www.ijiarec.com

ISSN:2348-2079

Volume-7 Issue-2

International Journal of Intellectual Advancements and Research in Engineering Computations

Smart home environment monitor and control using node MCU

B.Anusuya, Dr.G.Ramani

M.E Embedded System Technologies, Nandha Engineering College, Tamilnadu, India.

ABSTRACT

This project presents a low cost and flexible home control and environmental monitoring system. It employs an embedded micro – web server in NODE MCU microcontroller, with IP connectivity for accessing and controlling devices and appliances remotely. These devices can be controlled through a web application or via Bluetooth Android based Smart phone app. The proposed system is target to solve problems of common peoples in day to day life. It provides open source to user to design automation in less price. Different sensors are connected to node MCU and can operate from any part of world with help of IoT. The proposed system is server independent and uses Internet of things to control human desired appliances. This project presents a design and prototype implementation of new home automation system that uses WiFi technology as a network infrastructure connecting its parts. The proposed system consists of two main components; the first part is the server (web server), which presents system core that manages, controls, and monitors users' home. Second part is hardware interface module, which provides appropriate interface to sensors and actuator of home automation system. Besides monitoring humidity and temperature, the proposed system provides additional features of controlling household devices, automatic turn off/on of an appliance to prevent wastage of power.

Keywords: IoT, Web Page, Home appliances, Sensors

INTRODUCTION

As rapid change in technology always aims to serve the mankind, the expectation for living a simple yet advance life keeps on increasing. Internet has become an important part of human's social life and educational life without which they are just helpless. Internet of Things is a concept where each device is assign to an IP address and through that IP address anyone makes that device identifiable on internet. Basically it started as the "Internet of Computers." Research studies have forecast an explosive growth in the number of "things" or devices that will be connected to the Internet. The resulting network is called the "Internet of Things" (IoT). The recent developments in technology which permit the use of Bluetooth and Wi-Fi have enabled different devices to have capabilities of connecting with each other. Using a WIFI shield to act as a Micro web server for the Node Mcu which eliminates the need for wired connections between the Node Mcu board and computer which reduces cost and enables it to work as a standalone device. The Wi-Fi shield needs connection to the internet from a wireless router or wireless hotspot and this would act as the gateway for the Node Mcu to communicate with the internet. With this in mind, an internet based home automation system for remote control of home appliances is designed.

LITERATURE SURVEY

Miss. Aboli Mane, Miss. Pooja Pol, Mr. Amar Patil, Prof. Mahesh Patil discuss in this paper is target to solve problems of common peoples in day to day life. Atomizing home with using node MCU which is Wi-Fi model and using blynk app. Blynk app is used as third party app. It provide open source to user make to design automation in less

Author for correspondence:
M.E Embedded System Technologies, Nandha Engineering College, Tamilnadu, India.

price. Different sensors are connected to node MCU and can operate from any part of world with help of Blynk app.

Lalit Mohan Satapathy, Samir Kumar Bastia, NiharMohanty presents a reliable home automation system with additional security using Arduino microcontroller, with IP connectivity through local Wi-Fi for accessing and controlling devices by authorized user remotely using Smart phone application. The proposed system is server independent and uses Internet of things to control human desired appliances starting from industrial machine to consumer goods. The user can also use different devices for controlling by the help of web-browser, smartphone or IR remote module.

SYSTEM DESIGN

The designing methodology of the system has two major portions: software design and hardware design. The hardware is designed by arranging microcontroller, sensors and actuators whereas software design includes programming that is written and uploaded in the microcontroller. The designed system shows microcontroller connected to sensor-modules and actuator-modules for monitoring and controlling household devices. This design section shows how different hardware components are set up a web page.

