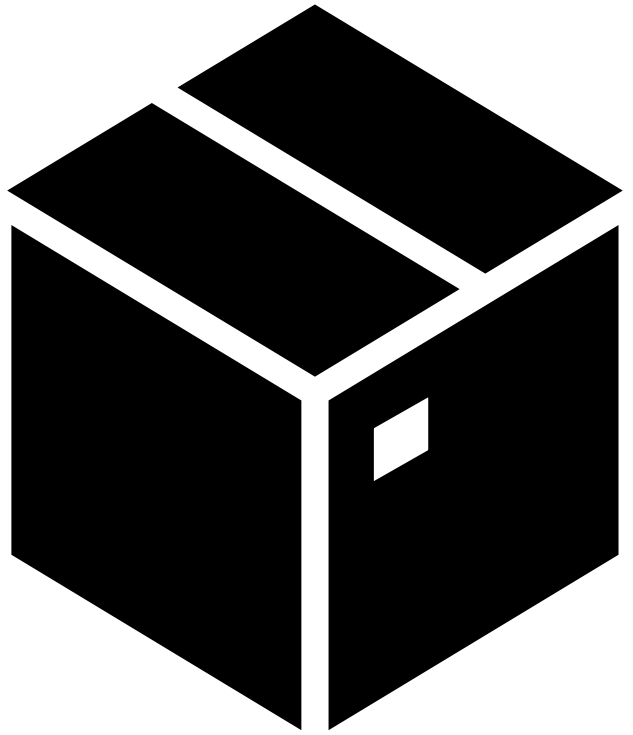
Black Box

A multi-faceted project designed to automate the key issueing system as well as the library baggage submission system to securely reduce waiting time



Made by - Group 10

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Motivation of the project

To automate the key issuing and baggage submission system currently prevelant

To reduce key/slot attainment time

To increase security by reducing human intervention in the key/slot issueing process

To create a portal to know the keys issued and the number of slots available without having to go to the corresponding place in person

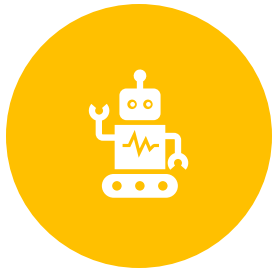
Key Features

UNIQUE ID ISSUING SYSTEM

- RFIDs used to calculate unique UIDs to allot the slots

ISSUE "NEAREST" FREE SLOT

- Allot the free slot nearest to current slot for minimum movement of apparatus and time taken



