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IoT Based Smart Home Automation and Security

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***Abstract:** Over the past few decades, home automation systems have been increasingly popular because they increase comfort and quality of life. A microcontroller and a smartphone are the main components of most contemporary home automation systems. A smart phone application is used to manage and monitor the home appliances via various types of communication. Due of their narrow scope, the current techniques have limitations. The implementation of this project, "IOT- based smart security and smart home automation," has been completed in order to overcome these problems. The concept focuses on "home automation," which is the control of lights and fans, as well as smart security by sending a picture taken by email to the owner via the internet when an object is recognized. This project will be carried out using the "Raspberry Pi" module. This will be especially beneficial to the crippled and elderly.*

I. INTRODUCTION

Since most companies in the car industry and bottling plants have automated assembly lines, the field of automation has evolved significantly in the industrial sector. The house, particularly in India, has not yet been fully automated. The average person's life would be easier if automation were implemented in houses.

The transfer of water from the subterranean water tank to the above water tank using sensors to determine the water levels in both tanks is a straightforward example of how automation is usedin the house. Utilising this method makes filling thetank easier for the user and contributes to water conservation. Additionally, people are becoming more familiar with the usage of smartphones and tablets, which can do the majority of a PC's tasks.

In order to make a low-cost IoT-basedsystem that can automate frequently used electric appliances and increase the security of the home with a fingerprint-authorized lock system that works with an IR sensor and integrated camera that can bemonitored through smartphones, the decision was made to pursue this project.

II. LITERATURE SURVEY

Today, there is an increasing demand of automated systems so that human intervention is reduced. This paper focuses on a system that provides features of Home Automation relying on Internet of Things to operate easily, in addition to that it includes a camera module and provides homesecurity. The android app basically converts Smartphone into a remote for all home appliances. Security is achieved with motion sensors if movement is sensed at the entrance of the house; a notification is sent that contains a photo of house entrance in real time. This notification will be received by the owner of the house via internet such that app can trigger a notification. So owner can raise an alarm in case of any intrusion or he/she can toggle the appliances like opening the door if the person is a guest. The user can make use of this system to control switching on of lights, fan, AC, etc. automatically. We have also incorporated a smoke sensor which, on detection of smoke will ringan alarm and alert the user on their phone by SMS alert. The user can access complete IoT system from anywhere using Internet. But the micro-controller must always have Internet connectivity. Raspberry Pi is a small sized computer which acts as a server for the system. The Raspberry Pi system functions like a computer with a small setup. It contains GPIOpins and USB ports and also supports port for camera module. These pins can be toggled on/off using simple programs. The project mainly aims to overcome the shortcomings of home security systems by providing information of current situation when the owner is away from the house. It will also enhance the IoTs' network security usingencryption and decryption of the user's data.

III. METHODOLOGY

Because IoT-based home automation will allow the user to utilise a home automation system based on the Internet of Things (IoT), home automation and smart security are significant. The internet automates modern houses and allows for remote control of household appliances. The Wi-Fi modems will receive the user's online commands. This modem may be accessed using the microcontroller. Both the system data and the system status are shown on the LCD.

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This is a typical Internet of Things-based system for automating all of your home's appliances. The demand for smart homes is growing as IoT device prices decline and more people become aware of their advantages. The IoT would go furtherif smart cities followed smart houses as the natural next step.

However, smart houses are only a tiny portion of our everyday lives that will change as a result of the Internet of Things in the future years. Using IR LEDs, the infrared sensor (IR) is a low- cost infrared object detecting device that may be used at home. When light is detected, it is activated. The Raspberry Pi receives a signal from the sensor when it senses something. We can turn on and off the light from the Raspberry Pi using Wi-Fi settings and the Internet of Things (IoT) idea.

Similar to IR, the PIR sensor detects human presence and activates or deactivates the fans in response. On a laptop or tablet, we can build a web server that can control the lights and fans. Alternatively, we can use a mobile device to build an app. Last but not least, if there is a fire mishap, the fire detection sensor is activated, and right away a message of alarm is sent to the mobile phone together with the picture and video captured in the camera. An automated phone call is then made to the closest fire station. The drawbacks of sending emails, such as the potential for virus infection in theattachment, can be avoided by utilising a mobile phone. A time delay resulted by the user having to check in with their email ID and password since emergency mail could not be accessed due to a large number of spam messages

