with a camera, a small touch screen, and a motion sensor. The touch screen would be the main display and interface. The camera would be used to take pictures of food items. The motion sensor would be used to turn the screen on whenever it senses motion, and turn the screen off when it detects no motion for at least 30 seconds.

Fridge Limitations

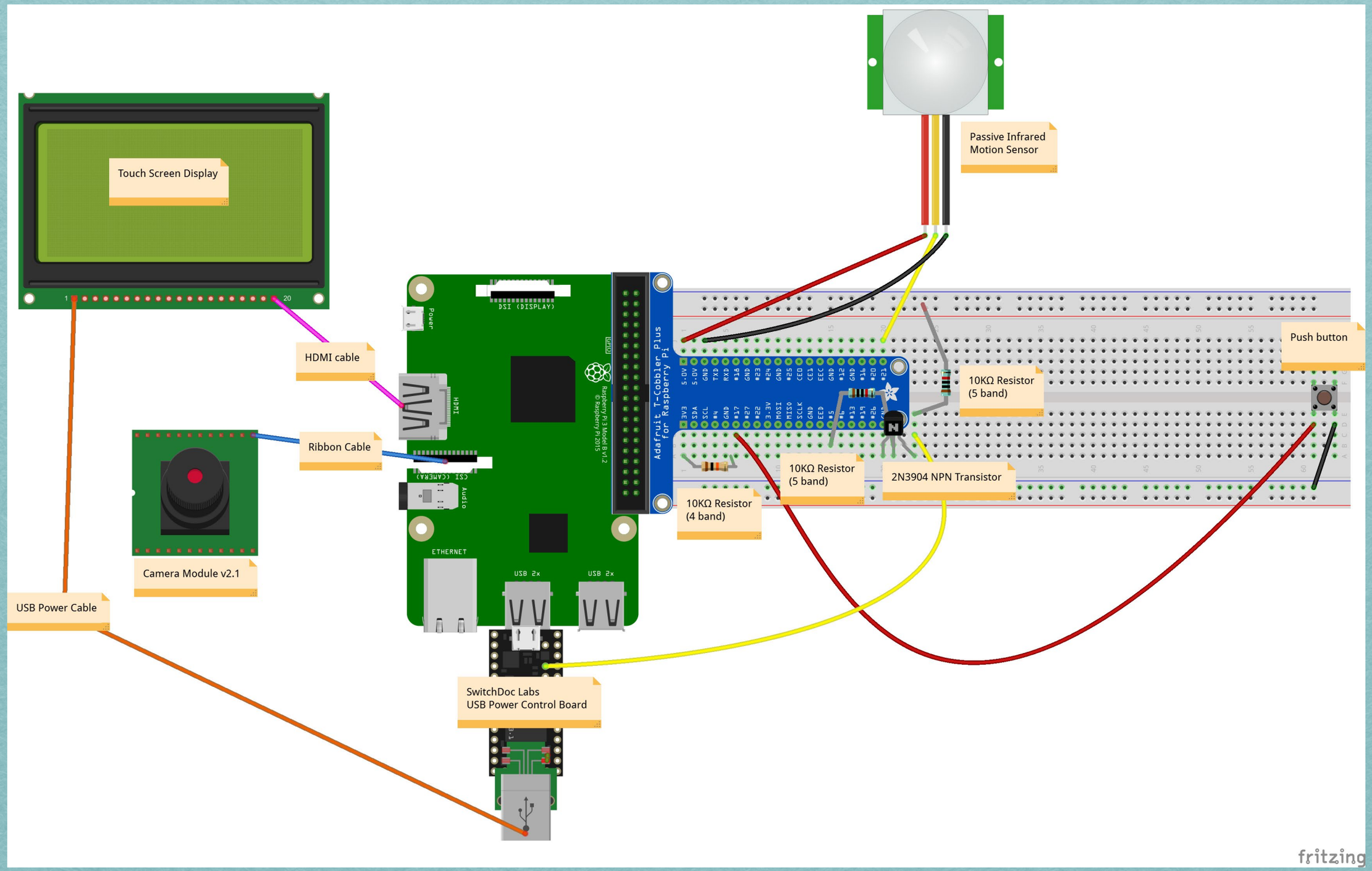
One idea was to build a device that can go inside the fridge. Some of the limitations of that idea:

- The recommended operating temperature of the Raspberry Pi is between 0°–70°C (32°–158°F). However, the Penguin Lifelines project in Antarctica has proven that the Pi can withstand temperatures as low as -42°C (-45°F).
- I could not find any information on the safe humidity range of the Raspberry Pi, but electronics in general are sensitive to humidity. However, air-tight casing could eliminate this issue.
- The environment inside the fridge is dark. Therefore, there would need to be a light turned on whenever the camera is triggered.
- Because refrigerators are airtight, the device would need to be battery powered. This would be inconvenient for the user, as they would have to take it out of the fridge to recharge every night.
- Some fridges, such as those with stainless steel, may block or weaken the wireless signal.