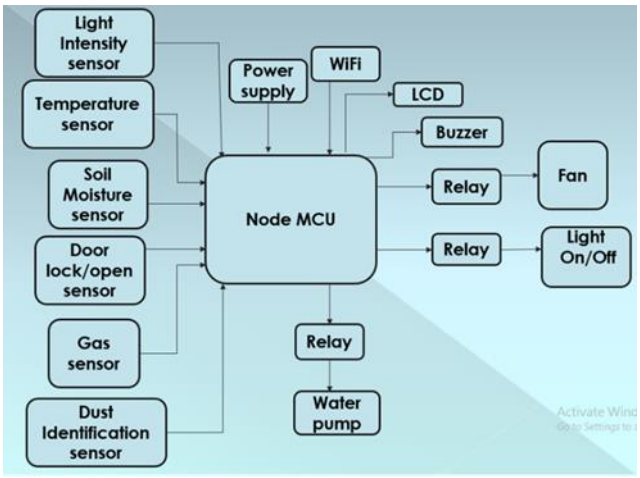

Figure 1Block Diagram

The proposed system allows the user to control the appliances of home remotely anytime from anywhere by using web page in PC or laptop or smart mobile phones. The user can control appliances via internet by using web page and monitor parameters of household environment easily by reading sensor data in Web application. ADC power supply of 5V is used as the power source for node MCU, sensor-modules and the relay board. Being powered up, Node MCU searches for the preset SSID (Service Set Identifier) and connects automatically to the Internet. Sensor-modules send the variable data about ambient conditions to the node MCU. The user gets these data in web page link via internet server and then decides the action to control the appliances. On pressing the suitable button in application, Node MCU gets the instruction via internet server and provides output signal to the actuator circuits. When the relay is turned on, the appliances get the power from 230V AC source .The switching circuit used for turning Fan and water-pump on/off can be used for turning the other household appliances like air-conditioner, room- heater, micro-wave oven etc. on/off as well. The interfacing circuit for speed regulation of AC fan can also be used for AC light dimming applications. Web page consists of user Id and password which can be open in any devices anywhere with the help of Wi-Fi.

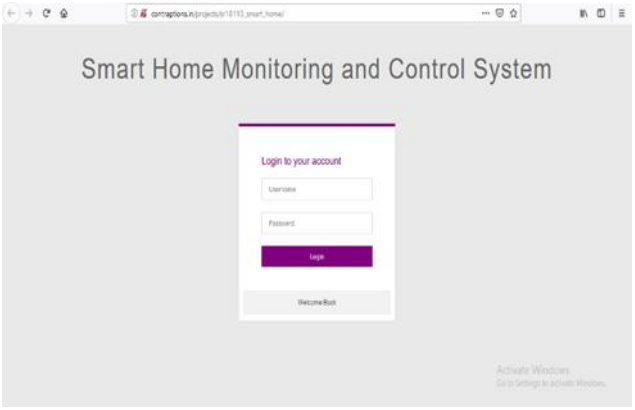

Figure 2 Web Page Login for control and monitoring

It consist of two sections

- Monitor panel
- Control panel

In Monitoring panel, the parameters like moisture, dust, door open or lock, Gas leakage everything are get monitored and if any unusual things happens immediately the buzzer will get ring by displaying the information in LCD display.

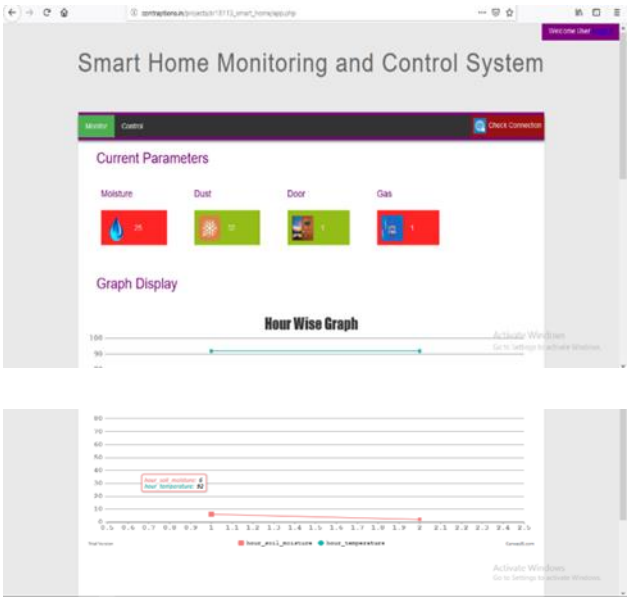

Figure 3 Monitoring panel with hour wise graph

Control panel performs two functions viz. water-pump on/off and controlling speed of fan. User reads level of ambient moisture content and temperature sensed by sensor module in mobile or PC via the web link.

