IoT based Smart Roads System

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Abstract— **The objective of the paper is to provide IoT Based Smart Road system, the street light turns on Automatically during the night and turns off during the day when a vehicle passes by the sensor the light turns on with maximum intensity without human involvement, this can save maximum power for street light. Public Lighting ensures safe and pleasant streets. This can perfectly be achieved using less energy. The lights in some streets can be switched off or dimmed during the night time and adequate lighting can be supplied at the desired time. This system also displays the temperature, humidity, and carbon monoxide in the atmosphere directly to the mobiles via the internet and web pages. Another major problem in the world is power consumption, this can be reduced by using this system.**

Keywords-IoT; Smart Roads, Safe Streets; Pleasant Streets; Public Lighting;

I. INTRODUCTION

The Internet of Things (IOT) is the network of physical objects-devices, vehicles, buildings and other it embedded with electronics, software, sensors and network connectivity that enables these objects to collect and exchange data.The IOT allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit.The objective of the project is to provide automatic control and monitoring on street light. The project deals with designing a lighting system which targets the energy saving and autonomous operation on economical affordable for the streets and immediate remedy on complaint. The Energy Consumption of street light of a specified area can be recorded and accounted on Energy Saving Lighting System with integrated sensors.

II. EXISTED WORK

This system is used to provide automatic control and fault detection for street lights. The lights are switched ON/OFF automatically based on the intensity of sunlight using the LDR sensor. The power supply which is supplied to the system is converted via Relay before supplying to the street lights. Here the system check's fault in the street light and also sends the alert message to the authorized mobile number through the GSM module. An object's motion is detected using an infrared sensor. According to the program, if there is any object that

comes near the IR sensor, the light will glow as bright. Otherwise, the light will be dim.

III. PROPOSED WORK

Instead of Arduino Uno, we used Arduino nano in this system and we replaced the relay along with a street lamp with the LEDs, added some sensors to display the readings of temperature, humidity, and carbon monoxide on the LCD, and the system is connected to wi-fi module to mobile in webpages upload these readings to things speak server directly via we can check these readings through.
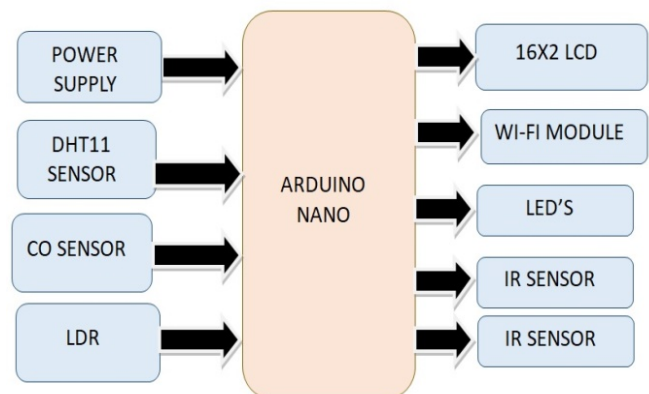

Fig. 1 Block Diagram

A. ARDUINO NANO:

Arduino Nano is a small, compatible open-source electronic development board based on an 8-bit AVR microcontroller. Two versions of this board are available; one is based on ATmega328p, and the other on Atmega168.
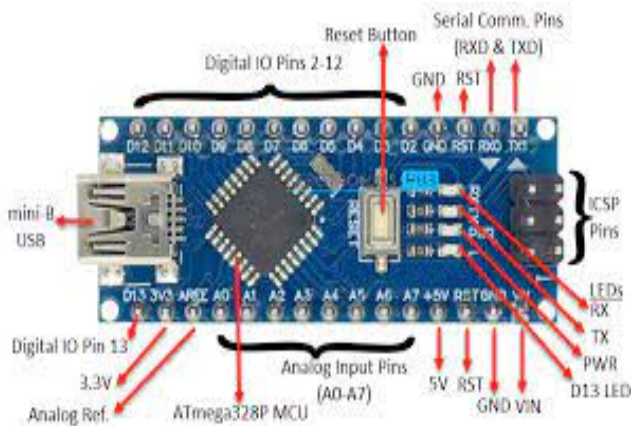
Fig 2 Arduino Nano board

B. 16x2 LCD:

A 16x2 LCD means it can display 16 characters per lines and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. The 16x2 intelligent alphanumeric dot matrix display is capable of displaying 224 different characters and symbols.

