Smart Home Automation System for Elderly and Handicapped People Using Mobile Phone

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---**ABSTRACT**---

Smart Home Automation System for Elderly, and Handicapped People using Mobile Phone is a mobile web based application. The aim of this project is to propose a mobile device based remote control that permits elderly with physical challenges, in particular, aged and handicapped people, to command their desired devices without moving to the nearest control point [1]. At the same time, the local control is not excluded but alternative additional controls are achieved using a remote control supported by Raspberry pi 3 processor.

The smart home automation system is a recent Internet of Things (IoT) based terminology but it is far away from people's usage. In fact, the maximum of home electronic devices are automated but the interconnection of these technologies, the inter-corporation of automated various appliances in a reasonable design, and the ease of deployment due to different communication provides comfortable and convenient. These systems are manageable, low-power consumption, secured, efficient, flexible, scalable and cost saving. In addition, it is showcase from other project by comfortable accessibility and supported by easy-to-use with familiar interfaces.

This research work is a dwelling IoT that connects the home electrical devices and services allowing them to be remotely managed, monitored or accessed.
The scope of this research work is to helps, the elderly and handicapped peoples to live with peaceful and individual confidentiality.

Keywords – **Internet of Things (IoT), Raspberry Pi, Relay**

I. INTRODUCTION

This research work "Smart Home Automation System for Elderly and Handicapped People Using Mobile Phone" by using application in mobile phone. The control signal is pass from the end user mobile to reach the expected appliances through control panel boards [8]. The purpose of the paper is to implement the concept of Internet of Things (IOT) to help the elderly and handicapped people to use smartphone to manage home appliances without any effort. Internet of Nano-Things is the natural extension of the IoT to nano networks. Since they can be applied everywhere, practically every device can be now managed and/or controlled from the IoT[5]. Internet of Things depends on Internet, sensors technology which makes the communication possible among devices by implementing different layers [12].The IoT network provides the connection between physical and virtual objects such as smart devices using sensors [10]. The home appliaciences connected with smartphone by using Raspberry Pi 3.
Also, created web pages and database to control home appliances using Raspberry Pi 3 in online server. The online database server used to store the status of the home electronic devices such as Lights, Night Lamps and Fan.

The research work is executed by different phases. First phase, the researchers learnt the requirement of elderly, and handicapped people. In the second phase, discussed and the data collected from health doctors to refine the requirements. In the third phase, implemented an IoT model to manage home appliances using mobile phone. This research work is useful to the elderly and handicapped peoples to improve their life style with ease of usages of home electronic devices.

II. PROJECT SIGNIFICANCE AND OBJECTIVES

To provide comfortable and improving the quality of life style to elderly and handicapped peoples.
• To develop an interface between the remote control with mobile phone and home appliances.
• Each device, in order to accomplish this interface design process using the Raspberry Pi 3 for controlling devices in the home by using smart phone.
• To maintain RF wireless communication between the remote control and the master control panel board.
• To improve the research activities in home automation system.

III. METHODOLOGY

Analyzing the requirements of the research work is to Primary and secondary data collected from internet, Health Doctors, Hospitals, elderly and handicapped peoples that helpful to understand the advantages and disadvantages of the existing controlling system in home appliances.

3.1 Design the architecture: Develops the architecture to establish the control system to manage the home appliances.

3.2 Designing of the communication model: Create a communication model and store in internet based remote server to access the devices from long distances.

3.3 Circuit diagram and configuration: Develop an architecture using Raspberry Pi 3 Model B, Micro SD card, HDMI - TV or Monitor and Smart Phone.

3.4 Database Access: To access the applications using database in online server and use the user account in online server.

3.5 Testing and Implementation: To verify the functionalities of the system and implementation in the real time devices.

Also the research work is focused in standard format as well as creating a model to explain the system to the elderly and handicapped peoples to use the devices properly.

IV. LOGICAL DESIGN

Logic design is a Basic circuit model of the research work to develop the application in a right way. It used to implement the physical devices in a circuit board or components connectivity.
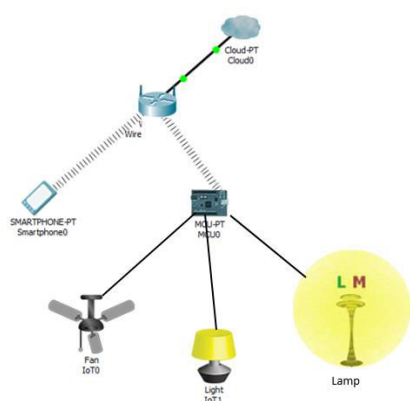

Fig.1: Logical Design of the home appliances connectivity

V. PHYSICAL DESIGN

The physical diagram is used to create the initial architecture of the research work. This diagram is helping to the researchers to implement the research work with real devices.