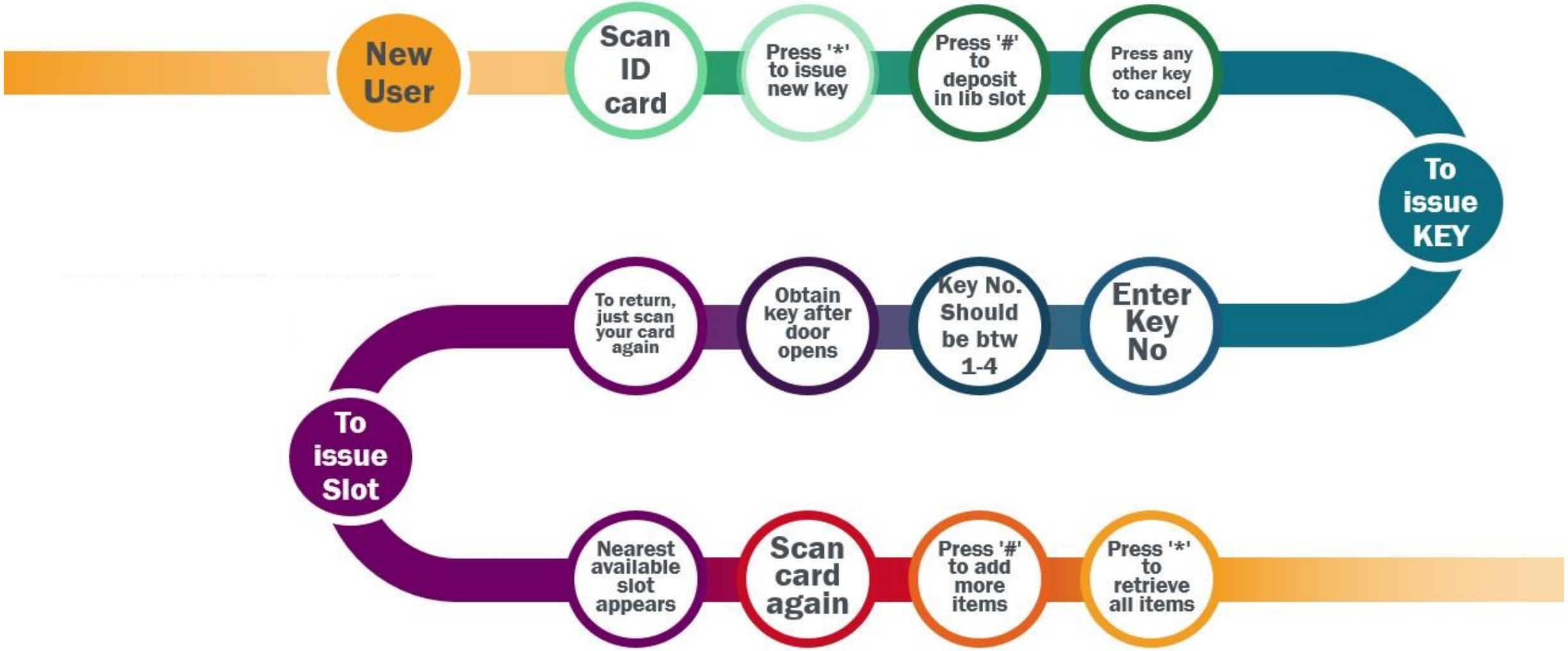
AUTOMATED "TO YOUR DOORSTEP" SLOTS

- Allot the free slot nearest to current slot for minimum movement of apparatus and time taken

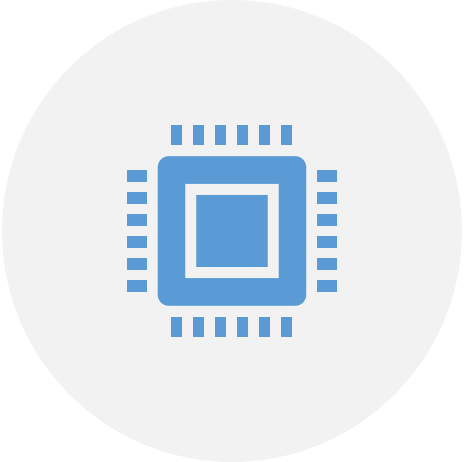
NOTIFICATION SYSTEM

- key retrieval and submission
- Know the current key holders
- Know the number of available slots to submit items

Working of the Project



Chips used



ARDUINO MEGA 2560

ESP 8266 (NODEMCU12)

