IOT BASED SMART COLLEGE

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ABSTRACT

The aim of paper to present a model for building a more energy efficient and low-cost college, save energy resources, develop eco-friendly college, design and implement a low-cost wireless smart college system.

KEYWORDS

Network Protocols, Wireless Network, Mobile Network, Virus, Worms &Trojon.

1. INTRODUCTION

One of the emerging technologies is the smart building technology, and there is an increasing interest in the Internet of Things (IoT) enabled smart buildings. An increasing number of things are being connected to the Internet at an exponential rate, resulting in the enrichment of the digital world. There are a number of different domains in which Internet of Things (IoT) is facilitating and improving human life and work efficiency. There is an increasing interest in using IoT devices for making buildings smarter and more efficient. For instance, a significant amount of energy is being consumed by buildings. The need for energy efficiency in buildings is "Smart college" is to monitor, reduce and manage building energy consumption without compromising the occupant comfort and operational efficiency. Within buildings, heating, ventilation and air conditioning systems contribute to significant energy consumption. Smart colleges promote comfort, luxury, entertainment, security, and world peace. Current existing smart colleges need special kind of appliances to deal with, which equipped with a network adapter since they should connect to a wired network. Smart home technology originally depends on the wired network infrastructure, but after the huge improvements in that technology, it also supports the wireless communication over multiple frequencies to control the system [1-21].

2. SMART COLLEGE

2.1. Smart Street Light System

The system is realized using the IR sensor (Infrared). IR sensors range of 2-30cm these IR sensors are connected on street lights depending on the presence or the movement. The light brightness if there is a no presence it is coded in such a way that the light is dimed this is done so that power can be saved.

2.2. Smart Automation

Smart Automation consists of controlling, when the light and the fans will turn ON or OFF, her we are using PIR (passive infrared sensors) which is used for motion detection, PIR sensors can

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detect motion its range of 120 degrees and up to 7meters. When motion is detected, the sensors give logical high as its output and the fans and lights are turned on, once there is no motion logical zero output is obtained, fans and lights are turned OFF

2.3. Fan Controlling System

Open and close fan automatically using android was designed in this paper using Arduino MEGA2560, ESP8266 ESP-01s Wi-Fi Module, Relay module, and Ac Fan.

2.4. Gases and Smoke Detection System

Smoke Detectors are very useful in detecting smoke or fire in buildings. They are considered an important safety parameter. This circuit triggers the Buzzer when Smoke level becomes higher than 500 ppm, this threshold value can be changed in the Code according to the requirement.

2.5. Motion Security System

It is a security system that detects movements and sends a signal to the control panel of your security system. They are sensitive to the slightest movement in an area and will be activated by a person walking by them. A motion sensor is a device that notices moving objects, mainly people.

