DEVELOPMENT OF VOICE-CONTROLLED IoT HOME AUTOMATION USING ARDUINO

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electrical Engineering Technology (Industrial Electronic) with Honours.

by

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I hereby, declared this report entitled “Development of Voice Control IoT Home Automation using Arduino” is the results of my own research except as cited in references.

Signature	:	*PAVITRA*
Author’s Name	:	PAVITRA A/P ANANDARAO
Date	:	14/02/2021

APPROVAL

This report is submitted to the Faculty of Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfillment of the requirements for the degree of Bachelor of Engineering Technology (Industrial Electronics) with Honours. The member of the supervisory is as follow:

Signature : .....

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ABSTRAK

Laporan ini mencadangkan sebuah sistem pemantauan rumah menggunakan Blynk yang membangun dengan kos yang rendah dan membolehkan pengguna mengawal peralatan elektronik rumah and sistem keselamatan iaitu pengesan asap. Projek ini adalah untuk membina sistem pemantauan peralatan elektonik rumah yang berkaitan dengan platform IoT, Blynk. Ini adalah sebab daripada kos melanjutkan mengurus, membahagi dan mengasingkan. Perkembangan projek akan digunakan pengecaman suara untuk mengawal peralatan elektronik di rumah. Data-data tersebut akan dimaklumkan dalam aplikasi android. Pengguna akan diberitahu bahawa peralatan elektronik di rumah dalam keadaan on / off. Bukan itu sahaja, dengan pengesan asap, jika berlaku apa-apa kebakaran di rumah, pengguna akan mendapat pemberitahuan dengan segera melalui android. Modul ESP8266 Wifi disepadukan untuk menghantar data melalui Wifi kerana teknologi internet telah dinaik taraf di Malaysia. Semua sistem masuk disepadukan dengan Wifi sekarang untuk menjadikan kehidupan lebih mudah. Ini membantu pengguna memantau sistem tidak kira di mana sahaja dan bila-bila masa. Arduino Mega 2560 Rev3 digunakan sebagai mikrokontroler dalam sistem ini untuk mengawal sistem. Apabila pengguna terlupa untuk tutup suis peralatan elektronik, ia akan menghantar pemberitahuan dalam aplikasi android serta ianya dapat mengawal melalui pengecaman suara. Ia juga dapat membantu orang kurang upaya (OKU) untuk memudahkan urusan mereka dengan mudah.

ABSTRACT

This report proposes a low cost home monitoring system using Blynk which enables users to control their home appliances and smoke detector. The project is to build a home appliance monitoring system which was connected to the IoT platform, Blynk. Electricity is one of the essential of human life. The use of power in the world goes on to consider the ways in which we have no awareness of energy consumption. This is due to the cost of further managing, dividing and isolating. Project development will use voice recognition to control electronic equipments in the home. The data will be communicated in the android application. Consumers will be notified whether home appliances are on / off. Not only that, with smoke detectors,if there was fire at home, users will be notified immediately via android. The ESP8266 Wifi module is integrated to transmit data over Wifi as the internet technology has been upgraded in Malaysia. All systems are integrated with Wifi now to make life easier. This helps users monitor the system no matter where and when. The Arduino Mega 2560 Rev3 is used as a microcontroller in this system to control the framework. When a user forgets to turn off the electronic equipment switch, it sends a notification in the android application and controls it via voice recognition. It also can help people with disabilities to facilitate their affairs easily.

DEDICATION

To my lovely parents,

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First and foremost, I would like to express my earnest affirmation to my supervisor Madam Raeihah Binti Mohd Zain from the Department of Electrical Technology from Faculty of Electrical and Electronic Engineering Technology (FTKEE) Universiti Teknikal Malaysia Melaka (UTeM) for her support, advises, supervision and valuable recommendation amid the arranging and advancement of this venture. I would like to thank everybody who is either specifically or indirectly involved with this project for their assistance and participants and also my colleagues. I would not have had the capacity to complete my final year project without their help.

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UTeM	-	Universiti Teknikal Malaysia Melaka
RF	-	Radio frequency remote control
RX	-	Receiver
TX	-	Transmitter

CHAPTER 1

INTRODUCTION

1.0 Introduction

The Internet of Things contributes to the ever-growing network of physical objects with an internet connectivity IP address, as well as the connection between these objects and other internet-enabled devices and systems. The term "Internet of Things" has come to describe a variety of innovations and analytical disciplines that allow the Internet to extend to the modern world of physical objects. This provided the inspiration for consumers to create a smart home. Smart home is that kind of home where everyone can monitor everything without the presence of a human being.

