pill box

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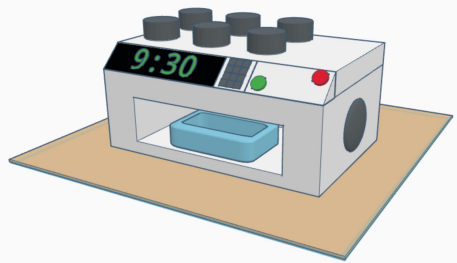
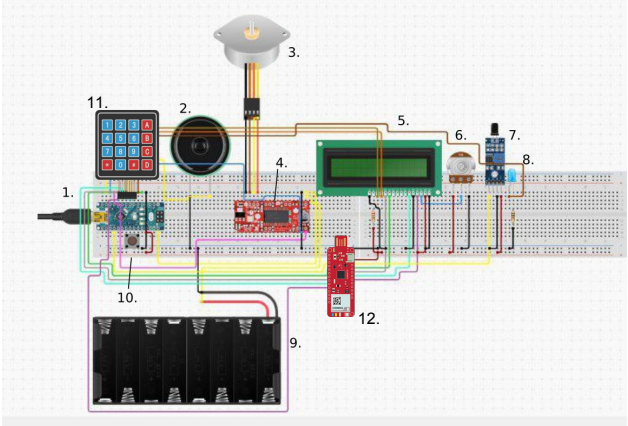
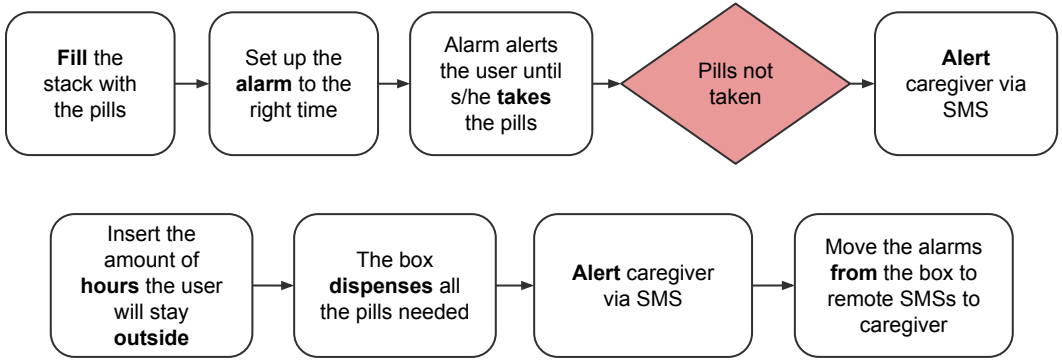
Product Architecture



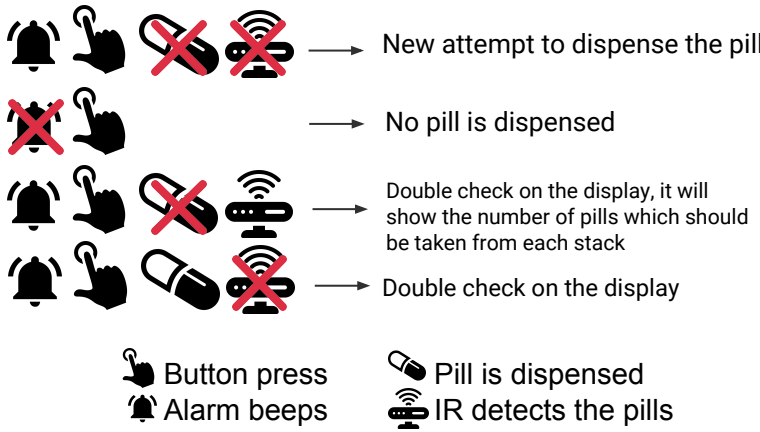


1. Arduino uno
2. Buzzer
3. Stepper Motor
4. Driver for the Stepper motor
5. LCD Display
6. Potentiometer
7. IR Sensor
8. LED
9. Batteries
10. Button
11. Numeric keypad
12. GSM module

Workflows



Error Handling



Personas

Head of alzheimer association, Trento: My associates have many issues with nurturing their relatives. Being sure that the patient gets the **right pill** and the **right quantity** is fundamental.

Informal caregivers, (Son, Grandson, ...): As a caregiver, I would like to have a **user friendly** device that could assist me for better **nursing** and help me in the act of reminding the relative to take pills on **time**. I need to be sure that the patient takes their medicines.