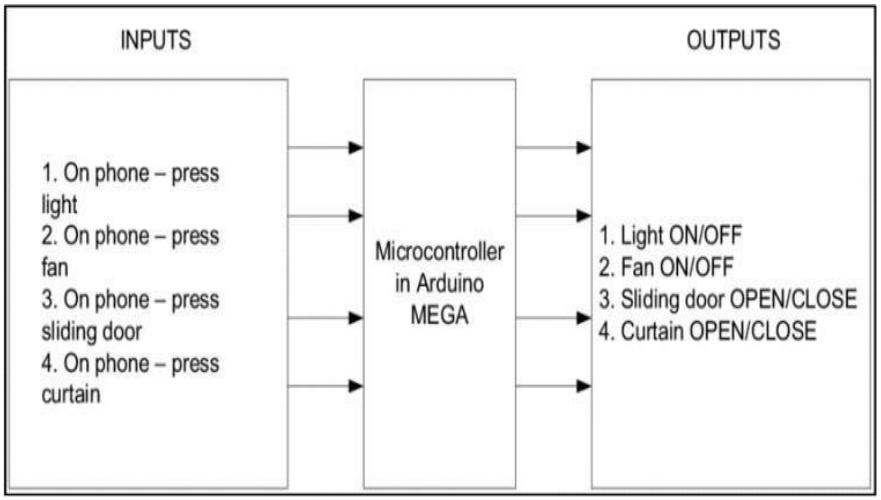

Figure 1. Schematic/block diagram

2.6. Hardware and Software Requirements

2.6.1. Hardware Requirements

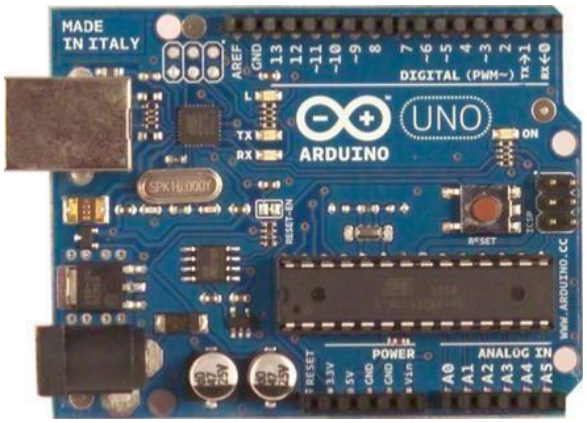

Figure 1. Arduino Uno

▪ Arduino Mega/UNO

The technical specifications are as –

- Microcontroller--ATmega328
- Operating Voltage -- 5V
- Input Voltage (recommended)--7-12V
- Input Voltage (limits) -- 6-20V
- Digital I/O Pins--14(ofwhich6providePWMoutput) Analog
- Input Pins -- 6
- DC Current per I/O Pin -- 40 mA
- DCCurrentfor3.3VPin--50mA
- Flash Memory--32KBofwhich0.5KBusedbybootloader
- SRAM -- 2 KB
- EEPROM--1KB
- Clock Speed--16MHz

▪ GSM (Global System for Mobile Communication) Module –

A digital mobile network that is widely used by mobile phone users.

▪ LDR Sensor

LDR (Light Dependent Resistor) as the name states is a special type of resistor that works on the photoconductivity principle means that resistance changes according to the intensity of light. Its resistance decreases with an increase in the intensity of light.Fig.2 shows the LDR and Fig.3 shows the symbol of LDR.

