

EE381A EC PROJECT

HOME ALARM SYSTEM

GROUP MEMBERS:

TUSHAAR RANGANATHAN(211114)

SHARVIL ATHALEY(210961)

SIDDHANT SRIVASTAVA(211029)

Section D

Table 7

WHAT PROBLEM ARE YOU TRYING TO SOLVE AND WHY IS IT INTERESTING/IMPORTANT?

The high prices of existing wireless siren systems and quality locks online pose significant barriers, especially in countries like India where a considerable portion of the population lives below the poverty line. Access to essential security equipment is crucial for safeguarding families, but the current costs are prohibitive for many. Our project involves making an electronic alarm system which uses an ultrasonic sensor to detect intruders. The intruder will be required to type the correct password either manually or via phone, failing to do so will alert the home/office owner with a notification on their phone.

WHAT ARE THE EXISTING SOLUTIONS? DESCRIBE A FEW OF THEM AND LIST ANY SHORTCOMINGS IN THEM. IS YOUR APPROACH UNIQUE IN SOME WAY?

Existing solutions for home intruder alarm systems typically include products offered by companies like Godrej. These solutions often boast advanced features but come with a hefty price tag, making them inaccessible to many. Common features of these systems include passcode-protected locks and wireless motion sensors to detect intruder movement.

However, these solutions have their shortcomings, primarily in their high cost and complexity, which can be challenging for non-tech-savvy users to operate effectively. Additionally, while they may offer either passcode-protected locks or motion sensors, they often lack integration for both functionalities in a single, affordable package.

Our approach offers a unique solution by combining affordability with convenience and versatility. With our system, users can disable the alarm either by typing a password on their phone via a Bluetooth module or through a manual override option, catering to the needs of non-tech-savvy individuals. This integration of both lock security and motion detection capabilities at a lower cost distinguishes our solution from existing offerings in the market.

WHAT RESOURCES DO YOU REQUIRE FOR COMPLETING THE PROJECT?

Material Used	Quantity	Cost(in Rs)
Arduino Nano	1	400
HCSR04 Ultrasonic Sensor	1	150
HC05 Bluetooth Module	1	230
Push Buttons	4	$17 \times 4 = 68$
LEDS	5	≤ 50
Breadboards	2	$100 \times 2 = 200$
Buzzer	1	30
1k Ω resistor	1	5
2.2k Ω resistor	1	5
10k Ω resistor	4	$5 \times 4 = 20$
220 Ω resistor	6	$5 \times 6 = 30$

Total cost=1188 Rs.

GIVE A BREAKUP OF TASKS THAT YOU WOULD NEED TO ACCOMPLISH WEEK BY WEEK TO COMPLETE THE PROJECT?

Week-1	<ul style="list-style-type: none">-Tested HCSR04 ultrasonic sensor and noted resistance values.-Started making the circuit, tested functionality of other components and wrote the Arduino code.
Week-2	<ul style="list-style-type: none">-Completed the wiring of the circuit.-Solved various bugs in the code and successfully uploaded it to the micro controller. Conducted test run which was successful.
Week-3	<ul style="list-style-type: none">- Finished integrating the Bluetooth module/ push buttons/ buzzer for sending messages.-Modified code to allow password to be sent to Arduino NANO using Bluetooth module.

Arduino Code

https://docs.google.com/document/d/1GFhBuQH0o8T_uspnZbDAs0mmkkTzZ062zvud-3zqd0o/edit?usp=sharing

