IoT Based Home Automation with Web Server

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ABSTRACT

In this work an IoT (Internet-of-Things) enabled system has to be designed and developed to ensure the smooth switching of various electrical appliances over the internet from any place in the world. The system would be using the local hotspot credentials to be entered by the user in the firmware itself which subsequently be able to generate an IP address. On entering this IP address as a URL in laptop, tablet, desktop pc or cell phone a dashboard in the form of graphical user interface (GUI) would appear on the screen for the user. There will be icons on the screen dashboard resembling on/off switch and tapping over these buttons would switch the relay states accordingly. The whole system will be built around NodeMCU development board for IoT.

Keywords:IoT, Web server, NodeMCU, Home Automation

INTRODUCTION

The internet of things, or IoT, is a system of connected equipment, machines, commodities, animals, or persons having unique identities and the capacity to exchange information across a network without necessitating human-to-human or human-to-computer contact. A point in the IoT technology can sometimes be a person ingrained with a breathing tube, a farm carnivore embedded with a nanoparticle-based guidance system, and any other instinctual or personal component that can then be assigned a Transmission Control protocol/internet (IP) email and transfer data.An IoT ecosystem consists of browser programmable controllers' systems and devices such as phones. The IoT applications that are developed greatly affect the connectivity, networking, and modulation schemes used with these web-enabled devices. IoT is critical to business in addition to providing smart gadgets to automate homes. The Internet of Things helps businesses to automate operations and cut personnel expenses. In general, IoT is most prevalent in manufacturing, transportation, and utility sectors, where

sensors and other IoT devices are used; but it has also found applications in agriculture, infrastructure, and home automation, propelling some firms toward digital transformation.Some of the advantages includes the right to access data from just about anywhere, at any period, on any device. Also, IoT allows people to communicate between integrated electronic devices. It gives acceptance and use of technology to contribute to the improvement of a business minimizing the overall need for operator interaction.

Some of the disadvantages of IoT includes the variety of linked devices increases and therefore more information is shared throughout them, the possibility of a hacker obtaining private information increases.Enterprises may someday be presented with massive numbers of IoT devices, potentially millions, and acquiring and storing data from all of those devices will be tough.If there is indeed a malfunction in the systems, every connected device is likely to get damaged.Since there's no standard measurement for IoT interoperability, devices from different producers find it

difficult to communicate with one another.

SCOPE OF RESEARCH

In this work an IoT (Internet-of-Things) enabled system has to be designed and developed to ensure the smooth switching of various electrical appliances over the internet from any place in the world. The system would be using the local hotspot credentials to be entered by the user in the firmware itself which subsequently be able to generate an IP address. On entering this IP address as a URL in laptop, tablet, desktop pc or cell phone a dashboard in the form of graphical user interface (GUI) would appear on the screen for the user. There will be icons on the screen dashboard resembling on/off switch and tapping over these buttons would switch the relay states accordingly. The whole system will be built around NodeMCU development board for IoT. An IoT enabled system has been proposed for home/ industrial automation. Nowadays, everybody used to bears/ carry some kind of electronic gadget may it be a laptop, tab, cell phone with an internet connectivity. So, exploiting this opportunity a basic idea has been formulated to connect somethings with a network so that their switching can be controlled just by few tapping over the phone or laptop screen.
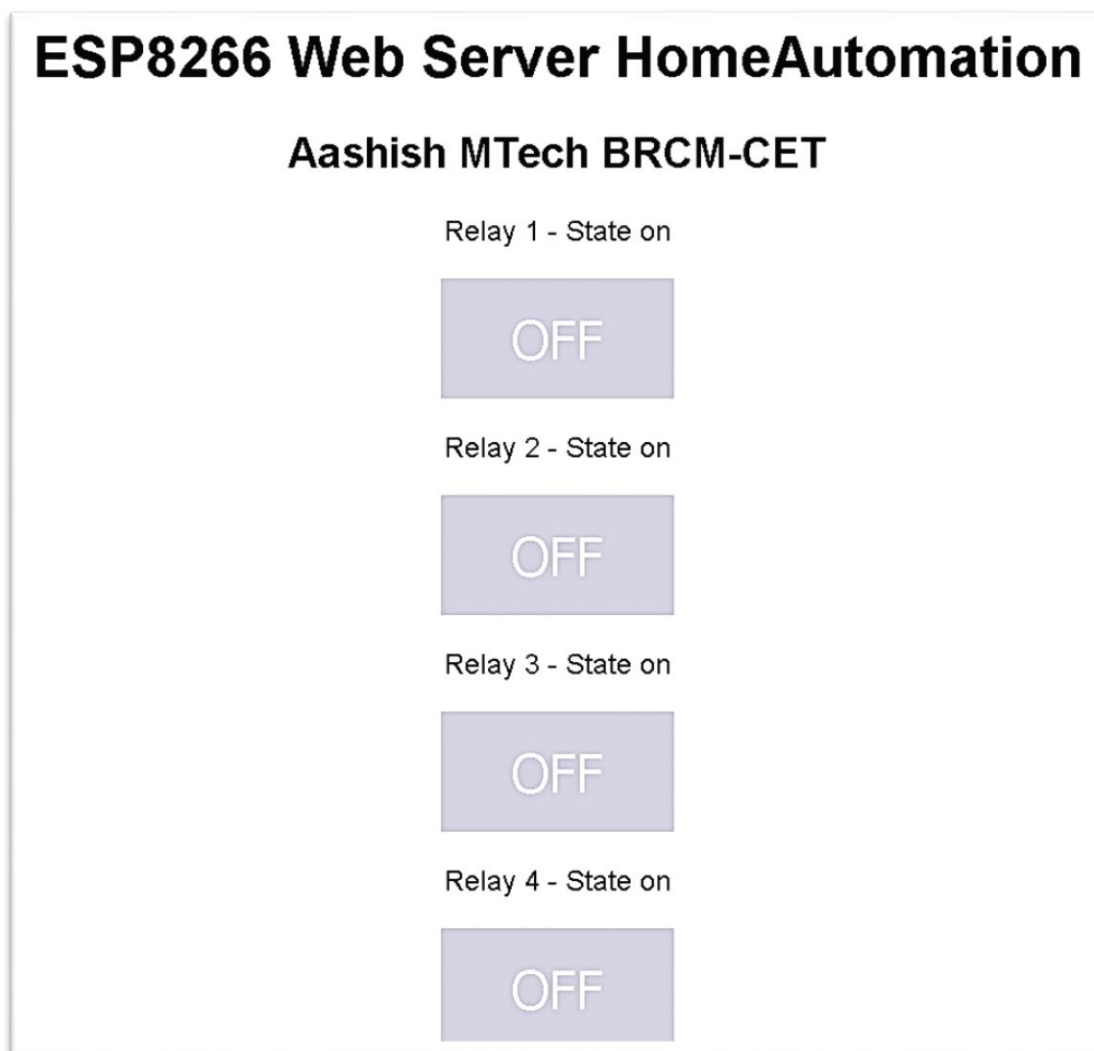

