AN APPROACH TO IOT BASED DEVICE CONTROLLING SYSTEM FOR ELECTRICAL DEVICES

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ABSTRACT

Now a day's, home automation is becoming a vital area in research as information technology becomes ever more invasive and grows so rapidly from the computing to communication, the design challenges in home automation are increasingly apparent. Introducing mobility and flexibility for any system, becoming an important factors and hence it motivated the researchers to make a fully independent and extensible home automation system that can support household electrical devices of differing functionalities and protocols. This paper describes how to control and monitor the household electrical devices using an IoT based system with a wifi module. With the advancement in communication technologies and availability of sensory devices at cheap prices, the Internet of Things has gained interest from both academia and corporate as the scope of it is only limited by imagination Automation and remote control of devices are such applications and in this system it has been focused the aim to utilize the same to build a system that can allow user to remotely control a device as well automate it on the basis of sensory data. A Wi-Fi module is used along with a microcontroller based switching circuit in the system, the user interface of which shall be provided by a web based application the source code of which is embedded in the Wi-Fi module itself.

Key Words: Internet of Things (IoT), Automation, Wi-Fi Module, Microcontroller

1. INTRODUCTION

1.1 Overview

The Internet of Things (IoT) is a concept in which surrounding objects are connected through wired and wireless networks without user intervention. In the field of IoT, the objects communicate and exchange information to provide advanced intelligent services for users. Owing to the characteristics and merits of IoT services, the concept of smart cities is gaining grounds which bring together various IoT technologies to provide better and efficient lifestyle to the masses. Through this project, it has been tried to create a system that will help attain such smart automation and remote device controlling.

1.2. Objectives

The system would be designed such that the users can communicate with their household appliances remotely through wifi based communication mechanism with reference to IoT. The entire designed had set certain some objectives which are stated as followed:

1.2.1. Remote Controlling of Load

The designed planning is to build a device that could control the power supply of the load connected to it, thereby allowing the user to remotely turn the device ON or OFF connected to the load using a web based application through Wi-Fi.

1.2.2. Parameter Based Automation

The system is designed to automate the power control of the load depending upon certain conditions being met by the parameter which have collected from the sensor.

1.2.3. Modular Sensor Based Automation

The entire model is developed to provide the system creating with a sense of generality and thereby decide to include a mechanism to automate the control of the load by introducing some sensors which would be modular in nature. Thus, any load could be connected and automated it on the basis of any parameters just by introducing a suitable sensor to the system.

2. METHODOLOGY

It was started to work on the project keeping the modular approach of programming in mind. The coding is designed in phases as modules which would eventually carry out certain important functions like facilitating remote device control and carrying out instructions which were based on how to behave according to the conditional inputs based on the data given into by the sensor. The details of the programme modules and the flow chart are given in details in the next chapter.

