SENTINEL : Home Automation and Security

CSE316 Term Project

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Contents

1 Introduction

As Engineers it is our job to solve practical problems to make other people's life better. In that spirit, We have made the perfect home assistant - "SENTINEL". You can tell instruct her switch lights, fans and windows. She can automate your house by turning lights on when it is dark and starting water pump when needed .She will not only make your life easier but also safer by detecting intruders and fire. Just don't fall in love with her, because she's already married . . . to *science!*

2 Features

1. Intruder Detection
2. Fire Alarm. Window opens when smoke is detected.
3. Automated Water Pump
4. Remote Controlled Light,Fan and Window
5. Rain Detection: Window closes during raining
6. Temperature, Humidity and Tank Water level monitoring
7. Auto Lights On When It is Dark

3 Implementation

3.1 Block Diagram

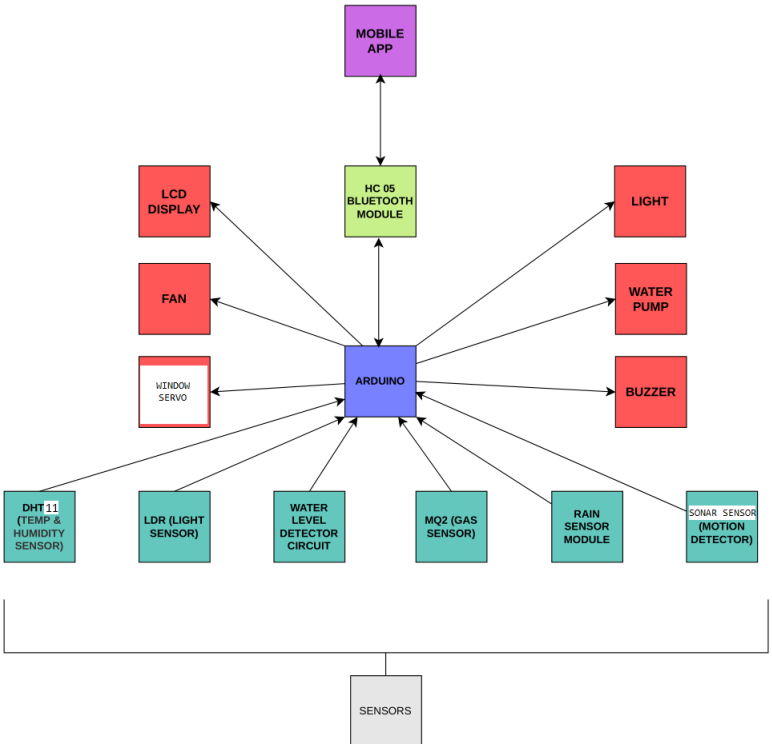

Figure 1: Block Diagram

3.2 Components

3.2.1 Electronic Instruments

Model/IC	Decription	Count
Arduino Nano	Microcontroller	1
HC-05 Module	Bluetooth Module	1
DHT11 Module	Temperature Sensor	1
MQ-2 Module	Gas Sensor	1
Active Buzzer		1
1k 1/4 W Resistor		9
2k 1/4 W Resistor		1
10k 1/4 W Resistor		1
LDR	Light Dependent Resistor	1
BC547	NPN Transistor	2
9V Battery		2
I2C LCD 16x2	LCD Display	1
HC-SR04	Sonar Sensor	1
Rain Sensor Module		1
5V Relay		2
12V DC Motor		1
6V Water Pump With Tube		1
TowerPro SG91R	Micro Servo Motor	1
5mm LED		2
5V Power Adapter		3
Jumper Wire	Male to Male, Male to Female	Approx. 30
Variable Length Wire	2-125 mm	As Needed
Breadboard	400 Point	4

Table 1: Electronic Instruments

3.2.2 Other Components

1. Cardboard
2. Masking Tape
3. 3d Printed Structure (Optional)
4. Water Jar
5. Super Glue

3.3 Circuit Diagram

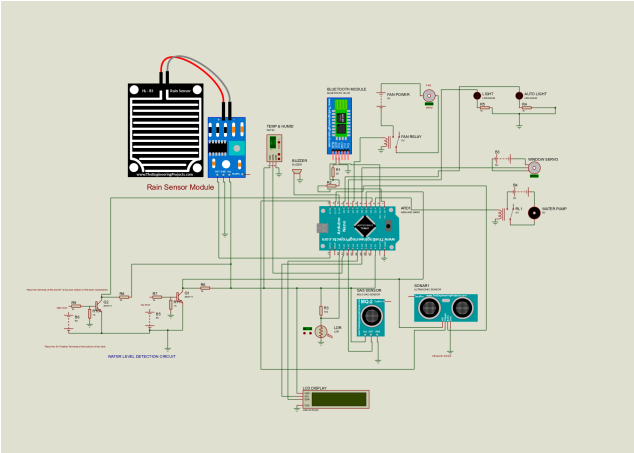

Figure 2: Circuit Diagram

The Proteus simulation file and higher quality circuit diagram can be found at here.

3.4 Codes

The source code can be found at here.

3.5 Android Application

The application can be downloaded from here.
Visit the Github Repository/Android App folder to see the user guide to use the app. (Github Repository's link is given at section 3.7).

3.6 3d Model

The .blend file which was used to 3d print the structure can be found here.

3.7 Repository

The github repository containing comprehensive codes, circuit diagrams etc. of this project can be found here.

4 Hardware Demonstration

The demonstration video of the project can be found here.

5 Problems Faced and Solutions to Problems

5.1 Power Issue

We faced severe power issue when we tried to run all the connected devices at once. Specially, the water pump and the servo motor drained too much power which shut off the system. The most probable cause was the required current was above the power adapter's limit.

Solution: We used separate 5V 1A/2A power adapters. Specially, provide separate power supply for the water pump as it is most likely to cause power issue.

6 Project Recreation

To recreate this project, follow these steps:

1. Collect the instruments catalogued in section 3.2.
2. Download and install the app provided in section 3.5.
3. Upload the code to arduino nano. The code can be found at the src directory of the repository (link given in section 3.7).
4. (Optional) Print the 3d model given in 3.6. It is not necessary, but will give structural support to some devices.
5. Assemble the circuit, using the circuit diagram given in section 3.3. You should also see the demo video given at section 4 to setup the water pump and tank and other devices.
6. Place the sonar sensor in front of where you want the device to detect intruder. Also make sure there is no one in front of it for a few seconds when the device is powered on.
7. Switch on power.
8. If it is your first time using this project, then first pair your phone with the bluetooth module named "HC-05". The password is "1234".
9. Open the Sentinel app and connect to bluetooth.
10. The system should be running properly! Interact with the UI and see if everything works!