.LDR

Figure.2

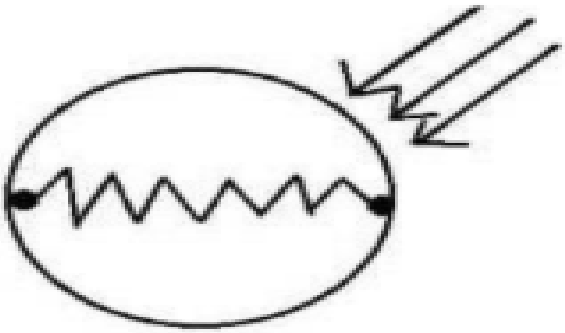

Figure.3.LDR Symbol

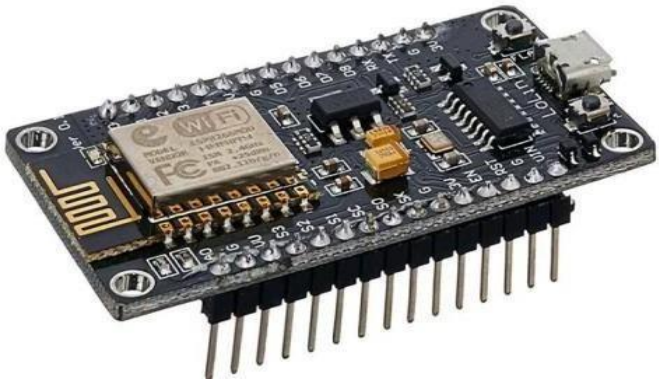

Figure.4. Node MCU Development Boardand

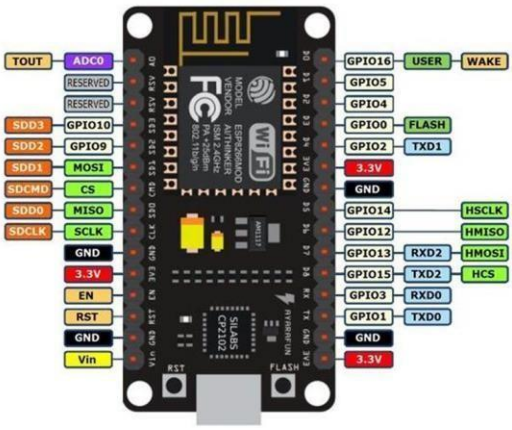

Figure.5. Node MCU Pin Out

2.6.1.1. Specifications & Features

- Microcontroller: Ten silica 32-bitRISCCPUXtensaLX106
- Operating Voltage: 3.3V
- Input Voltage: 7-12V
- Digital I/O Pins (DIO): 16
- Analog Input Pins (ADC):1
- UARTs: 1
- SPIs:1
- I2Cs:1
- FlashMemory:4MB SRAM:
- 64 KB
- ClockSpeed:80 MHz
- USB-TTL supported CP2102 is included onboard, Enabling Plug n Play
- PCB Antenna

2.6.1.2. Applications of Node MCU

- Proto typing of IoT devices
- Low power battery operated applications

2.6.1.3. Network Projects

Projects requiring multiple/Jointer faces with Wi-Fi and Bluetooth functionalities give same copy for word.

▪ Wi-fi Module

ESP8266 is an impressive, low cost WiFi module suitable for adding WiFi functionality to an existing microcontroller project via a UART serial connection. The module can even be reprogrammed to act as a standalone WiFi connected device.

2.6.2. Software Requirements

▪ Windows OS

Windows is an operating system designed by Microsoft. The operating system is what allows you to use a computer. Window 11 is used in this work.

▪ Arduino Software

The Arduino IDE (integrated development environment) is a cross platform application which is written in the functions from C, C++ and JAVA. The Arduino IDE is also a derivative of Processing IDE. The Arduino IDE is used for easy to write and upload programs in Arduino boards by using a cable that is connected between board and IDE. The operating system for Arduino software can be Windows, MacOs and Linux depending upon the user. The IDE has a Software library from the wiring projects and to provide a common input and output procedures as shown inFigure.6. Arduino IDE Setup.