2.1. Block Diagram

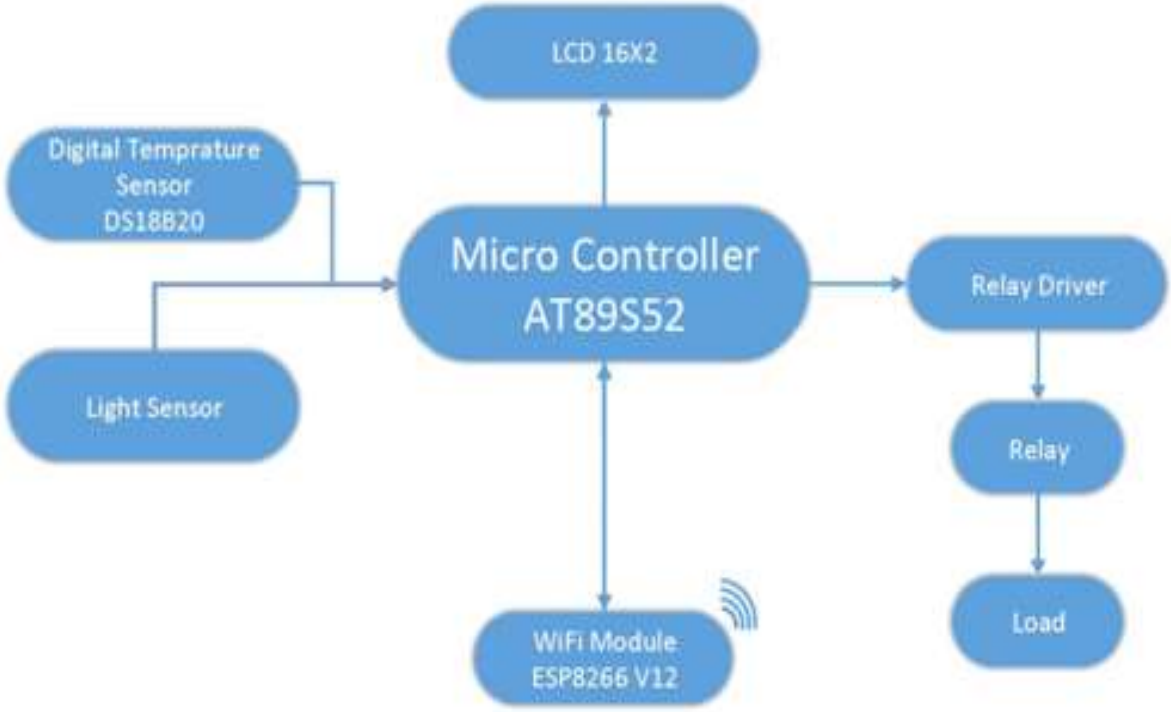

Figure 2.1: Block Diagram of system

The block diagram of the entire system is given below in the figure 2.1. The device behaves accordingly based on the conditional inputs it receives in the form of sensory data or how the user wants it behave, that is when the power supply to the load attached to the relay of the system must be ON state and when it must be in OFF state.

2.2. Circuit Stimulation

The code is tested first on the circuit stimulator software called Proteus ISIS before actually burning our code into the microcontroller which have helped us save a helped a lot in debugging and testing of code, as a result of which our final working code was possible to be executed successfully and getting the desired result from the system.

