

INDIAN INSTITUTE OF TECHNOLOGY ROPAR RUPNAGAR-140001, INDIA	IIT Ropar
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Tinkering Lab Project

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1. INTRODUCTION -

In recent years, rapid advancements in Internet of Things (IoT) technology has paved the way for increased connectivity and automation. IoT, being a network of connected devices, sensors, etc, promises to collect and exchange data between devices, allowing us to get a holistic view of the interactions among the devices and the world around them.

Smart home systems are a prime example of the rise of IoT technology. These use a network of connected devices and sensors to automate tasks and allow remote access to various aspects of the home, such as lighting, temperature and security.

Analysis of data collected from sensors, provides homeowners with real-time insights into the status of their home. Interconnectivity between smart home systems and other smart devices also allows convenient access to their smart devices. To showcase the benefits of the smart home system, we will demonstrate some of its functions.

2. PROBLEM STATEMENT -

Our objective is to design -

- Security - System where access to the house is given through face or fingerprint sensor. If forceful entry occurs, then we are to be notified of this.
- Moisture detection - System which will turn off the pump, to the plants, if it detects higher moisture in soil than the threshold.
- Automated device control – System which detects and keeps a count of people in a room. If count reduces to 0, any electronic/ device is to be turned off.
- Kitchen alarm: After a threshold of time, It reminds if the person has left the kitchen with food being on the stove.

3. MATERIALS REQUIRED -

- Microcontroller - Raspberry Pi 4
- IR sensor
- Motor driver - L298N
- Servo motor
- DC motor
- 16 X 2 LCD display
- Buzzer
- Moisture sensor - YL 69
- 7085 voltage regulator

4. Working and Use Case:

- Security at the main gate of the house: For a person to enter the house, his/her mobile phone must be authorized by a **local hotspot** by checking the **IP address**. Further he/she will be checked by **biometrics**(face detection) which opens the app. After that he can give instructions to the app to lock or unlock the door. The instruction is then sent to a **servo motor** which controls the mechanical locking system. In any other case the entry to the house will be marked as intruding and a security alarm, **buzzer** in our case will make sound. People have to use door locks and keys, which sometimes get missing. Also not all the members of the house have the copy of that key which creates many difficulties in a typical Indian household. So our method can eradicate this issue.
- Automated device control : Using **IR sensors** we can detect the entry and exit of people in a room. If two such sensors are fitted on the door, the processing unit can see if the person has entered or exited the room. The user can turn on the lights, fans, LCDs and other appliances by putting his choice on the app. As soon as the last person gets out of the room, all the appliances are automatically

turned off. Using this automation in households can save a lot of electricity.

- Automated watering of plants: **Moisture sensor - YL 69**, can detect the amount of water present in soil. We use this in our project to detect if water in the plant is insufficient. In that case a **DC motor** is turned on which pumps water and water the plants until the same sensor sends the message that the moisture level is sufficient now. People who are fond of beautiful and shower plants in their house find this technology very useful. Now going out on vacations they don't have to think of their plants getting dead due to no watering for a long time especially in the dry season.
- Kitchen monitoring: To make this feature, the logic is mostly resonant with that used in Automated device control, only used for a different purpose. We sometimes miss turning off the gas stove and the food is overcooked. Here we can detect the absence of a person in the kitchen which if exceeded by a cut-off time will sound an alarm and we get a reminder.

Possible Modifications:

On scaling this project, we can replace the IR sensors by face detecting cameras. Using computer vision techniques can make the features better. Using gas sensors to detect the LPG leakage can reduce the fatality caused.

Thank You