Sensors and Actuators

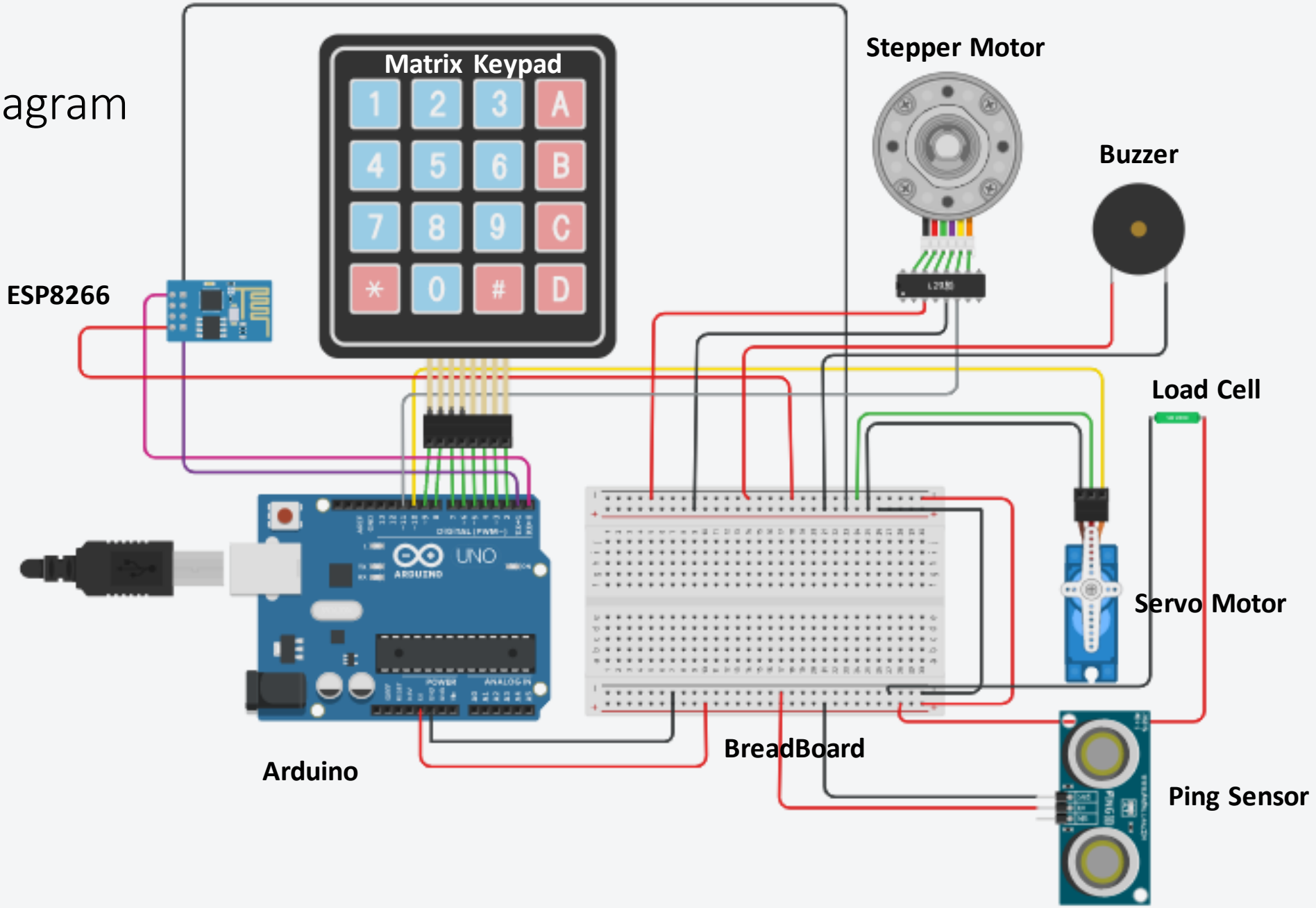
Sensors used

- Ultrasonic HC-SR04
- RFID reader RC522
- Grove Buzzer
- Matrix Keypad
- Load Cell

Actuators used

- Stepper motor with its motor driver
- Servo motor SG90

Circuit Diagram



Drawbacks of the project

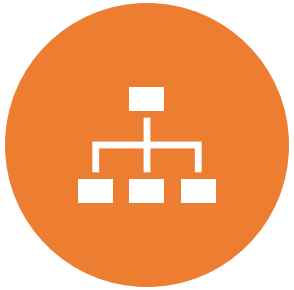
Delay to reach the correct slot

Possible problems of being unable to retrieve or return the items

Open loop system leading to insecure closure of the door and arrival of the incorrect slot because of weary motors

No access in case of a missing RFID card

Scope of future work



Multi-tier approach, I.e. dividing slots into groups for parallelism

Use of weight sensors for each slot to detect possible problems of being unable to retrieve or return the items

Use of a detection mechanism to ensure closure of the door and arrival of the correct slot for weary motors

Unique pin access to each user in case of a missing RFID card