# Concept Screening Worksheet

| **Overview** | |
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| Need statement: | |
| There is a need to reduce the risk of contents in a controlled environment from being compromised due to unexpected, unwanted, or unintentional access in frequently accessed refrigerators. | |
| Description of concept: | Concept sketch: |
| This will be a PinPad and Angle Sensor combination. This design will use a PinPad to disarm the alarms built into the product that would sound and flash when the Angle Sensor detects the door opening without a passcode. Inputing a passcode will enable a length of time in which users can open the door without the alarm sounding. The Angle Sensor will use a potentiometer on the hinge side of the door to monitor the open and closed status of the door. If the door stays open for a specified amount of time, the alarms will also sound and flash.  Main components include: -motherboard  -pinpad with LED  -a potentiometer  -speaker box w/ AA batteries  The angle sensor will utilize a potentiometer in order to modulate electrical resistance and thus change the voltage reading into a voltmeter. Different voltages will correlate to different degrees of door openness, and if the degree is too high for past the specified appropriate time for a refrigerator to keep open), the alarm will sound. |  |

\*Potentiometer part file was created by Oleksandr Velykyi on grabcad.com

<https://grabcad.com/library/potentiometer-10k-2>

| **Need Criteria** |
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| Must-Haves | Confidence in Ability to Satisfy |
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| Ease of Use | □ High □ Medium □ Low |
| Ease of Manufacturing | □ High □ Medium □ Low |
| Practicality | □ High □ Medium □ Low |
| Ease of Handling | □ High □ Medium □ Low |
| Affordability | □ High □ Medium □ Low |
| Power Delivery | □ High □ Medium □ Low |
| Longevity | □ High □ Medium □ Low |
| Security | □ High □ Medium □ Low |

| **Greatest Concerns About Concept’s Ability to Satisfy Need Criteria** |
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| The greatest concerns for this design were affordability and power delivery. The use of the pin pad, speaker, LED, and potentiometer circuit may require more power than is necessary for the other designs. Affordability was a concern due to the need to purchase a pin pad, potentiometer, and hardware to have the individual components communicate with each other. |
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| **Technical Feasibility** | | | |
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| **Favorability** | **Disease Process/ Mechanism of Action** | **Key Concept Mechanism** | **Concept Feasibility** |
| ... success growth graph | Well Understood | Well Established Technology | Similar Devices in Related Fields |
| Mostly Understood | Demonstrated in Related Fields | Similar Devices in Disparate Fields |
| Partially Understood | Demonstrated in Disparate Fields | Novel Approach |
| Not Understood or Well Known | Technology Not Yet Available | Novel, Risky Approach |
| **Critical Questions to Answer to Demonstrate Technical Feasibility\*** | | | |
| Since the pin pad might be left at the hinge side of the refrigerator there might be a problem in ease of handling since it is far from the door handle.  There is a chance that many different refrigerators may have different hinge designs making it harder to install.  How much power is necessary to power up the angle sensor? | | | |
| **Estimated Time and Resources Needed to Demonstrate Technical Feasibility\*** | | | |
| We will need an angle sensor (potentiometer), a pinpad, an LED, a speaker, AA batteries, and a motherboard.  The estimated time to put it together and properly code the sensor and alarm would be about a week. | | | |

\*Refer to your prototyping plan for the key take-aways to include in these sections

| **Intellectual Property** | | |
| --- | --- | --- |
| **Favorability** | **IP Landscape** | **Comments** |
| ... success growth graph | No existing prior art |  |
| Little existing prior art | Not many products use a potentiometer system to measure the degree to which a door is open. |
| Some existing prior art |  |
| Extremely crowded |  |
| **In specific terms, what does your concept do?** | | |
| The angle sensor measures the angle between a door and the side of the refrigerator. The angle sensor then compares this against a calibrated value of when the refrigerator is closed. If the angle sensor reads that the door is open without someone having put in a valid code on the pin pad, it will set off an alarm. | | |
| **What aspects of your solution are useful (utility)?** | | |
| Since the installation of this device is at the location of the hinge, the device will clearly not be obstructive to the user at all. | | |
| **What aspects of your solution are non-obvious?** | | |
| The non-obvious aspects of the solution are the calibration of the sensor in the closed position, and the desired timings for the alarms. In addition, the ability to know the degree to which the door is open can also alert users in cases where the door may be slightly open. | | |
| **What aspects of your solution are novel?** | | |
| There are no products currently fitted for refrigerators that use a potentiometer as a sensor to determine if the door is open. This allows for a novel solution that will be very sensitive and will have a more true to life digital image of how much the door is open as opposed to a binary open or closed. | | |