Figure 1 Snapshot of HTML based Web Dashboard

The aim is to design and develop a prototype to demonstrate the application of IoT (Internet of Things) in the field of home automation using a web server. The objective is to check the feasibility and reliability of a web server-based switching system intended to monitor and control the electrical appliances at home or office using IoT enabling software

techniques and hardware modules. To establish communication between the server and the clients an adaptable system was necessary. The central server node was expected to enable the user to remotely access the status of switching parameters in real-time over the mobile or laptop using internet. The system was expected to generate commands to the four-channel relay module based on the user feed and also update the user about the current status of the switches through a graphical user interface. The objective was to demonstrate the scope of IoT in home automation by

empowering the humans to monitor and control 'things' remotely sitting at any place in the world. The objective was to investigate the exclusive capabilities of IoT in comparison to the other wireless technologies sustaining in the market and how it would gradually replace almost every other technology existing in this domain. To connect here between technology and the mobile application, the Wireless Local Area Network (WLAN) protocol was to be deployed. A local hotspot is required meant to generate connectivity.
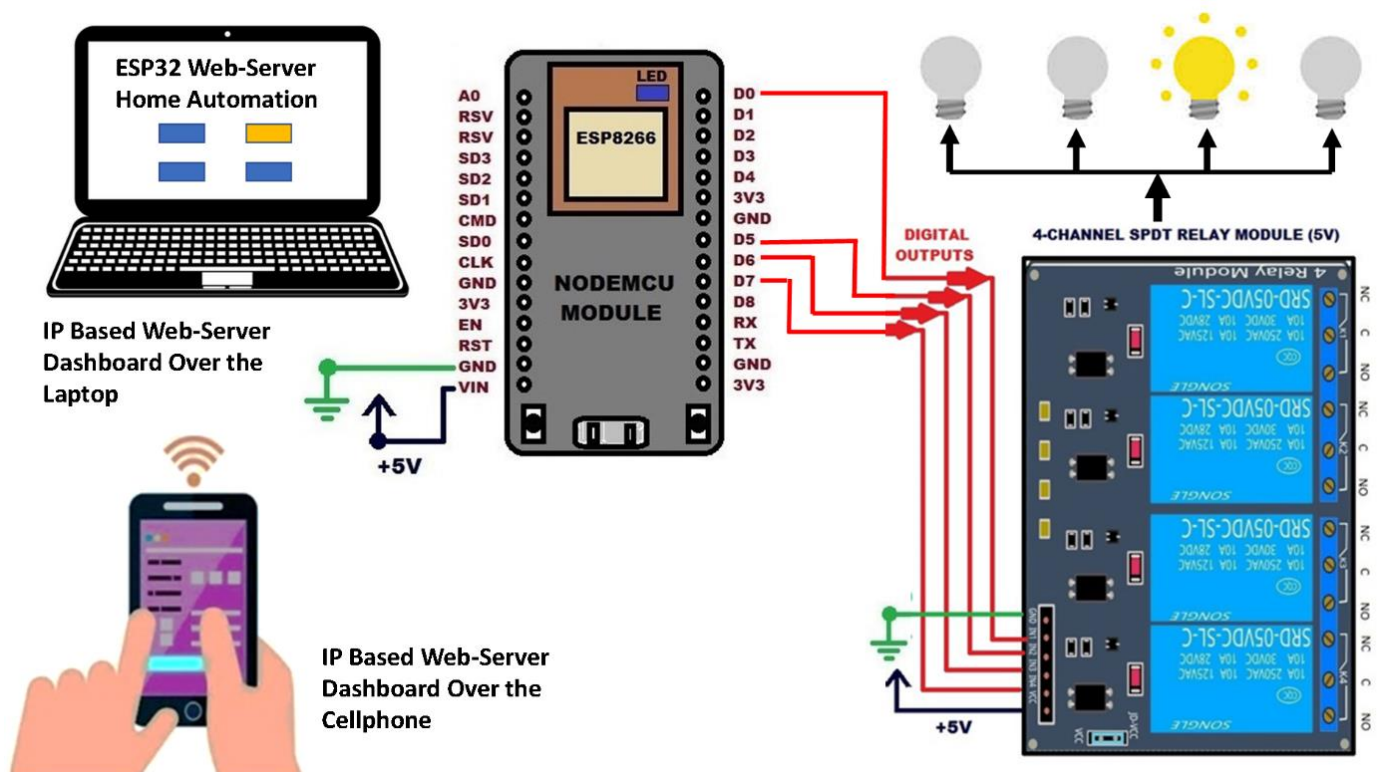

Figure 2. Implemented System Architecture

Implementation

The problem statement has been analysed and the after going through the rigorous study and referring a lot of literature reported so far it is inferred that the architecture of the proposed system must be having a NodeMCU development board which is considered as the most suitable boards for implementing such kind of applications at zero level. An IoT enabled system has been proposed for home/ industrial automation. Nowadays, everybody used to bears/ carry some kind of electronic gadget may it be a laptop, tab, smartwatch

or cell phone with an internet connectivity. So, exploiting this opportunity a basic idea has been formulated in mind to connect somethings with a network so that their switching can be controlled just by few tapping over the phone or laptop screen.

Experimental Results

The aim is to design and develop a prototype to demonstrate the application of IoT (Internet of Things) in the field of home automation using a web server. The objective is to check the