Fig 3 LCD Display

C. WI-FI MODULE:

ESP-12 is an open source Lua based firmware for the ESP8266 WIFI SOC from Espressif and uses an on-module flash-based SPIFFS file system. ESP8266 is implemented in C and is layered on the Espressif NON-OS SDK.
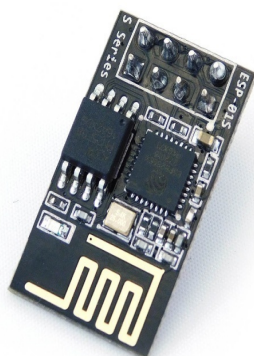

Fig 4 wifi module

D. LED'S:

A light-emitting diode (LED) is a semiconductor device that emits light when an electric current flows through it.When current passes through an LED,the electrons recombine with holes emitting light in the process. LEDs allow the current to flow in the forward direction and blocks the current in the reverse direction.

Fig 5LED bulb

E. LDR:

LDR(Light Dependent Resistor) as the name states it is a special type of resistor that works on the photoconductivity principle means that resistances changes according to the intensity of lights. Its resistances decrease with an increase in the intensity of light. It is often used as light sensor, light meter, Automatic street lights and in area where we need to have light sensitivity.

Fig 6 LDRsensor

F. CO SENSOR:

CO detector is a device that detects the presence of the carbon monoxide(CO)gas to prevent carbon monoxide poisoning. In the late 1990s Underwriters laboratories changed the definition of a single station CO detector with a sound device to carbon monoxide (CO) alarm.

Fig 7CO Sensor

G. DHT11 SENSOR:

DHT11 is a low-cost digital sensor for sensing temperature and humidity. This sensor can be easily interfaced with any micro-controller such as Arduino, Raspberry Pi etc… to measure humidity and temperature instantaneously. DHT11 humidity and temperature sensor is available as a sensor and as a module. The difference between this sensor and module is the pull-up resistor and a power-on LED. DHT11 is a relative humidity sensor. To measure the surrounding air this sensor uses a thermistor and a capacitive humidity sensor.
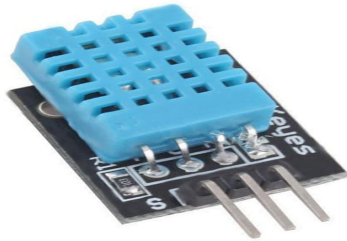

Fig 8DHT11 Sensor

H. POWER SUPPLY:

A power supply is an electrical device that supplies electric power to an electrical load. The main purpose of a power supply is to convert electric current from asource to the correct voltage, current and frequency to power the load. As a result, power supplies are sometimes referred to as electric power converters. Some power supplies are separate stand-alone pieces of equipment, while others are built into the load appliances that they power.
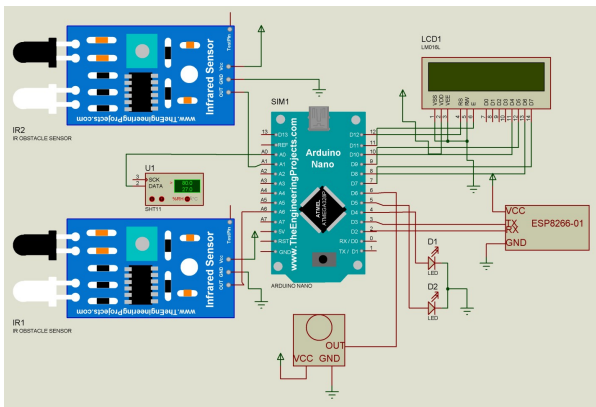

Fig 9Circuit Diagram

I. WORKING:

The street lights work automatically by detecting the movements of objects on the street. IR sensor is used to detect the object. The system also includes a DHT11Temperature-Humidity sensor that provides exact information on the temperature and humidity of the region.The

carbon monoxide sensor is used to detect the carbon monoxide readings around the system.LDR or Photoresistor is a type of variable resistor, its resistance varies according to the change in the intensity of light falling on its surface. LDR's full form is Light Decreasing resistance. It is also known as a photoresistor photoconductive cells or simply photocells.The main working of this system is when any object or a vehicle arrives near to the streetlight the streetlight will glow with hundred percent brightness.When a vehicle crosses the streetlight the streetlight brightness decreases to ten percent. Due to this process the power consumption decreases.Another major working of this system is by using IOT technology the readings of temperature,humidity, and carbon monoxide readings will be uploaded to things speak server by the connection of WIFI module to the system. The readings of the humidity,temperature and carbon monoxide will be displayed on the 16X2 LCD.

IV. CONCLUSION

This model is used to switch OFF and ON the street lights automatically. when the vehicle or any object arrives near the street lights, also continuously monitor the temperature, humidity, and carbon monoxide readings on the roads and display them on the LCD, and upload these readings to the things speak server.

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