Competitors

Products with similar features:
- Hero (product not in the market yet)

Price **>** $450, **Not** portable feature

Products with similar prices or less:
- Daily/weekly blisters
- Electronic pill organiser

No technological features

Services with similar features:
- Philips Lifeline
- Medminder

Price **>** 50€/$ per month, **Not** portable feature

Features

(How to solve problem?)

Our Solution:
Device with a very **simple** interface that **stores** and **dispenses** pills. It beeps an alarm and glows light to **remind** the **patient** to take the medicine. It **alerts** the **caregiver** with an **SMS** each time the pill is not taken by the patient.
Hence, **assisting** caregivers in the habitual nursing work.

Away Mode:
Patients can **carry** the pills along with them if they are going out for few hours in a day. Alarms are moved from the physical device to the caregiver's mobile via SMS.

Price

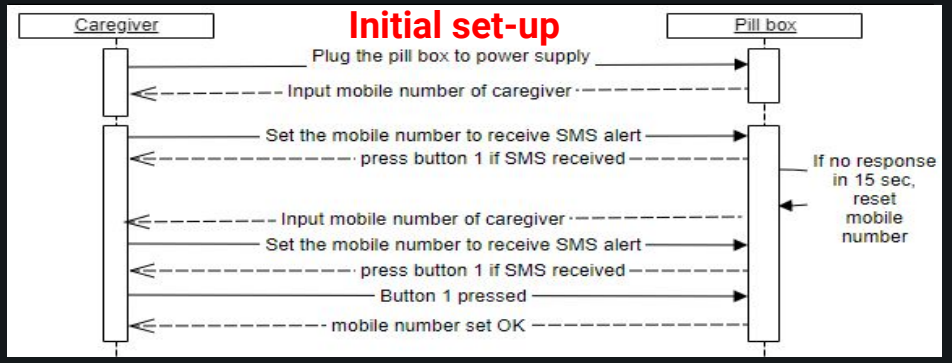
- Market price: €120
Not including the cost of SIM recharge.

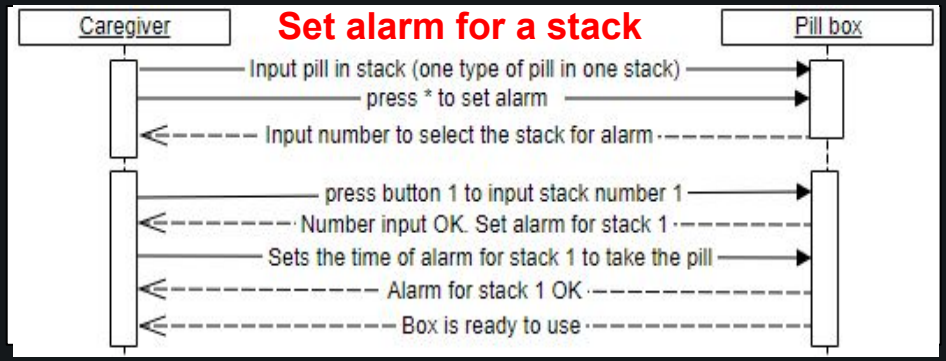
- Cost of the components (for 1000 units): €25