Components used in the project:
5.1 Raspberry Pi: Raspberry Pi 3 kit used in this project. This kit provides the way to connect the components and execution.

5.2 Micro SD card: To contain the working framework, it recommended that to use Micro SD card 8GB or more.

5.3 Micro USB 5 Volt power source: Normally a cellphone charger or digital book charger may use to power supply 5V.
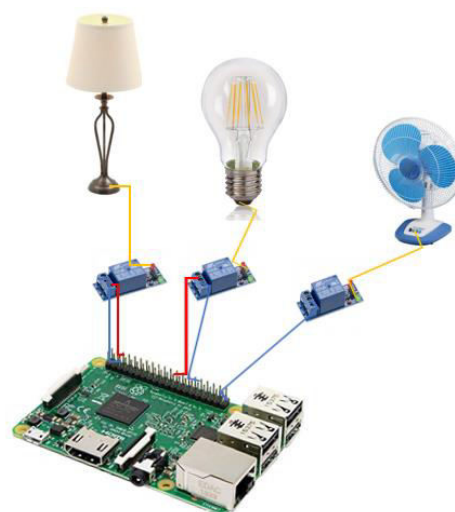
5.4 USB mouse: Any standard mouse.

Fig.2: Physical Design of the Raspberry kit connectivity to the home appliances

5.5 USB console cable: Any standard console cable.
5.6 TV or Screen: Any HDMI/DVI screen or TV should work; however for best outcomes utilize one with HDMI input.
5.7 HDMI link: To interface with a TV/screen.
5.8 Ethernet link: for wired web association, except if you utilize the implicit Wi-Fi connector to interface with a switch remotely.

VI. IMPLEMENTATION

4.1 System interface
This section is using to interact the programs with Raspberry kit for execution process. The software installation and management is handling by the system interface.
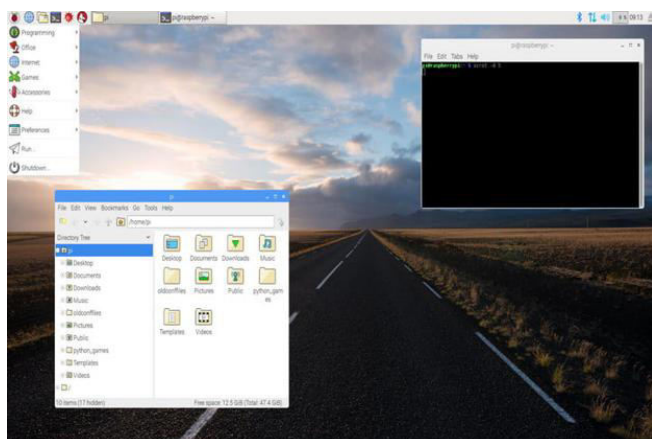
Fig.3: Screen shot of the system

4.2 The programming code in Raspberry Pi 3

The Python software is used to develop the programming part to solve the application. This phase is used to control the power supply between relays and the home appliances. Then, developed the program in python language to connect with the Raspberry pi 3 physical configuration in electronic circuit and connected smartphone.
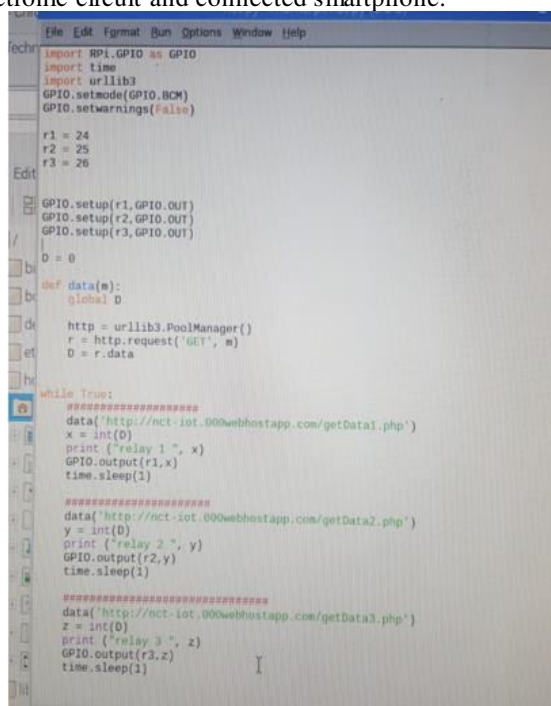

Fig.4: Relay Control Program using Python

4.3 The programming code in Raspberry Pi 3

The authors used the app inventor web site to create application to control all devices. Created the username and password in the website. The mobile controlling system application in the mobile screen as follows

