Team 1

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A potential idea we have is to work with the 6061 alloys for aluminum. We have to machine the aluminum and we have to be sure we have to be careful on the machining of the aluminum. In the optimal areas of the design, ideally we’d have steel cut stainless steel, 3D printed materials, as well as aluminum in order to minimize machining.

The arms and the case can potentially be rapidly prototyped with PLA, but the interior will not be rapidly prototyped since the interior will have items in there that are unique and cannot be rapidly prototyped.

We could potentially have a slip ring in order to permit rotation with wires on either side. We could also make the wire longer in order to be willing to move more. Furthermore, a rotary encoder and a rotary potentiometer could be used to help the arm joint in the lock be able to move more.

Some potential mounting methods we have come up with are differing types of adhesives depending on the degree of permanence that is desired. A permanent epoxy bond is possible, however other less permanent solutions such as double sided adhesive foams from 3M also exist.

We determined it was not necessary to be able to adjust the height of the pin pad as it was not really necessary for the overall function of the refrigerator lock and would add an extra layer of complexity and a possible point of failure.

Possible parts to use

Pin Pads:

<https://www.adafruit.com/product/3845>

This pin pad will be used for the code to unlock the refrigerator and silence the alarm.

LED:

<https://www.adafruit.com/product/4042>

This LED can shine with a green or red color, indicating an armed or disarmed alarm system.

10kΩ potentiometer:

<https://www.adafruit.com/product/562>

We plan to use a potentiometer to report the status of the door in the case of an obstruction blocking the weighted door system from fully closing. A 10kΩ rotary potentiometer will be the variable resistor that will change resistance in order to calibrate a closed and open position.

Final Design Components\*

Rapid prototyping will use 3D printing

| Component | Material | Purchasing Location | Part Number | Quantity | Weight | Price Per Unit | Total Price | Notes | Link |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 6061 Aluminum | 6061 Aluminum | Amazon | N/A | 2 | 1.755 lbs per sheet | $18.99 | $37.98 | The body for the pin pad | [6061 Aluminum Component Link](https://www.amazon.com/Aluminium-Aluminum-Finely-Polished-Deburred/dp/B08M63VD66/ref=asc_df_B08M63VD66/?tag=hyprod-20&linkCode=df0&hvadid=507685853899&hvpos=&hvnetw=g&hvrand=13803444464249626083&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=1013763&hvtargid=pla-1244865546405&psc=1&mcid=73ecb0c2c16c363090a3ab1a556c41a9&gclid=CjwKCAiAqY6tBhAtEiwAHeRopVNa8dwxIhKlyLCnpZvd1lSsjFA1dELC7lDzbDw5YA9n06tZS93lMhoC3QAQAvD_BwE) |
| Screws | 18-8 Stainless Steel | McMaster-Carr | 97613A529 | 1 | ~0 | $17.36 | $17.36 | For the Body attachment. 10 Pack | [Screws](https://www.mcmaster.com/97613A529/) |
| Adafruit METRO | Microcontroller | Adafruit | 2488 | 1 | 0.042 lbs | $17.50 | $17.50 | Coding component for alarms, pin pad, potentiometer | [Adafruit METRO](https://www.adafruit.com/product/2488) |
| Red and Green Indicator LED | LED | Adafruit | 4042 | 1 | Not Available | $1.75 | 1.75$ | Light Alarm | [RED/GREEN LED Link](https://www.adafruit.com/product/4042) |
| Pin Pad | N/A | Adafruit | 3845 | 1 | ~0 | $6.50 | $6.50 | The pin pad itself | [Pin Pad Link](https://www.adafruit.com/product/3845) |
| Wires | PVC Coated Copper | Amazon | B08BBXTBL7 | 1 | 0.79 lbs total | $14.94 | $14.94 | Wiring for the device | [Wires](https://www.amazon.com/Gauge-Wire-Solid-Core-Hookup/dp/B08BBXTBL7/ref=sr_1_4?crid=2YFKFOA4RD63X&dib=eyJ2IjoiMSJ9.UIo5E3q7NzPjkxQwKGNfdQ3FuhAzLC-mAshupgLoSkDXkWJc1I1QggnkW8dAvnQAoPGPPllbJenMA18wVx0t9j-gmsoh0NwyJyPDq3IPxBP2T55pKQpW10vA9NtuKP_kZATr4Ul6AlKtvMASqldw9Q.xbG82dSqDf78ub71xgXVEjiEBb7RhIcGF8l26PJFpKs&dib_tag=se&keywords=wires&qid=1705265164&s=hi&sprefix=wire%2Ctools%2C199&sr=1-4) |
| Potentiometer | Potentiometer | Adafruit | 562 | 1 | Not Available | $0.95 | $0.95 | 10k kiloohms | [Potentiometer](https://www.adafruit.com/product/562) |
| Adhesive (Epoxy) | Epoxy Resin | Amazon | N/A | 1 | 0.125 lbs total | $12.45 | $12.45 | 2 pack, Metal Adhesive | [Epoxy Resin](https://www.amazon.com/J-B-Weld-Original-Reinforced-Strength/dp/B0B5VNG2YT/ref=asc_df_B0B5VNG2YT/?tag=hyprod-20&linkCode=df0&hvadid=598238944920&hvpos=&hvnetw=g&hvrand=16027891236110708106&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=1013763&hvtargid=pla-1695224676408&mcid=13a156f4cdf13c26a20bfeb5266c44ce&gclid=CjwKCAiAqY6tBhAtEiwAHeRopf2Vh7qsXWIDqrsuZjqCuv6-VXtDVUysLzUv1R-RMKNJFESZMiPzWBoCWzAQAvD_BwE&th=1) |
| Speaker | N/A | Adafruit | 1891 | 1 | 0.01 lbs | $1.75 | $1.75 | Speaker for the alarm | [Speaker](https://www.adafruit.com/product/1891) |
| Closer | Aluminum | Amazon | ‎SOULONGg850ya231w | 1 | 2.31 lbs | $20.81 | $20.81 | Will use for hydraulic components | [Closer Link](https://www.amazon.com/Aluminum-Commercial-Automatic-Closing-Independent/dp/B08GPD3W6V/ref=asc_df_B08GPD3W6V/?tag=hyprod-20&linkCode=df0&hvadid=680463214693&hvpos=&hvnetw=g&hvrand=18051584580321407561&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=1013721&hvtargid=pla-2260095885309&psc=1&mcid=624b2ed7d3513a4e9b84fd5e8e249870) |
| Sum of Prices/Weights |  |  |  |  | ~6.8 lbs |  | $131.99 |  |  |

As an aside, using a prototype design in Solidworks, the mass evaluation came out to ~3 lbs.

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