Implementation of IOT Based Home Automation System

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Abstract: The concept of IOT was introduced by the growth of the widely used global network known as the internet along with the development of ubiquitous computing and mobiles in smart objects which brings new opportunities for the creation of innovative solution to various aspects of life. The concept of IOT creates a network of object that can communicate, interact and cooperate together to reach a common goal. In this paper we present a home automation system using node MCU ESP8266 that employs the integration of cloud networking, wireless communication to provide the user with control of various lights, fans, and appliances within their home and storing the data in the cloud.

Keywords- IOT, Home automation, Node MCU ESP8266, IC L293d, LCD 16*2, Internet.

1. INTRODUCTION

The IOT can be defined as connecting the various types of objects like smartphones, personal computer and Tablets to internet, which brings in very new-fangled type of communication between things and people. We know, in today's world each and everything which is related to our day to day life is fully automated. At every couple of second we required and automation.

IOT technology is used to coming with innovative idea and great growth for smart homes to improve the living standard of life. Communication has been extended via internet to all things around us. When objects can communicate with each other ,via the internet, we need to take complete advantage of remote access. The ultimate goal of IOT application is to automate systems rather than using manual systems, to improve the quality of living. IOT based home automation system is very convenient, easy flexible and cheap. Many devices now have wifi and can connect to smart phones. But this devices can not communicate with each other. Thus this devices need to be unified, such that they can be monitored

and controlled using one single program or device, e.g. controlling lights, fans, air –conditioners, oven, refrigerator, TV, etc. By using an application on the smartphones this gives the user more control of their home and can simplify many manual actions. The project aims at designing and advance home automation system using normal web server and Wi-Fi technology. The devices can be switched on/off by PC through Wi-Fi. Automation is the most frequently spelled term in the field of electronics. The hunger for automation brought many revolutions in the existing technologies. This has greater importance than any other technologies due to its user friendly nature. These can be used as a replacement of the existing switches in home which produces sparks and also results in fire accidents in few situations.Considering the advantages of Wi-Fi an advanced automation system was develop to control the appliances in the house.

2. LITERATURE REVIEW

N. Sriskanthan and Tan Karand in their work have presented an application of Bluetooth Technology for Home Automation. The Bluetooth technology which emerged in late 1990's is used for implementing the wireless home automation system. Various appliances such as air conditioners, home theatres, cellular phones etc., are interconnected, thus creating a Personal Area Network in Home Environment. The communication between several client modules and the host server takes place through the Bluetooth module. A Home Automation Protocol has been developed to enhance communication between the host server and the client modules. The system also allows integration or removal of devices to the network which makes the system scalable. The wireless system aims at reducing the cost of Home Automation. But the system does not use the trending mobile technology.

A. Z. Alkar and U. Buhur have developed an internet based wireless home automation system

for multifunctional devices. A flexible, low cost, wireless solution to the home automation is introduced. The transformation of the initial simple functionality control mechanism of devices to more complex devices has been discussed. The home appliances are connected through a server to a central node. The system is secured from unauthorized users by using SSL algorithm. During tests, the wireless communication was found to be limited to meters in a concrete building.

Muhammad Izhar Ramli, Mohd Helmy Abd Wahab, Nabihah developed a prototype electrical device control system using Web. They have developed a web based controller, for controlling electrical devices. Whenever the condition of server is down they also set their server with auto restart. The system does not use mobile technology. Being a web based system; this application is less effective since the use of headphones and Smart phones is increasing rapidly.

E. Yavuz, B. Hasan, I. Serkan and K. Duygu have designed and implemented a telephone and PIC remote controlled device for controlling the home electrical devices. In this Pin check algorithm has been introduced where it was with cable network and not wireless communication. The system ensures safety as it cannot be used by unauthorized users as the system uses Pin-check system. The architecture is very complex, but it gives an idea of remote handling of home automation system.

Shahriyar E. Hoque, M. M. Akbar, S. Sohan I. Naim, and M. K. Khan presented a GSM based communication and control for home appliances. Different AT commands are sent to the Home Mobile for controlling different appliances. The drawback of this system is that a Graphical User Interface (GUI) is not provided to the user. Different AT commands have to be remembered by the users to control the connected devices. Also, the system supports Java enabled mobile phones. The system thus becomes less functional as now-a- days the use of Java enables phones are reducing and the use of Android phones are increasing tremendously.

Jitendra Rajendra Rana and Sunil N. Pawar in their paper have implemented a zig-bee based home automation system. Zig-bee is a high- level communication protocol used to create personal area network. It supports any kind of micro-controller. The system eliminates the complication of wiring in case of wired automation. Considerable amount of power saving is also possible. Operating range is more than Bluetooth. But the system

3. BLOCK DIAGRAM

The block diagram of the proposed system is shown below
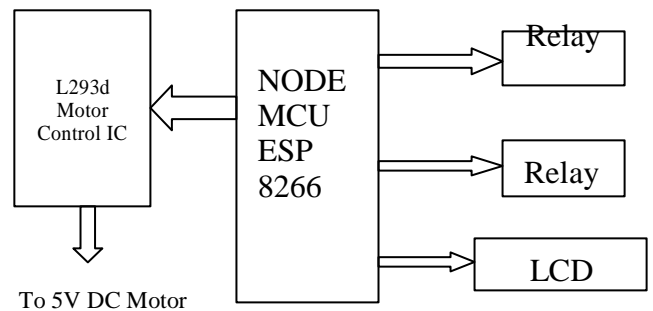
does not allow remote monitoring and controlling of appliances.