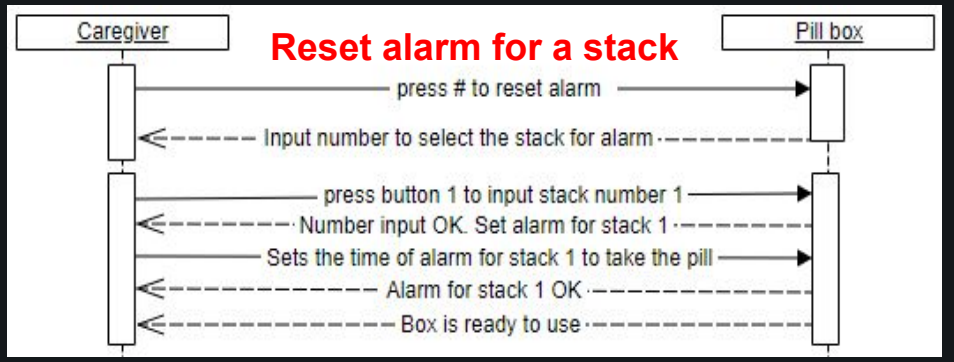
Constraints

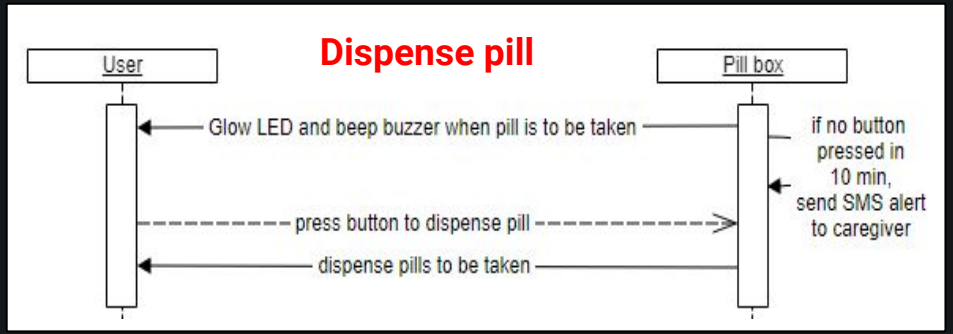
1. **Away mode** is applicable when the user is away only for few hours in a day.
2. The customer needs to recharge the SIM card.
3. Network range should be **available**.
4. Product should not be switched **off** from power supply for long hours.
5. This **box** is not for users who are deaf.
6. This box is not for users where **overdose** or **no dose** of medicine could lead to death.

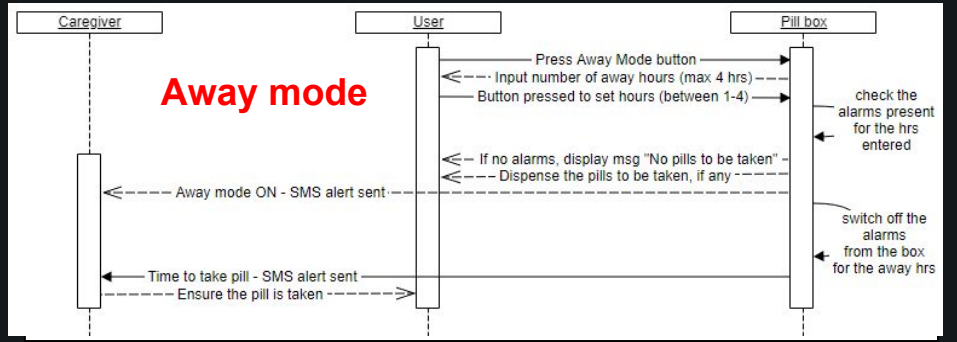
Sequence Diagrams











What will we likely demonstrate in the final demo?

In the final demo, we are going to present a product with two stacks, that is going to be able to dispense one kind of pill. We are going to provide a solution (not implementation) to dispense different sizes and shapes of pills. We will provide the product with the features described in the sequence diagrams, which are:
- Initial set-up, in which the user will insert the mobile number of the caregiver, in order to receive SMS.
- Set alarm, in which the user can fill the stack with the pills and set up the alarm for that specific stack.
- Change the alarm for one stack of pills.
- Automatically dispensing the pill when the user press the button and alarm is beeping (for the demo, we are assuming only one pill should be dispensed for one alarm).
- Alert caregiver through SMS if the button is not pressed within a certain range of time (10 minutes) after the alert.
- Away mode, in which we are going to dispense the amount of pills that the patient should take in the specified time (min 1 hour - max 4 hours).

Here we present a list of possible errors this product may have in general:

1. Errors mentioned in the architectural poster. The prototype will have a tolerance of 75±5% for these errors.

2. We will not handle following errors:
- Wrong set-up.
- Failure of the software part (long-term bugs, SMS not sent, ...).
- Failure of components (motors, leds, buzzers..).
- Incorrect number of pills dispensed (2 or more pills instead of one).

How will we likely "test the concept" with our customers?

We are going to perform solution validation questionnaire, consisting of two sections:
- Section 1: Validating if they are the right customer (e.g. “Are you taking care of an older family member?”...).

If answers for section 1 are positive, ask section 2 questions

- Section 2: Ask caregivers to rate the importance of each feature we propose in the product and ask for their contact (phone, id..).

Additionally we will ask them if they are willing to test our prototype. If they agree, after the development of the prototype, we shall contact them and perform a round of testing.