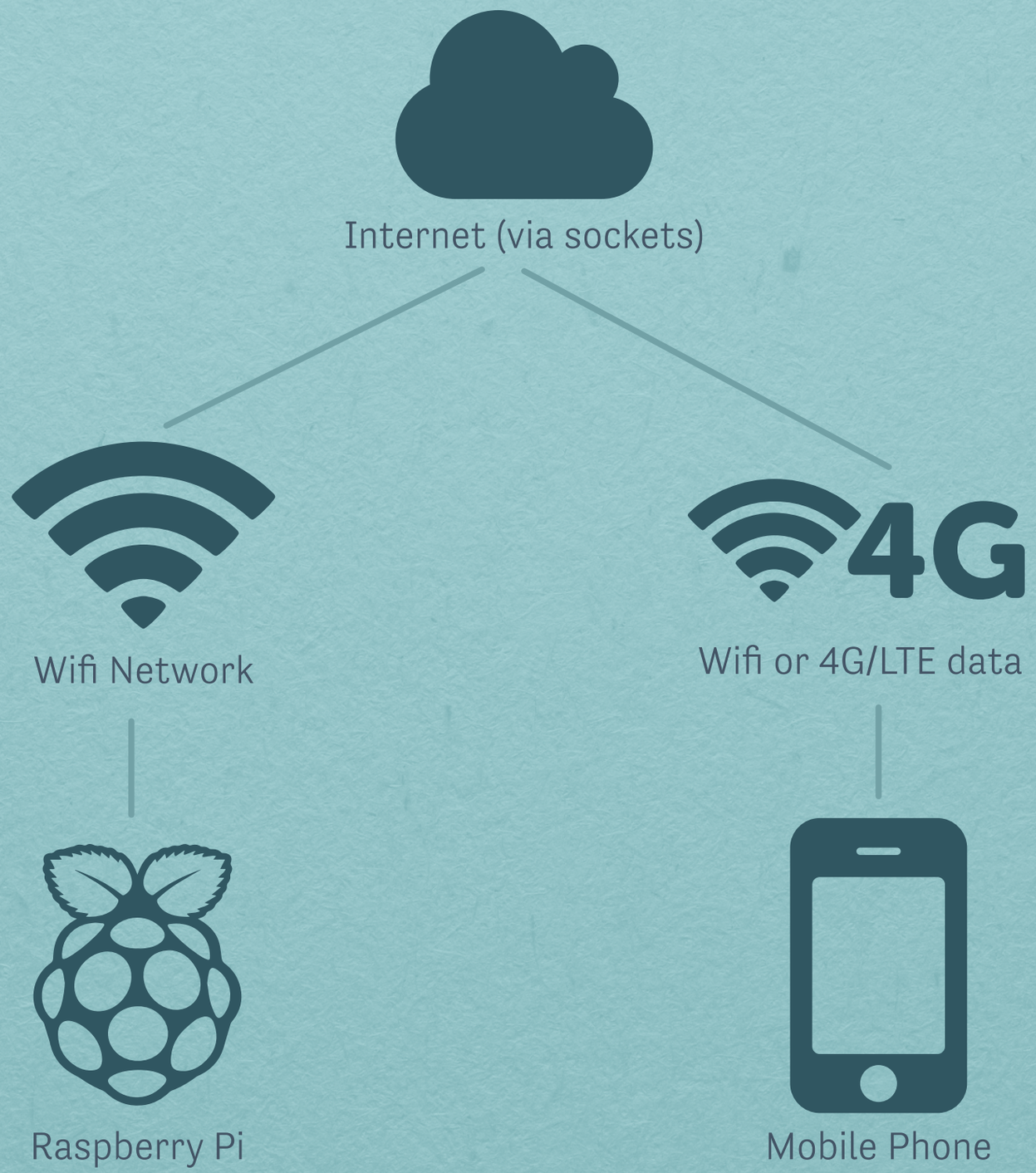
Therefore, the device should be able to switch between both scenarios. To compensate for the battery power issue, the Pi should be able to sense when the battery power is low, send a notification to the user's phone, and then safely shut down to protect the SD card.

