

CS-321

Computer Peripherals and Interfacing Laboratory

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Smart Locker

README

(Group - 01)

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Smart Locker

Our group has built a smart locker using Arduino, variety of sensors such as Ultrasonic Sensor, IR proximity sensor and other components such as keypad, Servo Motors, bluetooth module and buzzer.

The locker is aimed for general purposes, but also provides special features for academic use.

It is built with automatic door lock, which can be unlocked by keypad as well as an android app with bluetooth connectivity, which can also be used for change of password. Excessive force for intention of break-in causes alarms.

If the locker is opened and left unattended, then alarm is rung as a reminder. Also if the locker is opened during the night, then a bright LED bulb is automatically lit for assistance.

For the purpose of academic use, a submission slot is provided with its flap controlled by Arduino to efficiently enforce deadlines in academic submissions. The android app can be used to set deadline after which the flap is shut to stop further submissions. Also the locker is fitted with a proximity sensor to sense the situation when the locker is filled upto a certain level. After that, the flap is shut to prevent overflow of the locker.

Once the flap is shut due to a deadline, it can be re-opened when the owner opens the locker.

Hardware Used

- 1 Arduino Mega 2560
- 1 Keypad
- 2 Mini Servo Motors
- 1 HM-10 Bluetooth Module
- 1 IR Proximity Sensor
- 1 Ultrasonic Sensor
- 1 LED Bulb
- 1 Grove Buzzer
- 1 Relay Switch
- 1 Grove light sensor
- Breadboard and wire cables

Installation/Deployment

Connect the Arduino Board to the PC and using a software (Arduino IDE 1.8.7), and then compile and upload the program onto the device. After this, the Arduino can be powered by any USB based power source. For actual use, this power source is expected to be constant and backed up by sources like UPS.

The Locker is initialized in open state with its password set to 1111. The password to connect the bluetooth to the phone is set to 000000 for ease.

To calibrate the time inside the Arduino, when it is first powered up, send the following message through the App without the quotes: “calibrate 1111 hh:mm dd/mm/yyyy” which is the current time and date in the standard format.

NOTE: The locker password is set to 1111 on the power up of Arduino Board. This is hard coded because the Locker is expected to be initialized only once by the owner. Also the password of HM-10 bluetooth module is set to 000000 for easy connection, by a standard Bluetooth Serial Communication Program. This can be changed as per the wish of Locker owner during the installation.

Testing/Usage

All the features of the Locker can be checked following the below steps:

- As the locker is currently in open state, if the user moves away from the front of the locker, the buzzer will ring to remind him/her of the open locker.
- The LED feature can be tested by turning off the surrounding lights which makes the bulb glow ONLY when the locker is open.
- Simply closing the door against the locker will lock it automatically and if the user pulls the door now without unlocking and with unreasonable force, the buzzer will ring as an alert of unauthorized access.
- Now when the locker is filled through the submission slot with items such as sheets of paper, after a certain extent, the flap will be force shut by internal motor which means that the locker is full up to its capacity.
- The locker can be opened by entering password on the keypad. Enter the intended password and then press ‘*’. Wrong password causes a small beep by the buzzer. The same effect is observed when the message “open” is sent by mobile app followed by the password. This also causes flap to open if it was closed due to deadline.

- When the user sends message “change” followed by current password and then the new password, the locker password is changed. This can be checked with above step. The password should not contain ‘*’.
- Send the message “deadline XXXX hh:mm dd/mm/yyyy” to set the submission deadline. It can be set 1 min from current time for purpose of testing. Here XXXX is the current password followed by date and time in obvious format. After some time, the flap of submission slot will be force shut and no further submissions are possible

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