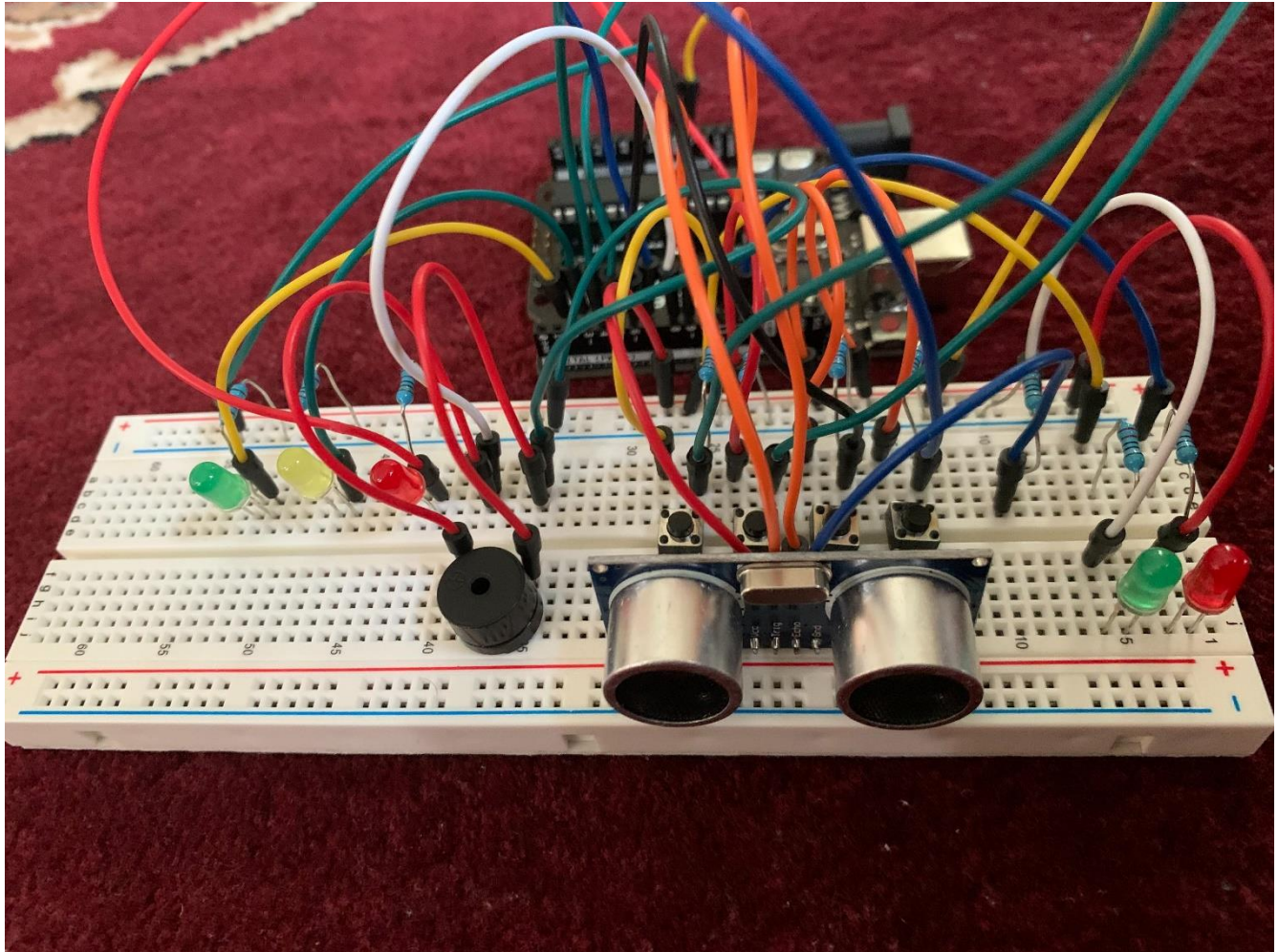
Implementation Details

1)Overview

We implemented an intruder alarm system using the values received from the HCSR04 Ultrasonic sensor to detect the intruder. We programmed the microcontroller to activate the buzzer and LED in case the intruder enters a certain proximity of the sensor(say 25cm) and a message is sent to the

phone via the Bluetooth module. The output is published on a phone application, and we can choose to deactivate the buzzer by either manually typing the password using the push button or typing the password on the phone itself. If the wrong password is typed, then the buzzer continues to ring and corresponding message is sent to the phone application.

CIRCUIT DIAGRAM



2) Arduino Nano

For programming the microcontroller, Arduino IDE was used, and the code was compiled and uploaded into Arduino Nano. The basic idea of the code was to take input values from the ultrasonic sensor and give different outputs on the user's phone based on how small the values were.

3)Bluetooth Module

As soon as the ultrasonic sensor is triggered, the data is sent through Bluetooth module to user's mobile. Also, the password is input on the phone and gets sent through Bluetooth to the Arduino.

4)Ultrasonic sensor

It formed the crux of our alarm system as it detects how close the intruder is to the alarm system, based on which apt action is taken by the code.

5)Push buttons

Push buttons are used to manually type in the password to stop the alarm, in case the user does not have their phone with them or are not "tech-savy".

RESULTS

We managed to successfully implement the basic objective of detecting an intruder, activating the alarm as well as de-activating the alarm when the correct password is input. A message is sent to the phone in case an actual intruder has entered the house without putting the correct password and the user can take appropriate action. **We also implemented taking the password to de-activate the alarm via the phone and transmitting it to the Arduino using Bluetooth module.**

FUTURE IMPROVEMENTS

There is a lot of scope for future improvements.

1)A lock can be attached, which will only unlock once the correct password has been entered.

2)Fingerprint sensors can be used, although it will provide inconvenience whenever a new person enters the house as they will have to register their fingerprint. However, this will increase cost of the project and will be against the intended use of the alarm system as not all people will be able to afford it.

3)A small camera can be added to take a picture of the intruder to further bolster security and send it to the user's phone.

4)We can add OLED Display to show the password when we type it manually. We can also use a keypad to type the password instead of push buttons.