SeLo Security Locker

Product Design Specification

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I.   Needs Identification:

- Most off-the-shelf security lock boxes currently on the market are large and heavy, restricting the location of them.
- The market price for a compact option is above $100, which is so it is unaffordable for some populations
- Most of the current security lock boxes do not have theft detection/identification.
- Some security lockers take long time for lock/unlock mechanism.

II.   Background:

- **Security lock boxes** are popular items in the US as they serve to add a layer of security that most appreciate.
- **Target cost:** Most items similar to the SeLo are above $100. We aim to have the price of our product under $100.
- **Competitions:** Our unit competes in the same market as entry level safes and lockable cabinets manufactured by companies like SentrySafe, Master Lock and Barska. However,the SeLo security Locker is compact, affordable and packed with extra features like an electronic keypad and status display. SeLo is also more accessible, as it is available for purchase in common local stores.
- **Intended customers:** We target ease of use so this product should be used by people of all ages.
- **Volume of container:** There are a variety of size options available, from portable to 200 lb ones. However, the compact segment is limited in choices when it comes to wall mounted units.
- **Lock/Unlock mechanism:** Based on the market research, the majority of manufacturers have opted to stick with a simple key and tumbler mechanism while others have integrated a pin pad. This all has to do with ease of operation and to use the most reliable system for their targeted customers.

III. Objectives:

The objective of this project is to design and prototype a security solution that is intended to be wall-mounted, allows 24 hours access and isn't limited to working hours if
  - People need wall-mounted security box
  - Security box SHOULD have theft identification
  - Security box SHOULD hold 10 kilograms
  - When people enter Pin/Password, the door MUST open/close within 5 seconds
  - The price MUST be less than $100
  - When the PIN/passcode is entered wrong more than 3 times, or when the lockbox is moved without correct PIN/passcode, the alarm MUST sound immediately.

IV. Requirements:

1. **Functionality:**
   a. The product MUST use a pin pad that accepts passcodes as inputs to the microcontroller.
   b. The product MUST activate the actuator and allow access to the box if PIN/passcode is correct.
   c. The product SHOULD sound an alarm after 3 wrong PIN attempts.
   d. The product MUST be able to mount to a wall or flat surface using conventional screws.
   e. The product SHOULD be able to easily change or alter PIN
   f. The product SHOULD be able to store at least 4 different passcodes.
   g. The product SHOULD have an backup/alternative method to open

2. **Performance:**
   a. The product MUST be able to access contents within 5 seconds of entering passcode.
   b. The box MUST operate trouble free for at least 4 years.
   c. The product MUST weigh less than 20 lbs.
   d. The product warranty SHOULD be about 3 years for premature material defects and parts breakdown.
   e. **The product** SHOULD be smaller than 12" x 12" x 12"
   f. The box SHOULD hold at least 0.5 cubic feet of volume.
   g. The product MUST be securable to a fixed surface (wall or floor)

3. **Economic:**
   a. Design, build, and test time MUST be less than 6 weeks.
   b. Cost of design SHOULD be less than $200.
   c. Cost of product SHOULD be around $50.
   d. Cost of manufacture SHOULD be less than $40.
   e. Cost of warranty SHOULD be less than $12.
   f. Cost of ownership SHOULD be less than $10.

4. **Energy:**
   a. The product MUST be run on a 5V battery
   b. The product MUST be compatible with off-the-shelf batteries.
   c. The battery should rechargeable
   d. The battery SHOULD last for 3 months.
   e. The product SHOULD not consume more than 15mA in standby and operation.

5. **Health & Safety:**
   a. The product SHOULD be of rugged construction
   b. The product MUST not to have sharp or jagged edges.
   c. The product MUST not use materials known to cause harm both humans and animals.
   d. The product MUST not allow for points of contact with electrical components.
   e. The product MUST keep items secured inside.

6. **Legal:**
   a. The product MUST not use explosive chemicals and substances.
   b. The product MUST prevent thieves.
   c. The product MUST be safe to keep.

7. **Environmental:**
   a. The product MUST not generate much environmental impacts/footprints.
   b. The product MUST use mostly recycling materials.

8. **Maintainability:**
   a. The product MUST be easy to maintain/warrant.
   b. The batteries on the product MUST be able to replace.
   c. The batteries on the product MIGHT be able to change.

9. **Manufacturability**
   a. A single security locker MUST be able to manufacture in the factory within 2 hours.

10. **Operational (Physical Environment):**
    a. A person MUST be able to carry the product with 2 hands.
    b. The size of the product MUST be around two palm-size.
    c. The weight of the security box itself MUST be less than 5 kilograms
    d. The product MUST not have sharp edges

11. **Reliability & Availability**
    a. The product SHOULD be available off-the-shelf in most grocery stores.
    b. The product MUST be ready to use right after purchase.

12. **Social & Cultural**
    a. The product SHOULD not invoke social and cultural misconducts.

13. **Political**
    a. The product SHOULD not invoke political misconducts.

14. **Usability:**
    a. The product MUST be ease of use.
    b. The product that will be on the store MUST come with an instructions manual.

15. Documentation
      a. The user manual MUST be written and revised.
      b. The user manual MUST be able to find online.
      c. The user manual SHOULD be multilingual.

16. **Marketing**
      a. The product SHOULD be advertised online and offline.