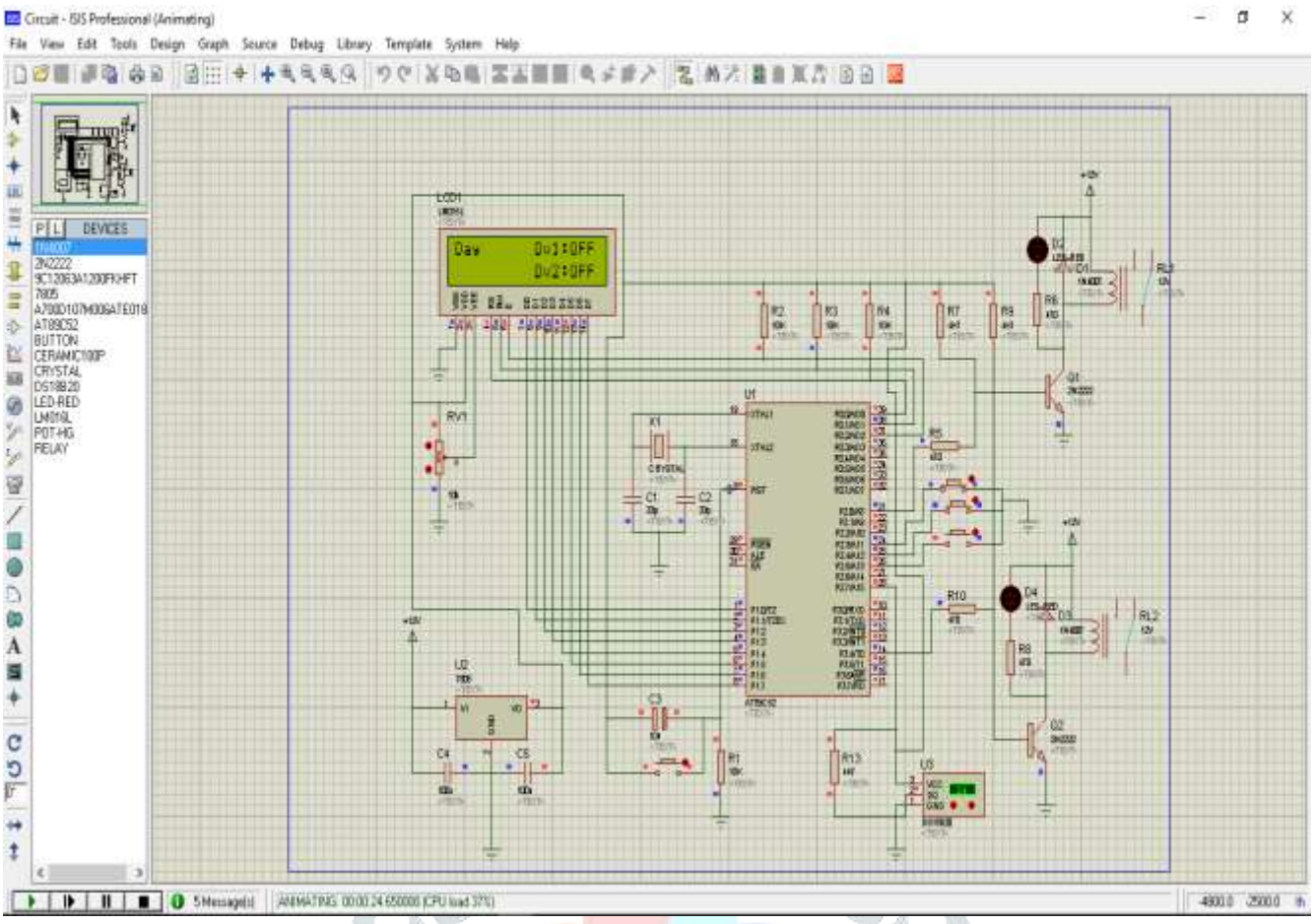

Fig 2.2: Screenshot of circuit simulation in Proteus ISIS

3. Implementation

The design of the whole system is implemented by following the modular approach for programming. Modules for distinct functionalities that the system must possess were built step by step before being put together. Coding was accompanied by regular debugging and circuit stimulation so as to eliminate errors and to ensure smooth functioning of the system. The programming for the Wi-Fi module was done in Lua using SciTE IDE.

