

IOT Based Home Automation Using Arduino and ESP8266

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Abstract- Our project is an approach towards Smart Home automation using Internet of things (IOT). In this era of increasing technology our day to day life becomes simpler and much easier in all aspects. Today's generation preferred automated system over manual system, and IOT is latest and emerging technology. In our project we control our home appliances using computer or mobile devices through internet from anywhere around the world. Our project is meant to save the electric power and human energy. Use of Android application software in home appliances renders. Our project is controllable and monitor able from remote places. Our project is suitable for physically challenged people and it is also helpful for those who are sick and on bed rest. In this paper we are going to present various scenario of controlling home appliance over Internet

Keyword: Home Automation System, Android Phone, Arduino, ESP8266 Wi-Fi Module, Relay.

I. INTRODUCTION

The AIM of our project is to implement an advanced home automation system using server and Wi-Fi technology. The device can switched ON/OFF using Personal Computer or phone through Wi-Fi. Homes of the upcoming generation become more and more self-controlled and automated due to the comfort it provides, especially when employed in a private home. Various kind of electrical appliances are controlled in home automation system. Many existing, well established home automation systems are based on wired communication which is a big problem because we can control from limited range. And the cost of installation is also very high for existing buildings. While our project is wireless and the increasing internet technology such as Wi-Fi, cloud network, wireless system can be used from everywhere and anytime the controlling devices for the home automation in our project is an Arduino UNO. Sending the data using mobile app or laptop over Wi-Fi will be received by Wi-Fi module connected to Arduino UNO. Then, it reads the data and decides the output of electrical devices connected to it through Relays by ON or OFF action.

The Section I contains the introduction of IOT based Home Automation, Section II contain the related work of Home Automation using IOT, Section III contain the methodology of our project IOT based home automation, Section IV contain the architecture and essential steps of Controlling

Home appliances through internet via IOT, section V contains the conclusion and future scope of our project IOT based home automation.

II. RELATED WORKS

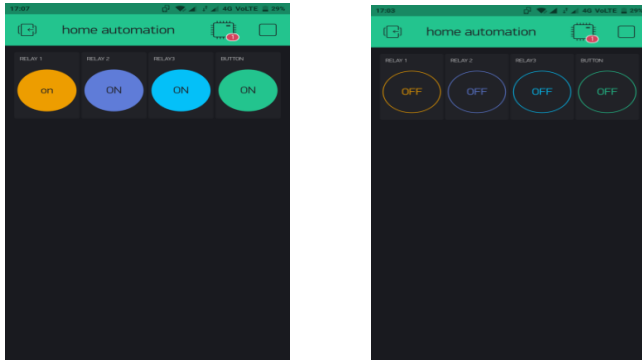
Many engineers designed home automation system by using different technologies. GSM based automation consumes more time to respond the message. In addition the system becomes complex. Bluetooth home automation can controlled all the home appliances but range is the main demerit.

.Review of related literature: When people think about home automation, most of them may imagine living in a smart home: One remote controller for every household Appliance, cooking the rice automatically, starting air conditioner automatically, heating water for bath automatically and shading the windows automatically at night. To some extent home automation equals to smart home. They both bring out smart living condition and make our life more convenient and fast.

III. METHODOLOGY

We can control our home appliances from laptop or mobile application using blynk app. Home appliances such as TV system, light, washing machine, refrigerator etc can be controlled with the aid of this application ware, from

anywhere remotely or locally. With just single click we can ON or OFF our home appliances.



CONTROLLING HOME APPLIANCES THROUGH BLYNK APP

ARDUINO UNO BOARD:- The Arduino UNO based on the ATmega328P it is an open-source microcontroller board developed by Arduino.cc. The board consists of 14 digital pins, , a reset switch, a 16 MHz quartz crystal, a power jack, and ICSP header and it is programmed with Arduino IDE (integrated development environment) via a type B USB cable.

The version of arduino we used in our project is version 1.0, we can connect arduino by using USB cable or AC to DC adapter .



WHY ARDUINO?

