

IoT Based Home Automation Control System Using Raspberry Pi

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ABSTRACT: In recent years, the home environment has seen a rapid introduction of network enabled digital technology. This technology offers new and exciting opportunities to increase the connectivity of devices within the home for the purpose of home automation. Home automation refers to control of home appliances using information technology. There are lots of devices on the market that allow you to monitor your home from a central interface. Thus the already existing methods for the automation of home are Bluetooth, Wi-Fi, Android app. But with the help of rapid expansion of the Internet, there is the potential to control and automate the home appliance using it. It is achieved by interfacing the internet with embedded systems. The aim of this project is to develop a system that will provide remote control of home appliances and also provide security against intrusion when the home host is not at home. This paper is mainly concerned with the automatic control of light or any other home appliances using internet. It is meant to save the electric power and human energy. The various appliances are connected to the sensor which is connected using wireless network.

KEYWORDS: Sensor, Home automation, Raspberry pi 3

I. INTRODUCTION

The provision for the user to automate homes remotely is the main target of this system. There was a need to automate home so that users can take advantage of the technological advancement in such a way that a person can send a control signal to the home control centre when he forget to turn off devices such as fans and lights instead of returning home. In addition to this home security has been a major issue and this issue is also dealt in this paper. Therefore in this paper we develop a system that allows user to control home appliances from wherever and whenever user wishes. Remote intelligent home system may include centralized control of lighting, fan, appliances and other security systems, to provide improved convenience, comfort, energy efficiency and security. The popularity of Remote intelligent home system has been increasing greatly in recent years due to much higher affordability and simplicity through internet connectivity. As the number of controllable devices in the home rises, interconnection and communication between the devices becomes difficult. Remote intelligent home system can also provide a remote interface to Domestic/Industrial appliances or the system itself, via telephone line, wireless transmission or the internet, to provide control and monitoring via a Smartphone etc.

II. LITERATURE REVIEW

As per our survey there exist many such systems that could control home appliances. Each system has its own unique feature. Following model describes the work performed in our project. Home automation using Bluetooth and Wi-Fi. Most systems would exchange data or would communicate with the help of Bluetooth and Wi-Fi, These systems have their own disadvantages. Bromley at (2003) describes home automation as the "introduction of technology within the

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home to enhance the quality of life of its occupants, through the provision of different services such as telehealth, multimedia entertainment and energy conservation". There has been significant research into the field of home automation with many other communication protocols like Bluetooth, hand gestures, Wi-Fi. The XIO industry standard, developed in 1975 for communication between electronic devices, is the oldest standard identified from the author's review, providing limited control over household devices through the home's power lines. Sriskanthanet at (2002) introduced a Bluetooth based home automation system, consisting of a primary controller and a number of Bluetooth sub-controllers. However, the system requires an intrusive and expensive wired installation and the use of a high end Pc. Baudelet at (1993) proposed a novel control network, using hand gestures. The controller uses a glove to relay hand gestures to the system. Ardamet at (1998) introduced a phone based remote controller for home and office automation. The system differs in that all communications occur over a fixed telephone line and not over the Internet. The system can be accessed using any telephone that supports dual tone multiple frequency (DTMF).

III. PROPOSED SYSTEM

1. Light sensors: A light sensor, as its name suggests, is a device that is used to detect light. There are many different types of light sensors, each of which works in a slightly different way. A charged coupled device (CCD) transports electrically charged signals, and is used as a light sensor in digital cameras and night-vision devices. Photomultipliers detect light and multiply it. Devices that include these sensors have many uses in scientific applications, but are also found in items that people encounter each day. Many modern electronics, such as computers, wireless phones, and televisions, use ambient light sensors to automatically control the brightness of a screen, especially in low-light or high-light situations. They can detect how much light is in a room and raise or lower the brightness to a more comfortable level for the user. Light sensors also may be used to automatically turn on lights inside or outside a home or business at dark.

2. Fan motor: The fan motor provides plenty of advantages for literate physically disabled and old aged people to The fan motor provides plenty of advantages for literate physically disabled and old aged people to become independent in using the appliance utilities, without taking help from others. User can control his home appliances anytime from anywhere easily & comfortably using wireless communication concept. Hence home automation can be extremely useful to those who need to access their appliances at home while they are away and also can incredibly help to improve the lives of the physically disabled and old aged people. Using this system one can control appliances of their home by simply using the android application from anywhere in the world. The application works real time, hence there is negligible delay. As a practical use housing appliances like lights are controlled along with speed of fan.

The major components used in the proposed have been discussed briefly:

A. Raspberry Pi

The Raspberry Pi is a wonderful platform that can be used to build your own home automation system. Clearly, the Raspberry Pi board is perfect when being used as a "hub" for your home automation system, connecting to other open-source hardware parts like Arduino boards and sensors. Raspberry pi is a credit card sized single board computer which is capable of doing the entire job that an average desktop computer does Like spread sheets, word processing, Internet, Programming, Games etc. It consist of 512mb RAM, ARM v6 Processor, 2 USB and an Ethernet port, HDMI & RCA ports for display, 3.5mm Audio jack, SD card slot (bootable), General purpose I/O pins, runs on 5v. The Raspberry Pi model is shown in fig.3. Figure3. Raspberry Pi module Raspberry pi Raspberry pi runs on Linux kernel based operating systems. It boots and runs from the SD card. It does not have any internal memory other than the ROM. It has an SD card slot which is capable of reading up to 32 GB. The GPIO pins of the raspberry pi are programmed using Python programming language. The Electro-valve is connected to GPIO pins with the help of transistor and relay so that we can switch on switch off it whenever needed.

B. GPIO: One powerful feature of the Raspberry Pi is the row of GPIO (general purpose input/output) pins along the edge of the board.

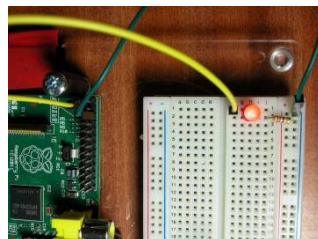
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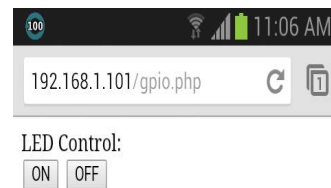
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IV. EXPERIMENTAL RESULTS

Figures show the results of light on/off and fan control. Figs.(a) shows the light circuit . (b) Shows the results which the light can be controlled through web app. (c) show the fan circuit. (d) show the app in which we can control the appliances



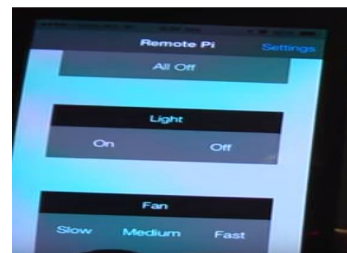
(a)



(b)



(c)



(d)

VI. CONCLUSION

In this highly developing era, where directly or indirectly, everything is dependent on computation and information technology, Raspberry Pi proves to be a smart, economic and efficient platform for implementing the home automation. This paper provides a basic application of home automation using Raspberry Pi which can be easily implemented and used efficiently. The code provided is generic and flexible in a user friendly manner and can be extended for any future applications like power control, surveillance, etc, easily. Moreover, this technique is better than other home automation methods is several ways.

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