Fig. 1. Block Diagram of System

**3.1.*Node   MCU
ESP8266***

The ESP8266 is the name of a micro controller designed by Espressif Systems. The ESP8266 itself is a self-contained Wi-Fi networking solution offering as a bridge from existing micro controller to Wi-Fi and is also capable of running self-contained applications. This module comes with a built in USB connector and a rich assortment of pin-outs. With a micro USB cable, you can connect Node MCU devkit to your laptop and flash it without any trouble, just like Arduino. It is also immediately breadboard friendly.

Fig. 2. Node MCU ESP8266

NodeMCU is a complete environment of hardware and software for IoT prototyping based on the Lua language. You can connect NodeMCU to your computer through a standard USB interface for power, programming, and debugging.

3.2. *LCD 16*2*

We come across LCD displays everywhere around us. Computers, calculators, television sets, mobile phones, digital watches use some kind of display to display the time. An LCD is an electronic display module which uses liquid crystal to produce a visible image. The 16×2 LCD display is a very basic module commonly used in DIYs and circuits. The 16×2 translates o a display 16 characters per line in 2 such lines. In this LCD each character is displayed in a 5×7 pixel matrix.

Fig. 3. LCD

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs.

3.3. L*293d*

L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors.L293D contains two inbuilt H-bridge driver circuits. In its common mode of operation, two DC motors can be driven simultaneously, both in forward and reverse direction.

Fig. 4. L293d

The motor operations of two motors can be controlled by input logic at pins 2 & 7 and 10 & 15. Input logic 00 or 11 will stop the corresponding motor. Logic 01 and 10 will rotate it in clockwise and anticlockwise directions, respectively.

Enable pins 1 and 9 (corresponding to the two motors) must be high for motors to start operating. When an enable input is high, the associated driver gets enabled. As a result, the outputs become active and work in phase with their inputs. Similarly, when the enable input is low, that driver is disabled, and their outputs are off and in the high-impedance state.

3.4. *Relay*

The main operation of a relay comes in places where only a low-power signal can be used to control a circuit. It is also used in places where only one signal can be used to control a lot of circuits. The application of relays started during the invention of telephones. They played an important role in switching calls in telephone exchanges. They were also used in long distance telegraphy. They were used to switch the signal coming from one source to another destination. After the invention of computers they were also used to perform Boolean and other logical operations. The high end applications of relays require high power to be driven by electric motors and so on. Such relays are called contactors.

3.5. *5V DC Motor*

DC motors were the first type widely used, since they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances.

Fig. 5. 5V DC Motor

In this project we are using 5v dc motor which is operates on 5v dc supply we are using this motor.

4. WORKING METHODOLOGY

In this project we are using two methods for controlling the appliances.

4.1. *By using Google Assistant*

Google assistant is an android application through which we can control the home appliances successfully by giving the command to the application. Requirement is only that we should have internet connectivity. For executing the command successfully we are using another application known as IFTTT, IFTTT is nothing but the if this then that, means when we give the some command then we have to perform these operation, in this way we can control the home appliances throughout the world.
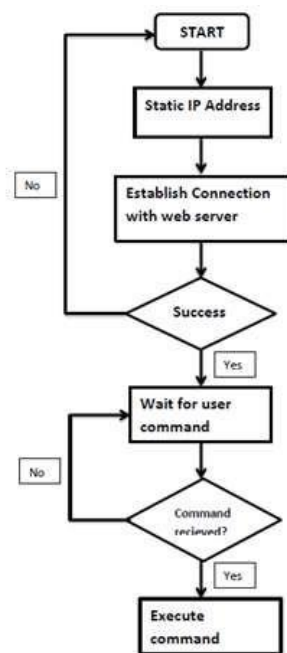
Fig. 6. Flowchart of System

Above flowchart shows the execution of commands and according to these flowchart google assistant will work.

4.2. *By Using Web Page*

In this project we control the home appliances by using an web page, we have design the web page in that we have taken three lights and one fan, we can design the web page according to our requirement. In this we not only on/off the fan but also control the speed of the fan. The web page designed for this project is shown in following figure.

Fig. 7. Web Page of System

5. EXPERIMENTAL SETUP

In experimental setup of the project we are showing the home automation system in off and on state.

5.1 *System in ON State*

Following fig shows the home automation system in ON state.

Fig. 8. System in ON State

5.2 *System in OFF State*

Following fig shows the home automation system in OFF state.