The current prototype does not have a battery and must remain plugged into an outlet.

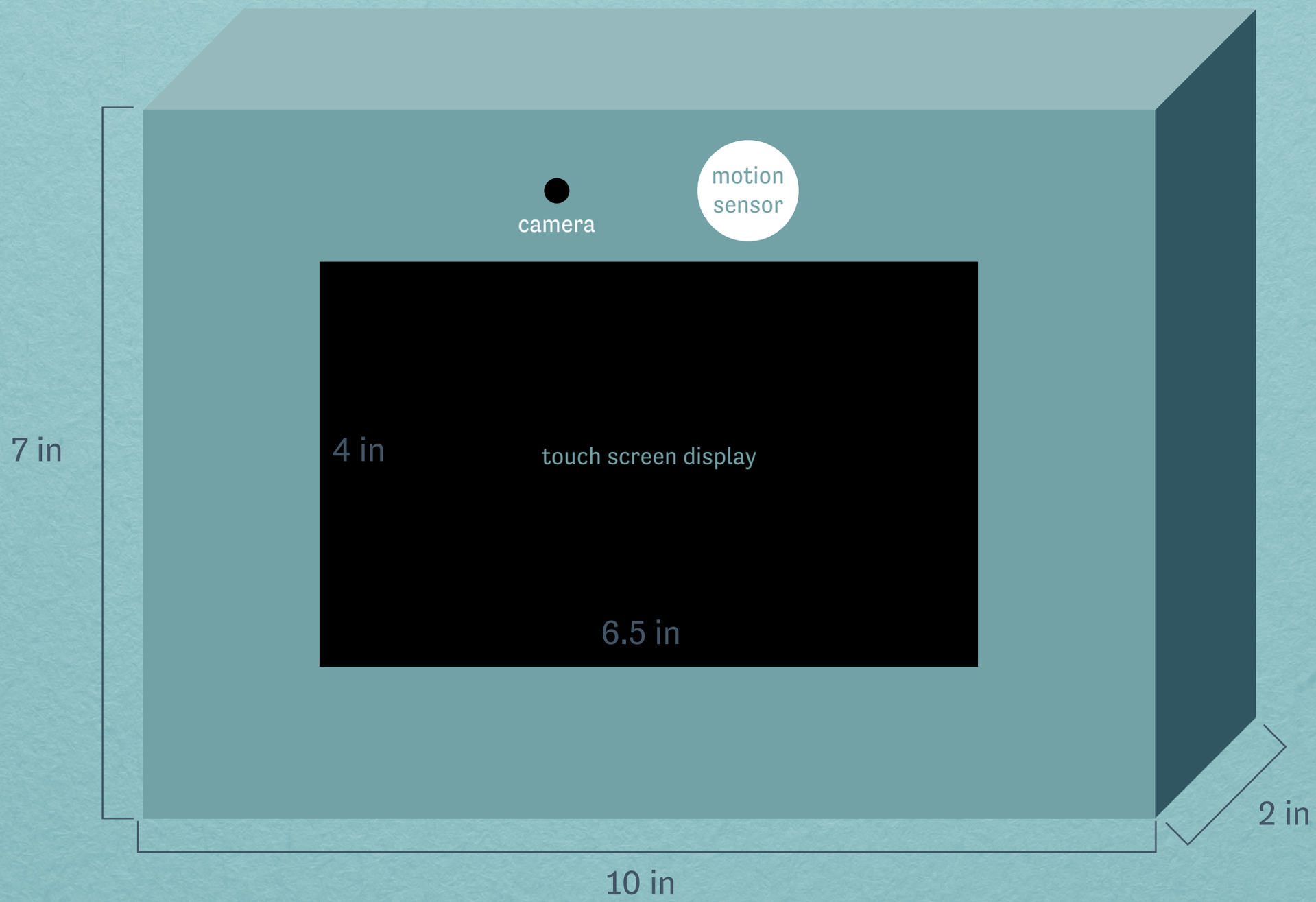
Hardware


Touch Screen Display
1
20
HDMI cable
Ribbon Cable
Camera Module v2.1
USB Power Cable
DSI (DISPLAY)
Power
HDMI
CSI (CAMERA)
Audio
ETHERNET
USB 2x
USB 2x
Raspberry Pi 3 Model B v1.2
© Raspberry Pi 2015
SwitchDoc Labs
USB Power Control Board
Adafruit T-Cobbler Plus
for Raspberry Pi
Passive Infrared
Motion Sensor
Push button
10KΩ Resistor
(5 band)
10KΩ Resistor
(5 band)
2N3904 NPN Transistor
10KΩ Resistor
(4 band)
fritzing