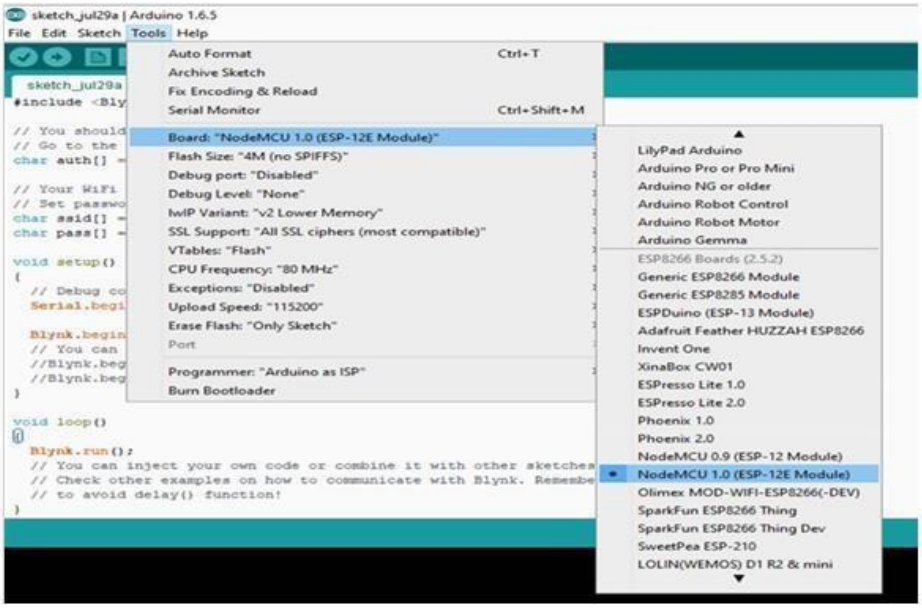

Figure.6.ArduinoIDESetup

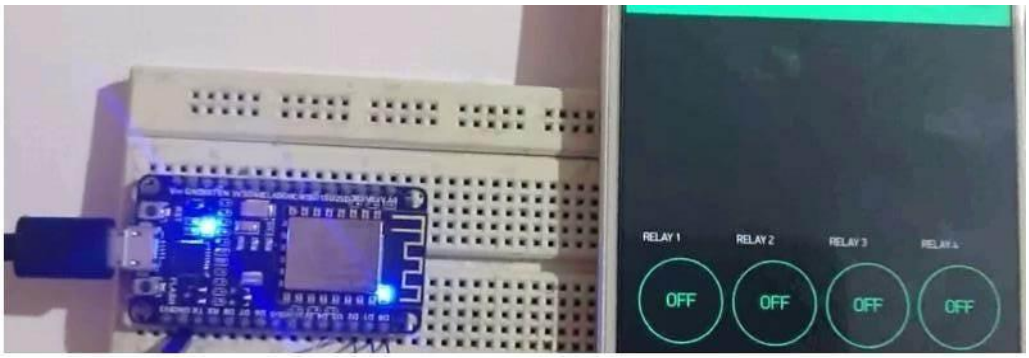

Figure.7.BlynkIoT

main.cpp

```
// Fill-in information from your Blynk Template here
#define BLYNK_TEMPLATE_ID              ""
#define BLYNK_TEMPLATE_NAME            ""
#define BLYNK_FIRMWARE_VERSION         "0.1.0"
#define APP_DEBUG

#include "BlynkEdgent.h"

void setup()
{
  delay(100);
  BlynkEdgent.begin();
}

void loop() {
  BlynkEdgent.run();
}
```