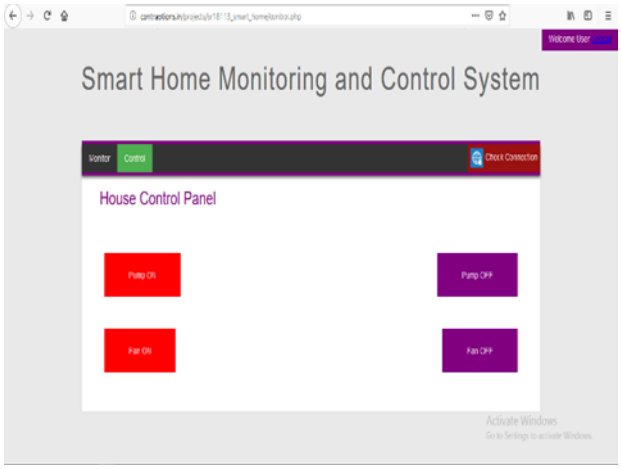

Figure 4 Control Panel

This panel performs two functions viz. water-pump on/off and controlling speed of fan. User reads level of ambient moisture content and temperature sensed by sensor module inmobile or PC via the web link. User reads moisture level of soil in hour basis and takes action to switch pump on/off by pressing button in app. In case the pump is on when moisture-level reaches a predefined threshold, user gets a notification in phone which informs about the high moisture-level. If the user does not switch off the pump and there is a further rise of moisture- level then the pump is turned off automatically by Node MCU when moisture- level rises to a certain height. On failure of Node MCU in turning off the pump at this moisture- level the moisture- level rises higher and after this level reaches a specified value user gets a second notification in mobile which informs about such failure. After getting this notification user has to turn off the pump from his app. To control the speed of fan user checks the application display to read values from sensor module about ambient temperature and humidity. User presses proper buttons in the app to adjust the speed of fan.

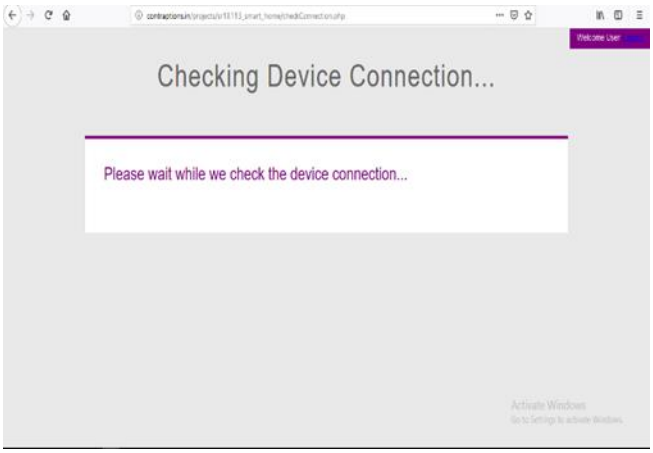

Figure 5 Check Connection

Check Connection is an option to get info about the connectivity of the hardware with the software via Wi-Fi. If there is no connection then it will intimate.

RESULT

In proposed method, this application provides the facility to read sensor data and control appliances easily. The present state (on/off) of

appliance appears on the button widget. Every control will be done based on time constraint.

1. Control also has been done along with monitoring the appliances,.
2. Dust Identification is included which identifies the dust particles easily and intimate it in LCD display.
3. High security can be provided by intimating door lock/open status.
4. Temperature and Moisture are continuously monitored and get updated in hour basis.
5. Gas leakage can be identified and buzzer will ring to avoid accidents.

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