

# Security System and Rangefinder for Garage Parking

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## I. INTRODUCTION

**I**N this paper, a modification of Arduino based garage parking system is described. The original project was developed by David on [create.arduino.cc/projecthub](https://create.arduino.cc/projecthub). In the original project, the rangefinder device is supposed to be mounted at the wall in the rear side of the garage. It detects the vehicle and calculates the distance of the vehicle from the wall to assist in parking. It uses an ultrasonic sensor to detect the proximity of the vehicle, calculates the distance and displays the distance in centimeters on a matrix display.

## II. NOVEL CONTRIBUTION

An additional security feature is added to the existing project. The garage owner will need to enter a password to enter the garage. Password is to be entered through a RF remote to provide the comfort of entering the password sitting in the car itself. If the password is right, a message will be displayed on an LCD display and will also turn the lights on in the garage.

Also, in the rangefinder, an extra actuator is added apart from the display of the distance on the matrix display. An RGB LED is used to show how near is the vehicle and when to stop. Initially, it is green. When the vehicle comes closer, it turns yellow and when the vehicle reaches a distance at which it should stop, the LED becomes red and a buzzer goes off.

## III. MOTIVATION

Author uses the garage as a storage space. The author doesn't have a security system in her garage. In many occasions, many stuff in her garage has been stolen. Author decided to design a system to prevent intruders from entering the garage. This project was chosen as a security measure for the garage.

## IV. MATERIALS REQUIRED

According to the Arduino project site, the following materials are required:

- Arduino UNO
- Ultrasonic sensor - It is a sensor which detects the proximity of an object
- Matrix display - 8x8 matrix display is used instead of the 8x32 matrix used in the original project because of the availability of the component

Additional materials required are:

- Remote control - Radio frequency remote control
- LCD display - 16x2 LCD display

- LEDs
- RGB LED
- Piezo buzzer- It is passive buzzer which goes off when a DC voltage is applied
- Various resistors

## V. SOFTWARE IMPLEMENTATION IDEA

Software implementation consists of monitoring the status of various sensors connected namely ultrasonic sensor, remote control and sending output to the actuators like LEDs, buzzer, LCD and matrix display. Monitoring various input ports and sending output to various ports at a time is difficult. Therefore, interrupts will be used for monitoring some of the sensors as Arduino does not support multithreading. One of the main calculations required is the calculation of the distance based on the input from the ultrasonic sensor. Depending on the calculated value, particular RGB value will be sent to RGB LED. Also when the distance reaches the threshold, buzzer will go off.

In the security system part, the input from the RF remote control will be read and will be compared to a predefined password. If it is correct, a message will be displayed on the LCD screen and the LED(indicating garage light) will be turned on.

## VI. MILESTONES

The following milestones are planned for the project:

Milestone 1	March 13	Gathering all hardware components
Milestone 2	March 20	Working hardware circuits and Github repository setup
Milestone 3	March 27	Working Software programs
Milestone 4	April 3	Working demo
Milestone 5	April 10	Project report

## VII. SUMMARY

The completed project will serve as both security device and rangefinder for garage parking. It will allow only authorized people with the password into the garage which prevents the vehicle inside the garage from being stolen. It also assists in parking by indicating the proximity of the vehicle using matrix display and LED, and also the buzzer turns on when the vehicle goes beyond the safe distance from the wall.

## REFERENCES

- [1] Rangefinder for Garage Parking with Arduino. (2019). Retrieved from [https://create.arduino.cc/projecthub/AppsByDavideV/rangefinder-for-garage-parking-with-arduino-8dc2c9?ref=tag&ref\\_id=automation&offset=35](https://create.arduino.cc/projecthub/AppsByDavideV/rangefinder-for-garage-parking-with-arduino-8dc2c9?ref=tag&ref_id=automation&offset=35)