feasibility and reliability of a web server-based switching system intended to monitor and control the electrical appliances at home or office using IoT enabling software techniques and hardware modules. by a writing survey. To establish communication between the server and the clients an adaptable system was necessary. The central server node was expected to enable the user to remotely access the status of switching parameters in real-time over the mobile or laptop using internet. The system was expected to generate commands to the four-channel relay module based on the user feed and also update the user about the current status of the switches through a graphical user interface. The objective was to demonstrate the scope of IoT in home automation by empowering the humans to monitor and control 'things' remotely sitting at any place in the world. The objective was to investigate the exclusive capabilities of IoT in comparison to the other wireless technologies sustaining in the market and how it would gradually replace almost every other technology existing in this domain. To connect here between technology and the mobile application, the Wireless Local Area Network (WLAN) protocol was to be deployed. A local hotspot is required meant to generate connectivity. The work has been validated using a hardware prototype designed and developed around an IoT enabled development board i.e. NodeMCU. The IP address for establishing the connectivity with your network can be obtained over the serial monitor window available in the Arduino IDE. This IP address can be used as a URL to open a web-page in the format of a dashboardwith caption-1 "ESP8266 Web Server Home Automation" and caption-2 "Aashish MTech BRCM-CET". There can be seen four buttons on this web-server dashboard intended to display the status of device ON or OFF. As this is an HTML based design the user can easily change it as per his/ her requirement by editing some lines of the code. The user can directly give a command to trigger the remotely connected relays just by clicking on these buttons by tapping over the phone or by using mouse over the laptop screen. The research work has been validated by the hardware prototype developed.

CONCLUSION

Following effectively completing this project, it was found that the Internet of Things (IoT) constituted a new framework for wireless communication devices. The Internet of Things (IoT) is the development of current networks to handle anything that is or will be present in the future. Items with personas and simulated dispositions that operate in the smart home environment and use a connected device to connect and engage within a social environment and user context.

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