This project is developing and implementing a “Development of Voice Control IoT Home Automation using Arduino". The subject was chosen based on the project with respect to both modern age technologies and current state of people's busy lifestyle. It's improved people's comfort level. IoT-based smart automation and control system helps to operate and monitor any type of technology such as lights, fans, refrigerators, televisions, washing machines etc. from anywhere.

Whenever a person wants to turn a light or fan on / off inside the house, he or she must step towards the switchboard and press a switch. This is not so hard for a person who seems to be physically fit. However, this simple task of

pressing a button to turn on / off a light or fan by itself might be difficult for a physically handicapped person to accomplish. Therefore the disabled person may need to rely on someone else to do this menial work. It also offers the ability to monitor programmable isolated devices like smoke / fire detectors. If these functions could be done with remote control, then reliance on another human would be lessened by the users and greatly benefited by them. It can also manage these machines as people go to workplaces or elsewhere and thus the burden of managing the house or workplace or other locations will also be greatly reduced.

1.1 Project Background

Home automation is becoming important in these busy lives today to simplify the daily tasks. Home automation provides a modern lifestyle in which consumers can use a smartphone or website to monitor and control the entire home, monitor electricity consumption, security system, etc. Home automation includes tracking and monitoring remote electronic devices based on the IoT principle. It also offers the ability to monitor the isolated devices like smoke / fire detectors. These services too usually provide connections to equipment / appliances such as electrical appliances and smart grids.

However, it can be expensive to acquire and implement these devices, revealing why home automation has not really gained much market interest and demand to date. Furthermore, these programs can be difficult to configure and customize. Therefore, it is absolutely essential that new solutions have cost effective, simple to customize strategies.

This research involves identifying solutions for some of the most important problems missing in the literature, which includes: safety-monitoring, home-security, and energy management solutions. Most of the studies and products in the field of home automation systems have not addressed those areas, however, much have concentrated on monitoring electrical devices like the fan and lighting units upon user commands, leaving other essential home automation tasks unaddressed. For example, only a few of the previous studies concentrated on how to monitor energy consumption or could detect fire events. Attempting to help overcome these key issues in this study by creating a system that offers functionality for safety monitoring, home security, and energy management to support people and society.

1.2 Problem Statement

The Internet of Things (IoT) is becoming a rapidly growing topic of conversation both on and off around the world. However, conventional wall switches are located in different parts of a house and require manual operations such as switching on or off. These switches to control different appliances, making it virtually impossible to keep track of the appliances running and monitor its performance, and the IoT-based Home Automation System helps bridge this gap. Several smart house commercial and research projects have been carried out. If it has a button or a full touch screen, many of the consumer products use remote control. Even, it takes some effort and physical touch to track and operate the appliances. It will also be a burden on disabled people particularly for people with disabilities and the elderly. Thus, this project aims

to establish an IoT monitoring system, controlling device and also security system in home. This system very helpful to control electrical appliances such as light, fan, refrigerator and etc. Besides that, it also provides security framework smoke or fire detector by showing its temperature level. Therefore, the development of smart home automation network technology using the Internet of Things (IoT) has allowed users to automatically manage the environment and control devices remotely.

1.3 Objectives

1.3.1 To build a home automation framework that users can control electrical appliances and security system through mobile phone and voice recognition using IoT platform,Blynk.

1.3.2 To study the best way to integrate between Blynk application software, voice recognition system and electrical appliances.

1.3.3 To develop an efficient energy management system for electrical system and security system.

1.4 Scope of the project

Based on the main objective of this project, its aim to track from anywhere all electrical equipments and security system. This project is about programme light control, or whatever other home appliances. The user can connect via internet or WIFI module with Arduino. This device is less costly, allowing for extra home appliances. IOT or the Internet of Things is a

developing application that allows people to use the network to monitor hardware equipment and also security system such as smoke or fire detector. Here the system suggest the use of IOT to monitor home appliances, thus automating modern home via the internet. This is around an exact conception of a device for speech recognition. Along with low-power wireless networking, sensors will be connecting to embedded systems to track and manage electrical appliances and security system remotely. The Android app can use the open source web platform which known as Blynk to monitor domestic devices using every Android device. It can actually control any device from far apart with the help of IoT. In this project, Arduino Mega 2560 Rev3, ESP 8266 Wi-Fi module will receive an input data from WIFI module through application in the smartphone and transmit it to home automation system to control electrical appliances and security system.

1.5 Expected Results

Home automation using the Internet of Things may prove to operate satisfactorily experimentally by attaching basic appliances to it and the devices that will be effectively remotely operated through the Network. It can help the user, everywhere, evaluate the state of various parameters in the house. A Smart Home network combines electrical equipment with each other in a building. The technologies that can be used for home automation include those for building automation as well as for home operation monitoring, such as lamps, fans and protection devices. Not only does the device control environmental conditions but it also operates according to the demand of the