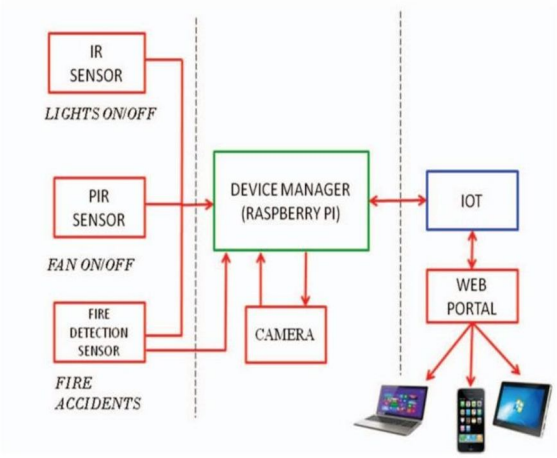


Figure 1: Architecture of Home Automation

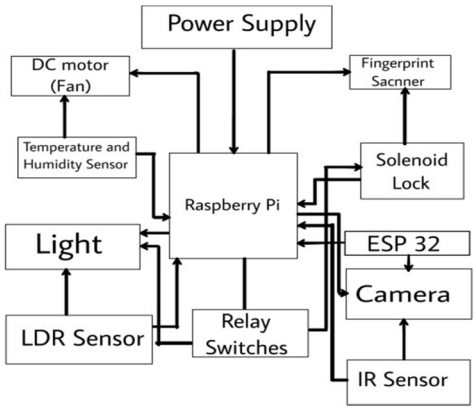


Figure 2: Block diagram of Smart HomeAutomation and Security

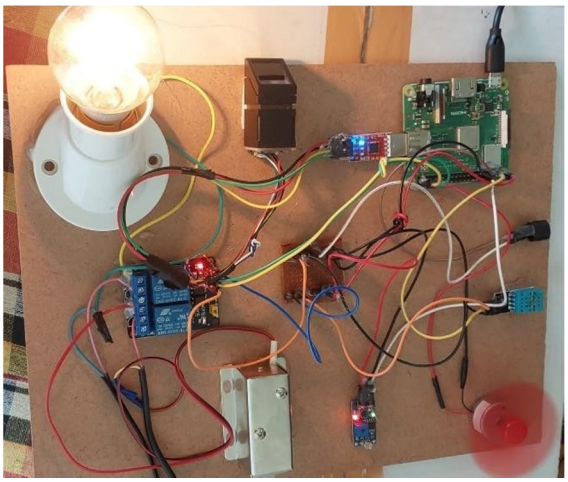
A. Advantages

1) Can be connected and authorized throughSmartphones
2) Included home safety and automation
3) Sensors are used for optimal detection of temperature
4) Arduino is cost-friendly and effective.
5) Quick accessibility to system.
6) Android connectivity to electric appliances.

B. Disadvantages

1) An external Web Server has to be created
2) Does not include a door lock security system
3) An extra Wi-Fi module has to be used to be connected to Arduino.
4) The complexity of the system.

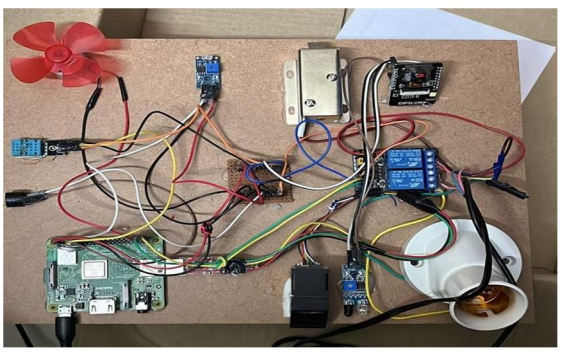
IV. RESULTS



When the project is switched on is connected, first the raspberry pi is connected to the Wi-Fi for enabling the IoT-based functions. Once that is connected all the sensors and all the devices are turned on. This project comes as multiple applications in one system, working as,

1) Application 1: The temperature and humidity sensor is connected to a dc motor fan. Once the system is turned on the temperature sensor senses the temperature and humidity in the air and accordingly,to the given requirements of temperature, the fan turns on. In this particular case, the temperature requirement has been mentioned to the room temperature that is 27 degrees. If the temperature sensor senses above 27 degrees, then the fan turns on if not the fan stays off.
2) *Application 2:* The connectivity of LDR sensor andlight bulb is established. When darkness is sensed, the light bulb turns on and if light is detected then the light bulb stays off.
3) *Application 3:* The fingerprint sensor is used to authenticate authorised entry into the home. When the fingerprint sensor detects the right finger then the door lock is unlocked if not there is a buzzer that alerts the people that someone is trying to intrude into the home.
4) *Application 4:* The PIR sensor and Camera are connected to each other with an external power supply. When a motion is detected by the pir senor which will be installed at the door, the camera immediately captures the pictures and captured images are sent to the owner's mobile phone.