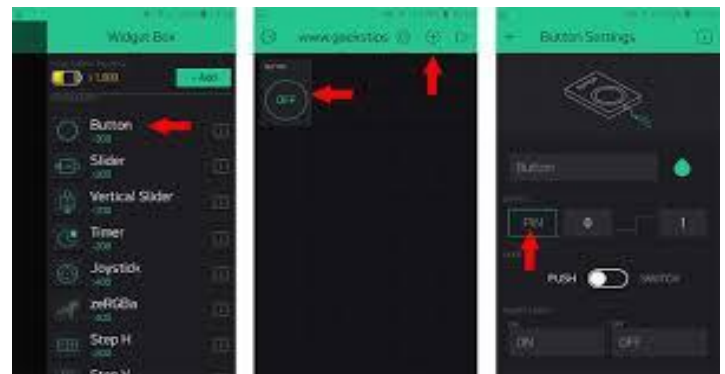
- It is open source ideal platform.
- To interface with other software or for developing inputs we use this language
- Supported in all OS
- Less expensive
- Its runs comfortably
- Programming is easy
- Easily available

ARDUINO VS RASBERRY PI

| | Arduino Uno | Raspberry Pi Model B |
|------------------------------------|--------------------|--|
| Price | \$30 | \$35 |
| Size | 7.6 x 1.9 x 6.4 cm | 8.6cm x 5.4cm x 1.7cm |
| Memory | 0.002MB | 512MB |
| Clock Speed | 16 MHz | 700 MHz |
| On Board Network | None | 10/100 wired Ethernet RJ45 |
| Multitasking | No | Yes |
| Input voltage | 7 to 12 V | 5 V |
| Flash | 32KB | SD Card (2 to 16G) |
| USB | One, input only | Two, peripherals OK |
| Operating System | None | Linux distributions |
| Integrated Development Environment | Arduino | Scratch, IDLE, anything with Linux support |

ANDROID:-Android is an open source mobile operating system based on a modified version of Linux initiated by Google. Google released its code under the Apache license. Android mobile application development is based on java language codes (codes allow to control mobile devices via Google-enabled java libraries.) it provides a flexible environment for Android Mobile Application Development as the developers can not only make use of Android Java Libraries but it is also possible to use normal Java IDEs.

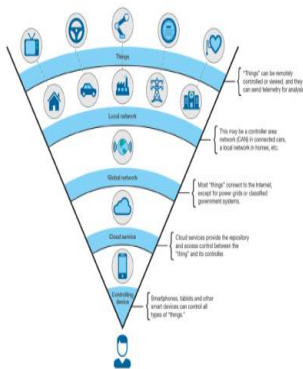
ANDROID APP:-Our app is a Platform with iOS and Android apps to control Arduino, Raspberry Pi and the likes over the Internet. It's a digital dashboard where you can build a graphic interface for your project by simply dragging and dropping widgets.



CREATING BUTTON ON BLYNK APP

INTERNET OF THINGS (IOT):-We can control (or connect) our daily used objects with the help of internet of things (IOTs) like Smart phones, internet TV's, sensors and actuators via internet. Collecting our big data from world with the help of internet all the objects connect together and communicate smartly .And gives the expected output as

decided by the user sitting anywhere. Thus, it can connect the different appliances of home or offices via internet using mobile application II



**IOT representation
iot**

| Applications | Overall popularity and selected examples | Scores |
|---------------------|--|------------------|
| Smart Home | Smart Home | 200% 4.1 2.8 4.0 |
| Smart City | Smart City | 15% 4.1 1.8 4.0 |
| Smart Grid | Smart Grid | 20% 4.1 1.8 4.0 |
| Industrial Internet | Industrial Internet | 10 1.8 4.0 |
| Connected Car | Connected Car | 10 1.8 4.0 |
| Connected Health | Connected Health | 3 1.8 4.1 |
| Smart Retail | Smart Retail | 2% 1.8 4.1 |
| Smart Supply Chain | Smart Supply Chain | 1 1.8 4.1 |
| Smart Farming | Smart Farming | 1 1.8 4.1 |

**Applications of
iot**

ESP8266 WI-FI MODULE:- For networking purpose we used ESP8266 node MCU Wi-Fi module. This open source platform prefers facilities of such kind. It includes firmware which runs on the **ESP8266 Wi-Fi SoC** from Espressif Systems, and which is based on hardware. The term "**NodeMCU**" by default refers to the firmware .it is used in different open source projects based on internet



FEATURES:

- Open-source, Interactive
- Programmable
- Low cost
- Simple
- Smart
- WI-FI enabled

IV. Results & Discussion

Our system is classified into two parts- Hardware and Software. The hardware system consists of arduino uno board, arduino Wi-Fi shield, and LCD, relay. The software system consists of a java based android application also arduino language is used to configure the arduino uno board to display. These hardware components are used to control the home appliances. Arduino uno board will help to develop an interface between the hardware and the software application and to display on LCD. This system also

consists of a software application which is developed using android. The ESP8266 Wi-Fi module will help us in transmitting and receiving the input given by the end user the main aim of our project is that we can control our home appliances or office appliances using laptop or android phone application (we use BLYNK app) from anywhere around the world. After successful completion of programming, we can implement our project for commercial or office use on daily basis. In our project we use Android application (BLYNK app), Arduino, Relay, LCD, Wi-Fi module etc.