Figure.8. Arduino code for Blynk IoT

Development of Circuit, Web dashboard and Mobile App

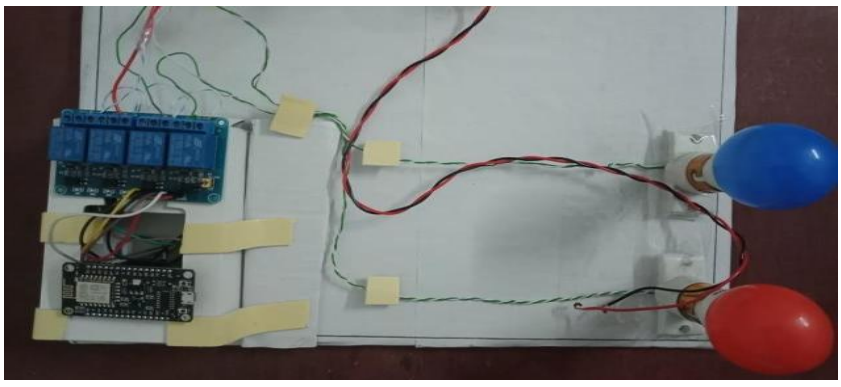

Figure.9. Circuit using NODEMCU

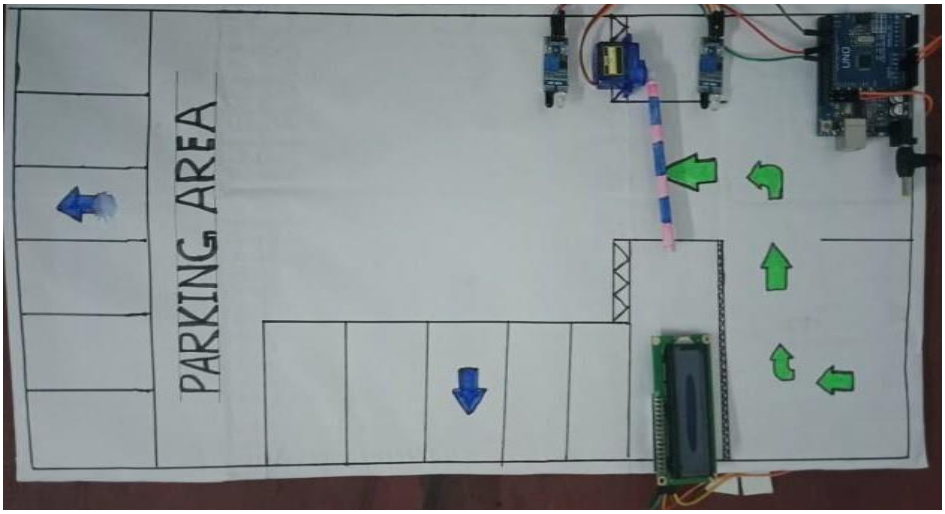

Figure.10. Sensor based Automated Parking Area

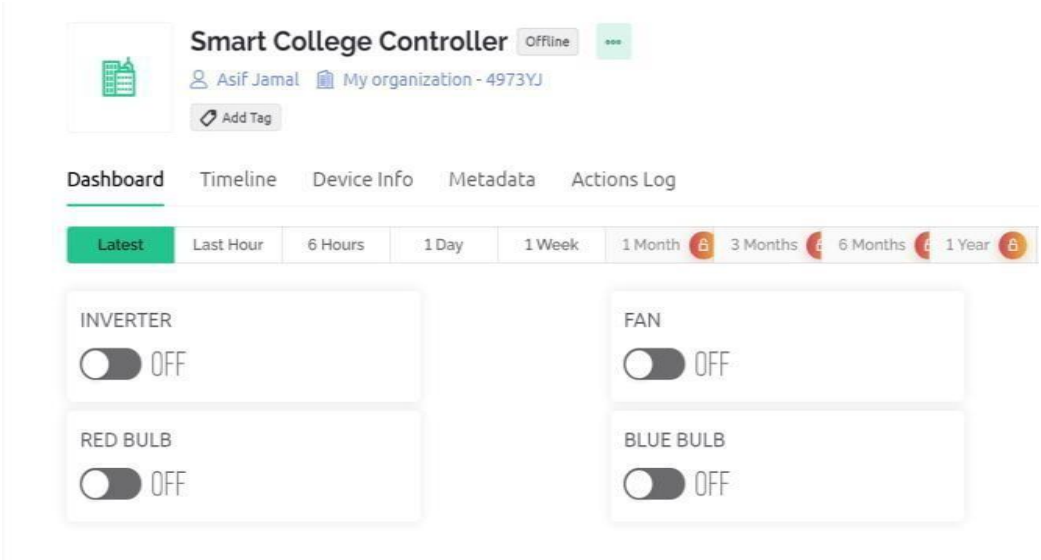

Figure.11. Web Dashboard

Figure.12. Mobile App

Fig.9. shows the Circuit consisting NODEMCU, relays and electrical appliances like bulbs etc. that are used in the colleges.

Fig.10. shows the smart parking area of college consisting LDR sensors and Arduino that has been programmed. The entrance and exit of parking have LDR sensors which open and close automatically by sensing the vehicle as the microcontroller is programmed which is attached with the sensors.

Using NODEMCU, the electrical appliances are controlled through Internet (IoT) by using Web Dashboard and MOBILE APP.

Fig.11. shows the Web Dashboard and Fig.12. shows the Mobile App for Smart College System.

CONCLUSION

The main objective of this paper is to design and implement a low- cost wireless smart college system, which automatically control lighting systems, fans, parking systems using simple and inexpensive electronic circuits. Trying to provide a more comfortable life within the college as well as saving in energy consumption. The main feature of this system is that it will use the regular home appliances/devices with no or minimal modification.

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