The working has been observed and all the sensors worked optimally and when used in real-time this system can be effectively functioning



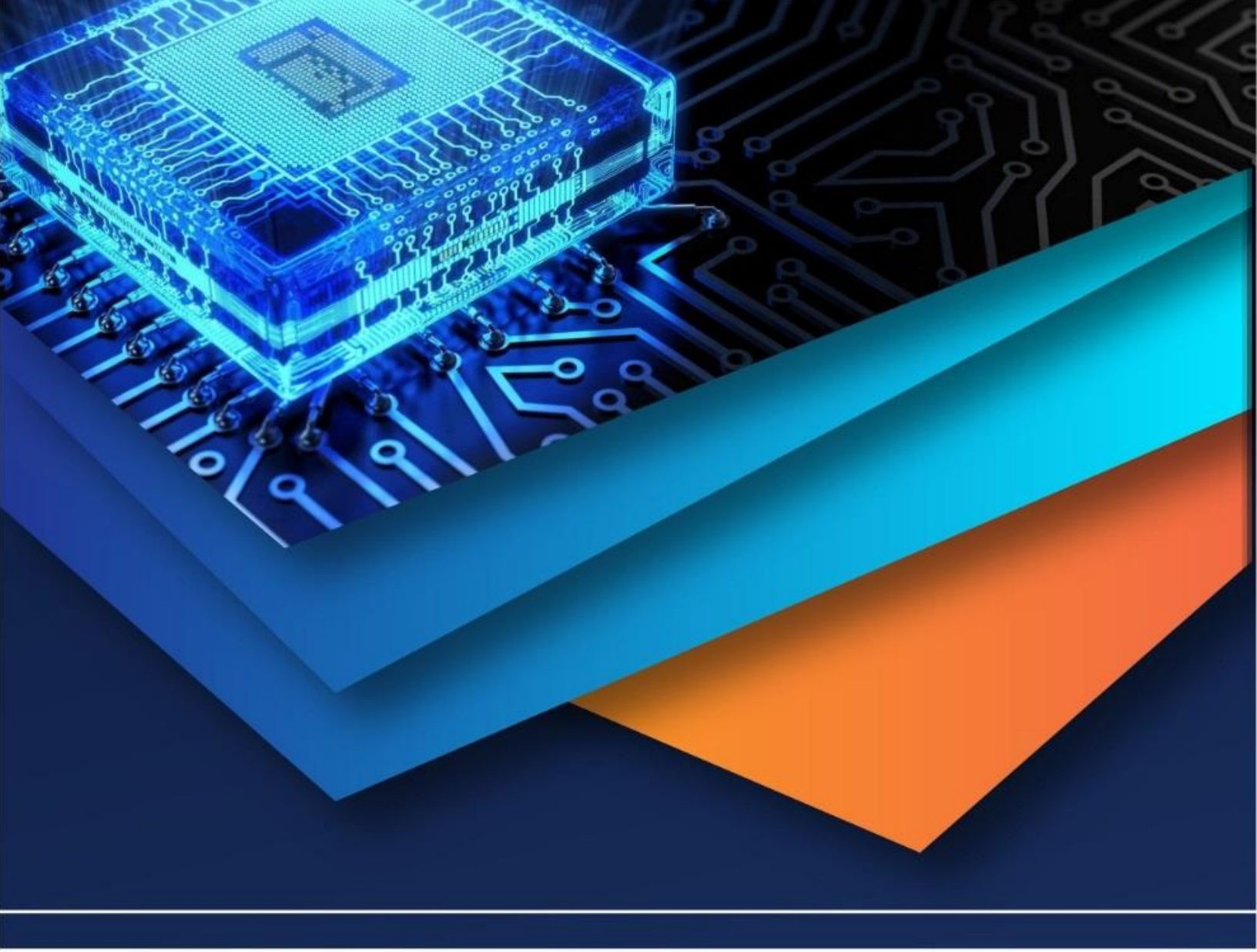
V. CONCLUSION

The project has put out the concept of intelligent houses that can accommodate several home automation devices. A smart house has wireless connectivity, sensors, monitoring, and security links. A PIR can detect motion and be usedfor security purposes, making an alarm ring; an LDRcan detect daylight and switch the bulb in accordance; it can also sense ambient temperature and humidity and switch the fan in accordance. Smart homes are a vast system with a variety of technologies and apps that may be used to conveniently regulate and offer security for the house.

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