CONTROLLING APPLIANCES THROUGH MOBILE APPLICATION

V. CONCLUSION & FUTURE SCOPE

our project is an architecture for low cost and flexible home automation system using android based smart phone via internet (via IOT technology).The technique we are using is our project is that it automates our home appliances such as TV, fan etc. After reading and understanding various literature surveys and existing works, we proposed our mode that will provide better. The wireless technology helps the users to fulfill their needs. Wi-Fi technologies enable us to control our home appliances remotely, it also provides security and it is easy to implement as it is low cost and flexible. Finally we can say that our proposed system is easy to implement and one can easily use it on a daily basis and it has a great future work.

In future we can modify our system by adding *Gas sensor* to detect gas leakage, *temperature and humidity sensor* to monitor temperature and humidity of our home, *water level indicator*, and also *Intruder detection system* so that if no one is in the home and someone try to enter in our home we get message and also the alarm starts.

REFERENCES

- [1] Atukorala K., Wijekoon D., Tharugasini M., Perera I., Silva C., (2009), "SmartEye Integrated Solution to Home Automation, Security and Monitoring Through Mobile phones", Next Generation Mobile Applications, Services and Technologies, IEEE Third International Conference on, pp.64–69.

- [2] Zhai Y., Cheng X., (2011), “*Design of Smart Home Remote Monitoring System Based on Embedded System*”, Control and Industrial Engineering, IEEE 2nd International Conference, pp.41-44 .
- [3] Gurek A., Gur C., Gurakin C., Akdeniz M., Metin S. K., Korkmaz I., (2013), “*An Android Based Home Automation System*”, High Capacity Optical Networks and Enabling Technologies, IEEE 10th International Conference on, pp.121- 125.
- [4] Tan K. K., Lee T. H., Soh C. Y., (2002), “*Internet Based Monitoring of Distributed Control Systems an Undergraduate Experiment*”, Education, IEEE Transactions on, vol.45, no.2, pp.128-134.
- [5] R.Naresh Naik , P.Siva Nagendra Reddy, S.Nanda Kishore and K.Tharun Kumar Reddy published a Paper Titled “*Arduino Based LPG gas Monitoring & Automatic Cylinder booking with Alert System*” in IOSR Journal of Electronics and Communication Engineering (IOSR-JECE) , Volume 11, Issue 4, Ver. I (Jul.-Aug .2016), PP 06-12 e-ISSN: 2278-2834,p- ISSN: 2278-8735.
- [6] Yükksekaya B., Kayalar A. A., Tosun M. B., Özcan M. K., Alkar A. Z., (2006), “*A GSM, Internet and Speech Controlled Wireless Interactive Home Automation System*”, Consumer Electronics, IEEE Transactions on, vol.52, no.3, pp.837-843.
- [7] Yamazaki T., (2006), “*Beyond The Smart Home*”, Hybrid Information Technology, IEEE International Conference on, vol.2, pp.350-355.
- [8] Ogawa M., Tamura T., Yoda M., Togawa T., (1997), “*Fully Automated Biosignal Acquisition System For Home Health Monitoring*”, Engineering in Medicine and Biology Society, IEEE Proceedings of the 19th Annual International Conference on, vol.6, pp.2403-2405.
- [9] URL: <https://www.irjet.net/archives/V2/i3/Irjet-v2i3317.pdf>
- [10] Al-Ali A. R., Al-Rousan M., (2004), “*Java Based Home Automation System*”, Consumer Electronics, IEEE Transactions on, vol.50, no.2, pp.498-504.
- [11] Deepti S., (2014), “*Home Automation System with Universally Used Mobile Application Platform*”, IOSR Journal of Electronics and Communication Engineering, vol.9, no.2, pp.01- 06.
- [12] Piyare R., Tazil M., (2011), “*Bluetooth Based Home Automation System Using Cell Phone*”, Consumer Electronics, IEEE 15th International Symposium on, vol.45, no.3, pp.192-195.

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Mr Ashutosh Pandey pursued Bachelor of Technology from University of AKTU, UP in 2008 and Master of Technology from KNIT, Sultanpur, India in year 2016. His main research work focuses on database management system, software engineering, computer graphics, discrete mathematics and IOT and computational intelligence based education. He has 10 years teaching experience

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