Fig. 9. System in OFF State

6. ADVANTAGES

Security
Energy Efficiency
Saves money and Increases Convinience
Flexibility for New Devices
Reduces Human Efforts
 Saves Time
Add Safety through Appliance and
 Lightening Control

7. APPLICATIONS

Lighting control

Smart Home Appliances

 Improved Home safety and
security

Smart Switches

Smart Locks

Smart Energy Meters

8. FUTURE SCOPE

IOT is having tremendous attention recently and its various applications are growing, changing the way we live and work. This project's main focus was on security and safety perspective of smart home automation, which is a small part of what can be automated and controlled inside a smart home. Future work focus would be working on actual AC devices to implement what was simulated in the model in a real house, developing a more advanced motion detection algorithm on surveillance cameras, and surveillance car moving autonomously avoiding obstacles.

9. RESULT

The system allows the user to control various home appliances (which can operates on 230v also) from a smart phones and PC from anywhere in the world through an internet connection. It also allows the user to control their units within their home from a wireless remote. In these papers we proposed a Novel technique that will give us best results and provides Notifications to the user if problem occurs in any device.

10. CONCLUSION

This paper gives basic idea how we can control home appliances by computer technology. The main objective of this project is to help handicapped people. It provides security and saves energy. As we are accessing devices by website, we can access it even if we are far away from home where the Wi-Fi is available.

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that are taken to protect information, but there is always the possibility of hackers breaking into the system

really needed. Hospitals already struggle to assess and take care of the patients that they have. By monitoring individual's health, it will allow them to judge who needs primary attention. The Internet of Things can also assist people with their personal safety. ADT, which is a home security system, allows individuals to monitor their security systems at home through their phones, with the ability to control it. Also, another technology that has already been released is GM OnStar. This is a system that is embedded in GM cars that can detect if a crash has occurred and it automatically calls 9-1-1. It can also track the movement of the car. All of these combined maximize revenue by cutting cost of inefficiencies within the business. Another advantage of IoT is the ability to track individual consumers and targeting these consumers based on the information supplied by the devices. In a way, it provides a more "personalized" system that could potentially increase business sales and increases their demographic. Additionally, with the increased amount of devices connected to the Internet the Smart Grid expands, conserving more energy. Devices can make decisions and adapt without human guidance to reduce their energy usage. The IoT has many advantages to businesses, individuals, consumers, the environment, and society, but as with any technology, there are always repercussions and controversies that arise.

8. DRAWBACKS OF TECHNOLOGY

Three of the main concerns that accompany the Internet of Things are the breach of privacy, over-reliance on technology, and the loss of jobs. When anything is put on the internet it will always be there. Of course there are security measures[5]

and stealing the data. For example, Anonymous is a group of individuals that hacked into federal sites and released confidential information to the public. Meanwhile the government is supposed to have the highest level of security, yet their system was easily breached. Therefore, if all of our information is stored on the internet, people could hack into it, finding out everything about individuals lives. Also, companies could misuse the information that they are given access to. This is a common mishap that occurs within companies all the time. Just recently Google got caught using information that was supposed to be private. Information, such as the data collected and stored by IoT, can be immensely beneficial to companies. The privacy issues also leads to the question of who will control the Internet of Things. If there is only one company, that could potentially lead to a monopoly hurting consumers and other companies. If there are multiple companies that are given access to the information acquired, doesn't that breach consumers privacy? Also, where is the information going to be stored? Phone service suppliers such as Verizon and AT&T are no longer offering unlimited data usage for mobile phones because it is too costly, yet by 2020 it is expected that 50 billion devices will be connected, collecting and storing data. Another argument against IoT is the over-reliance on technology. As time has progressed, our current generation has grown up with the readily availability of the internet and technology in general. However, relying on technology on a day to day basis, making decisions by the information that it gives up could lead to devastation. No system is robust and fault-free. We see glitches that occur constantly in technology, specifically involving the internet. Depending on the amount that an individual relies on the information supplied could be detrimental if the system collapses. The more we entrust and the more dependent we are on the Internet could lead to a potentially catastrophic event if it crashes. Finally the connecting of more and more devices to the Internet will result in the loss of jobs. The automation of IoT "will have a devastating impact on the employment prospects of less-educated workers". For example, people who evaluate inventory will lose their jobs because devices can not only communicate between each other, but transmit that information to the owner. We already are witnessing jobs being lost to automated machines, such as the checkout line in supermarkets and even ATM's. These disadvantages can be largely devastating to society as a whole, as well as individuals and consumers.

9. FUTURE SCOPE

The system will likely be an example of event-driven architecture bottom-up made (based on context of processes & operations, in real-time) & will consider any subsidiary level. Therefore, model driven & functional approaches will coexist with new ones able to treat exceptions & unusual evolution of processes (Multi-agent systems, B-ADSc, etc.).In an Internet of Things, meaning of an event will not necessarily be based on a deterministic or syntactic model but would instead be based on context of event itself: this will also be a semantic web.

10. CONCLUSION

The integration of solar based energy system with IOT for home automation is a new idea. Integration of sensing & actuation system by connecting to internet is discussed here. IOT base home automation will provide safety to the user as the home appliances will automatically switch off as per circumstances. The automation make the Devices intelligent and reduce the tension of user. Due to Automated appliances the standard of living of user would raise. As the power turn off automatically the power consumption got reduced.

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