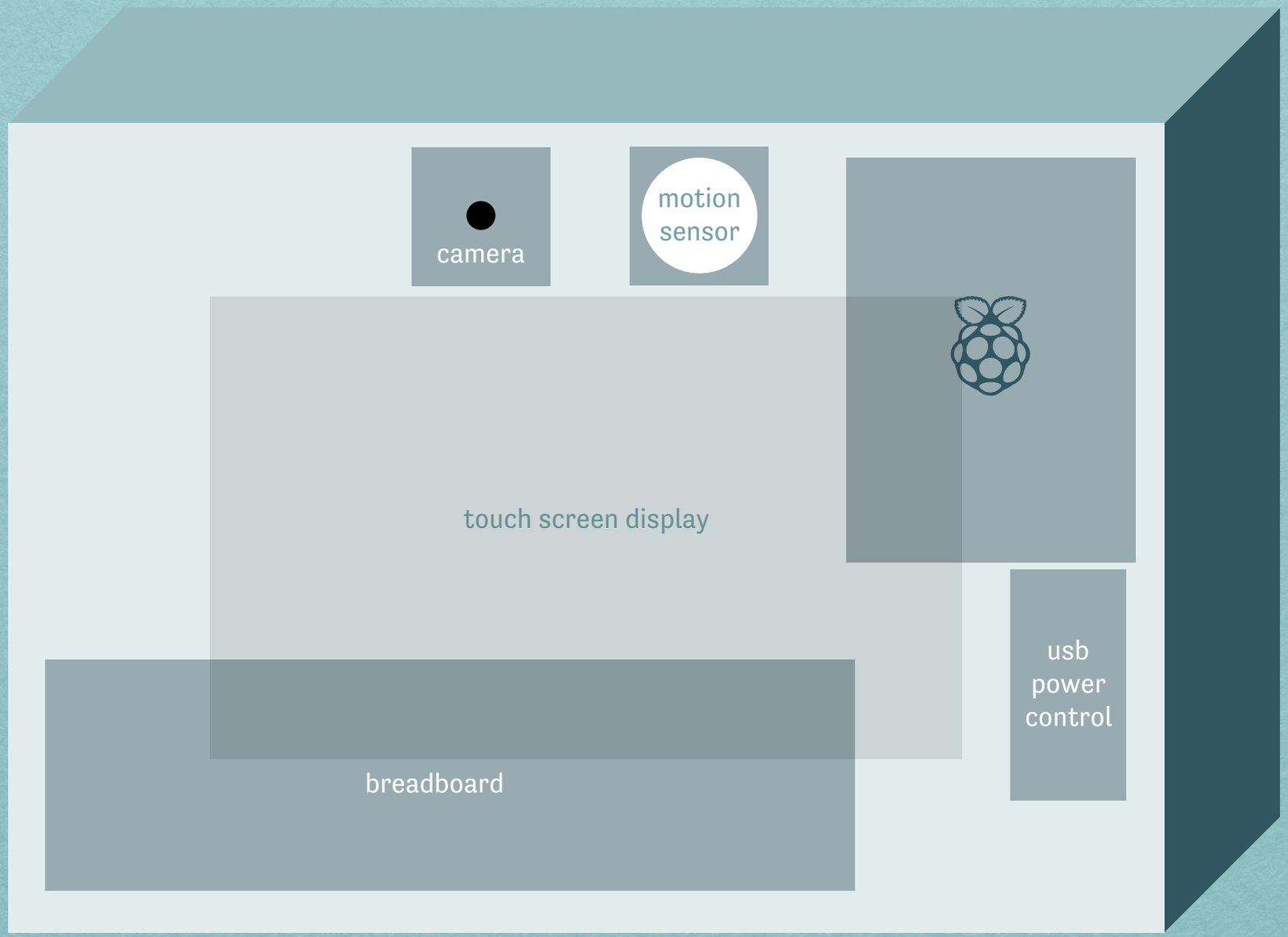
Connectivity



Product Mockup



Inside View



Refer to hardware diagram for wiring

Expected Cost

Raspberry Pi Kit - $80

Touch Screen - $50

USB Power Controller - $16

Custom Case - unknown

The retail price should be around $200 depending on how much the casing will cost.

Hardware Test

A simple test showing that images taken with the camera can be transmitted over the internet.

https://www.youtube.com/watch?v=gBdioUfgCMg