3.1 Flow Chart

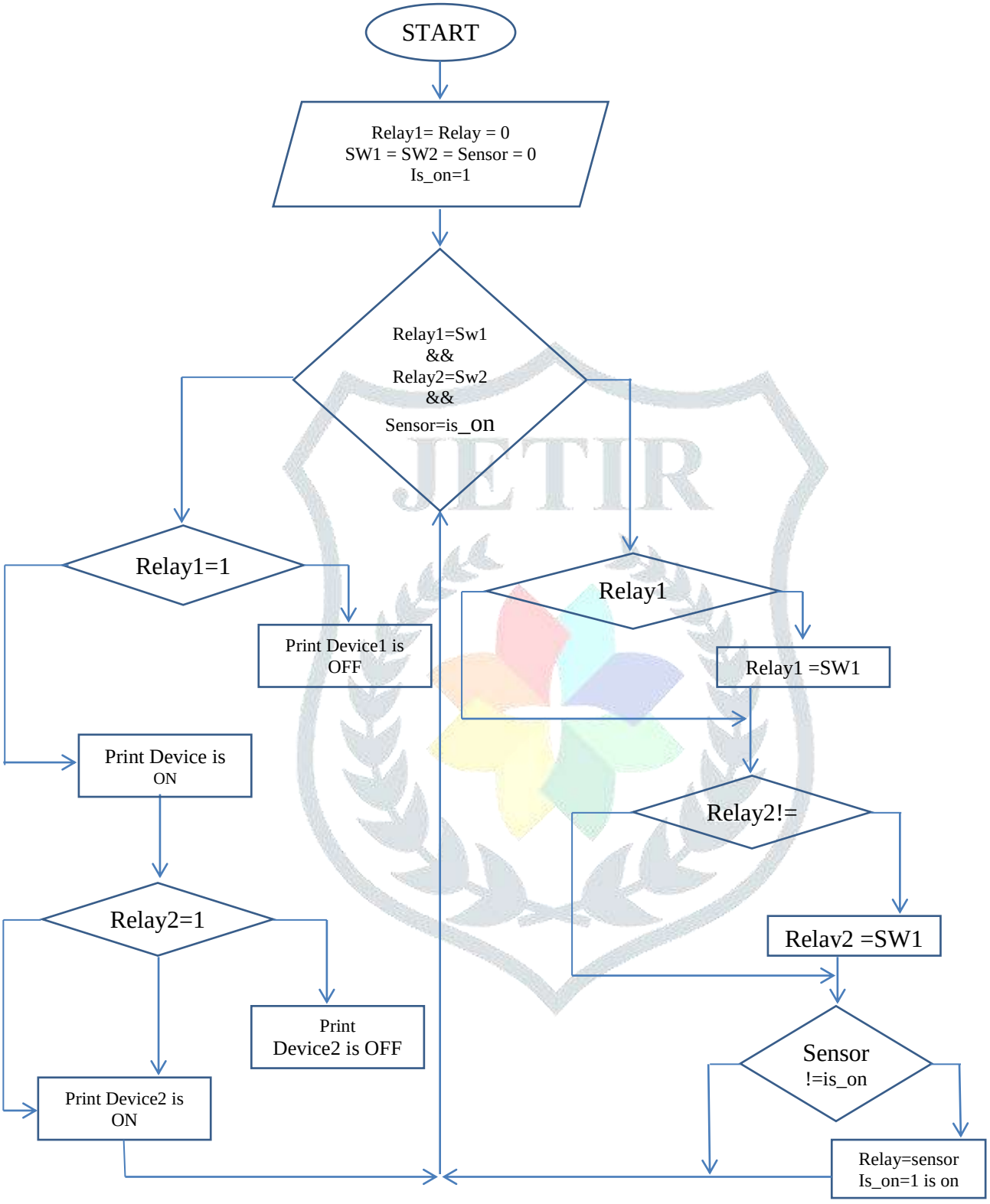

Fig 3.1. Flow Diagram of the designed System

3.2 Observation

This IoT based system is very useful in automation as it provides the option of introducing different sensors based on the requirements of the user and automating the control of power supply of the load accordingly with respect to the sensory data. This system also provides some facilities as follows

- Remotely control the power supply of the load.
- Introduce automation on the basis of the parameters that are sensed by the sensor.
- Introduce other sensors in the system which automates the control of the power supply of the load depending upon the value of the sensory data, thereby making the device support modularity and generality.

It also leaves the control to override the flow of automation to the user and remotely control the device according to his or her will.

4. CONCLUSION

Moving forward, when study is focused on improving the different aspects of the system, it has come to know that the device can be connected to the internet in the following four ways like on the home / business network, connects to a local / remote server, Internet using a Static Public IP Address, Internet using a Dynamic Public IP Address. As of now, this device is used only on the home / business network but it can be also tried to connect the device to the internet by using the rest of the three ways by making uses of Static Public IP Addresses and Dynamic DNS Services. The way for integrating database is more efficient so as to facilitate storing of the value of the parameters and analysis of it. With this implementation finished, there is much to reflect on, in terms of what the hardware was able to achieve, areas that could be improved upon, highlighting the strengths and weaknesses of the presented solution and limitations surrounding the device. One of the first realizations was an appreciation for how much work goes into doing a real, live project in the field. Furthermore, programming embedded microcontrollers in C is an involved task. This project leave with a deeper appreciation for what teams of dozens of computer scientists and hardware and software engineers do when they work on a single project to bring a product to market, and despite the developments in recent years that make engaging in programming and manufacturing IoT devices/dabbling in the space much easier, why that kind of manpower is required.

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