Fig.5: Mobile phone screen layout to control the devices

To create online access used in the mobile application as Fig.5 and used online server in webhost website. In addition, relay control program is used to connect all relay and raspberry pi 3.
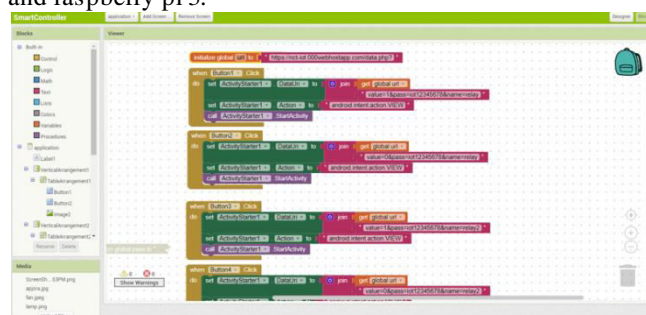

Fig.6: Relay Control Program

Here relay 1 connected to fan, relay 2 connected to night lamp and relay 3 connected to lamp.

VII. TESTING AND IMPLEMENTATION

7.1 Before Execution of the Project:

This model consists of sample home appliances of internal parts of the research work. Internal resources connected with the controller Raspberry pi and the components such as Relay, Diodes using breadboard.

Fig.8: Connectivity model

External devices connected with the Raspberry-pi using relay. A relay helps to control power supply thing except that the switch get power not by manual but by a low-power signal. Relays used to convert the circuit close or open and provide the power supply to the devices such as fan, light and night lamp. Refer Fig.8 for the sample home appliances connectivity in this research work.

7.2 Working stages of the Smart Home:

The designed model is perceive by means of a mobile phone that uses by the elders or handicapped people and select the control button of the home appliances On/Off button icon.

Based on the button selection the signal send to the remote database. If the user selected the on button in the mobile, the digital value one (1) will be stored in the remote database. At the same time, if the user selected off button of the home appliances in the mobile screen, the digital value zero (0) will be assign to the remote database. The Raspberry pi controller connected to the database using GPS connectivity.
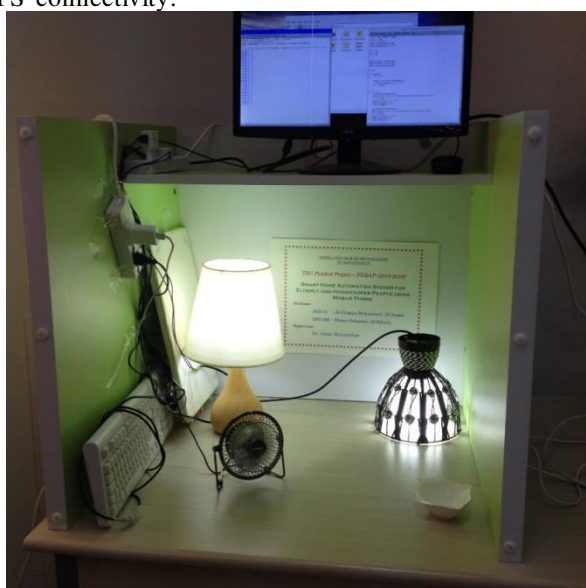

Fig. 9: Working status of the Smart Home

In addition, it reads the value from the database and based on the value it pass the voltage (on/off) to the relay. Relay, control the home appliances with the help of the normal power supply to switch on or off the devices such as light, fan and night lamp.

VIII. CONCLUSION

Smart Home Automation System is successfully implemented in real time home appliances such as fan, light and night lamp. This project demonstrated to Elderly, and Handicapped People and they felt very happy to use the home appliances through Mobile Phone. In addition, the project helps to elderly and physical challenged peoples to command their desired devices without moving around to the nearest control point.

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Biographies and Photographs

Dr. Jehan Murugadhas has over 20 years of experience in teaching and research, working as a Lecturer in Networking/Internet and E-Security Section, IT Department, University of Technology and Applied Sciences-Nizwa, Sultanate of Oman. He served in D. J. Academy for Managerial Excellence as an Associate Professor of Computer Science Department at D. J. Academy for Managerial Excellence, Coimbatore, India from 2007 to 2014. He received his Ph.D (Computer Science) from Dr.G.R.Damodaran College of Science, Coimbatore under Bharathiar University, India in 2015. He completed his B.Sc degree in Computer Science from Manonmaniam Sundaranar University in 1998 and the M.Sc degree in Computer Science from Bharathidasan University, Tiruchirappalli, India in 2000. He completed him M.Phil degree under Manonmaniam Sundaranar University, Tirunelveli, India in 2003. He has published more number of papers in International Journals and Conferences. His research interests are IoT, Wireless Networks, Congestion Control and Ad hoc Networks.

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