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Intelligent Home Automation System Using Android Application

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***Abstract*—** The proposed system that we introduced focuses on increasing the efficiency. While the cost of living is going up, there is a growing focus to involve technology to lower those prices. With this thought the project based on home automation allows the user to increase efficiency and maintain a house that is smart enough to reduce the electricity consumption while providing more automation. A home Automation System will sense its surrounding and take advantage to enhance the efficiency even if no one is present at home. With a house having home automation system, one can ensure that our house is at its best in power consumption and results in enhanced energy efficiency. With this upgrade of Automation technology, Quality of human life is increased significantly. In this world of technology there is a significant increase in the field of automation as it is making our life luxurious. With the rapid increase in the number of users of internet over the past decade has made Internet a part of once day-to-day life, and Internet of Things is the latest technology which is helping us in connecting devices or appliances through internet. Internet of things is a growing network of everyday from industries to Home Appliances that can execute the tasks the one want to perform while he/she is busy with other activities. Home Automation system using Internet of Things is a system that uses computers or mobile devices to control basic home appliances automatically through internet from anywhere around the world, an Home Automation System is sometimes called a smart home. It is meant to save the electric power and Time. The home automation system differs from other system by allowing the user to operate the system from anywhere around the world and also provides the feature of day and night mode which can control the appliances specifically light by sensing the intensity of the room.

***Keywords*—** Raspberry ver1.2 model b, 4-channel relay board, python version 3, google assistant, smart phones, Light emitting diode.

I. INTRODUCTION

There are number of ways to control home appliances such as home automation using cloud, home automation with the help of android apps in our Smartphones, home automation using Arduino , home automation by android application based remote control, home automation using digital control, Home automation using Bluetooth application which uses RF-communication.

It is the type of communication which allows us to connect two or more devices/appliances in a network which help the user to communicate or perform certain tasks. [1][7]

Wireless home automation using IOT is the proposed of our project is an innovative application of internet of things developed to control home appliances remotely over the cloud. Wi-Fi (Wireless Fidelity) is a wireless networking technology used for exchanging the information between two or more devices without using cables or wires.

There are various Wi-Fi technologies like Wi-Fi 802.11a, 802.11b, 802.11g and 802.11n. In this project Wi-Fi module is used to receive commands from the internet and reacts by fetching the keys from the input which can trigger the python script to enable and disable circuits.

A smart home will take advantage of its environment and allow seamless control whether the user is present or away. With a home that has this advantage, you can know that your home is performing at its best in energy performance. With increasing technology, life is getting luxurious and easier in all aspects. In today's world Automation is being preferred over manual system. [2]

Internet of Things is the latest and technology. Internet of things is a growing network of everyday from industries to costumers that can complete tasks according to the requirement, while you are busy with other activities. [4]

The introduction of home automation in the 1970s failed to improve the lifestyles of users for people due to some reasons. Firstly, determining economic benefits of home automation technologies is difficult. Secondly, the costs of

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implementing smart home technology must be justified by the effects brought about by their installation. There is a need for home automation technologies to be cost effective, easy to install and flexible with many network infrastructures and appliances. [5] Wireless Home Automation system using Internet of Things is a system that uses computers or mobile devices to control basic home functions and features automatically through internet from anywhere around the world, an automated home is sometimes called a smart home. It is meant to save the electric power and human energy. The home automation system is unique as it allows user to operate his/her devices form mobile locations.

II. RELATED WORK

The home automation system as a system to control remote devices using a web application as a client/user to give command to the raspberry pi

As it used a web application he needs to buy a domain and make it live and it has lesser control over the native device specifications when compared to the native applications.

They are using PHP as a server side language which is free open source language used for server communication and performing operations such as fetching data, sending data, etc. [1]

This system shows a home automation system using Arduino boards. Just like raspberry pi, Arduino is a small computer which helps us perform certain task but unlike raspberry pi Arduino does not have an inbuilt Bluetooth or Wi-Fi module in this system Arduino is used as a central processor and converts the input from desktop or mobile device in the form of '1' and '0' to perform the particular task. [2]

This system uses raspberry pi with the android or web application i.e. the architecture is like client will provide an input through the android or web application which will be sent over the server in an encrypted form then the program running at the raspberry pi will fetch the input from server and the it will decrypt the input. Finally the input will be passed through the code triggering the GPIO pins of raspberry pi to perform related task. [3]

We'll mainly use Python in our code for the automation system and NodeJS along with other suitable development tools will be used to create the web interface so that the system can be made accessible from anywhere in the Globe. It will be possible to know the status of the electronic components of the house as all the information will be available right inside the web interface. [6]

PROBLEM STATEMENT

To make a system through which we can control our home appliances from almost anywhere in the world and also to sense the intensity of light of the rooms and automatically turn on and off the lights.

The home automation device that we are aiming can be integrated with almost all the home appliances and can be used to control them remotely from any part of the world with enhanced security as well as day and night mode.

III. METHODOLOGY

In this system we will use raspberry pi as a central processor that will perform the tasks from the commands given by the user. We will be providing input commands through google assistant or other android application which will take our command through voice or in text form. Then it will convert the command into its equivalent .json code , which will then be sent through the server to the backend module which will accept the input in form of '1' and '0' which will be identified by the module for performing particular actions.

Python will help us by processing the client request on the server, which will then be executed by the raspberry pi. In our system, raspberry pi module which is connected a relay driver which helps us.

RASPBERRY PI

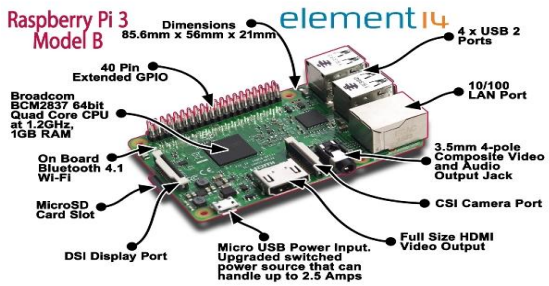

Fig 1: Raspberry pi 3 model B. [1]

The project mainly consists of three modules that includes User Interface, server, Raspberry pi, Relay circuit and Appliances. The raspberry pi is the credit card sized, single board computer developed in the UK by the raspberry pi foundation. The Raspberry pi has a Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZF-S 700 MHz processor. It has an internal storage of 512 MB , external storage supported up to 32 GB, 1 Ethernet port, 4-2.0 USB ports, 1 micro SD card slot, DSI display connected, 1 HDMI out port, 1 CSI camera connected, 5 volt USB power, RCA video and audio jack . [5]

With the python is a default programming language for the Raspberry pi with support of C, C++, and Java. The Raspberry pi board is configured for each home appliances.

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So according to user intervention the matched out will make high and the corresponding relay will switch on and device start function. The system is scalable and allows multivendor appliances to be added with no major changes to its core. [1]

RELAY BOARD

Fig 2: 4-channal relay. [2]

A Relay is an electrically operated switch. Relay are used where it is necessary to control a circuit by a low power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal. In our system the output from raspberry pi is directly given to relay circuit. According to the out of raspberry pi, corresponding relay will turn on and makes its device working. We are using a NPN transistor in Relay and its works based on concept of EMF. The relay can be selected according to our application purpose. The home automation system ends up with the working of relay circuit.
In this home automation system we can add devices very easily in to the system. Also it can be configured with more security and functional services. The raspberry pi minicomputer can be make use better to incorporate variety.

Flow Diagram

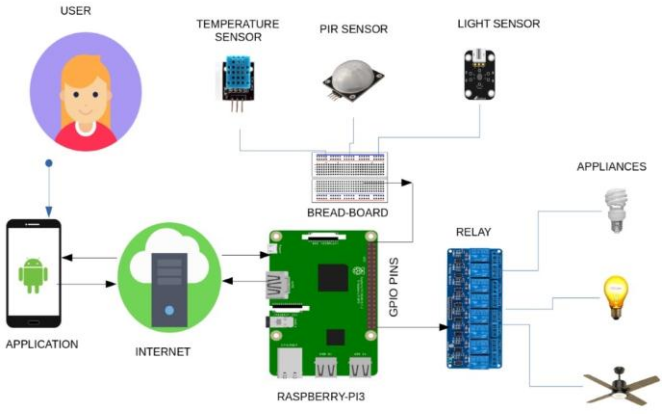

Fig 3: Flow Diagram of Home Automation System[8]

The figure above shows the flow diagram of Home Automation System. It controls the appliances connected to our system from any remote location. We use an user/client application to give the command to the raspberry pi through internet or cloud so that raspberry pi can respond through GPIO pins in the form of '1' and '0' so that the switch created by the relay board can turn on and off the appliances connected to it.We also integrated a sensory system through which we can sense the intensity of light and the lights will adjust its intensity according to the room.

IV. CONCLUSION AND FUTURE SCOPE

The Internet of Things involves an increasing number of smart interconnected devices and sensors (e.g. cameras, biometric and medical sensors) that are often non-intrusive, transparent and invisible.

System through which we can control our home appliances from almost anywhere in the world will be introduced. There will be enhanced security.

Day and night mode helps us save electricity and at the same time we don't waste any time turning light on and off.

However, there needs to be improvements in security problems.

In future, person other than the residents will be considered such as guests. Industrial Automation and Management through internet from anywhere around the world can be made possible

Season modes will be considered. Higher cross-compatibility standards can be provided. Also, increased efficiency and control using customization are the future scope of this project.

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