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IOT BASED DYNAMIC CONTROL O STREET LIGHTS FOR SMART CITY

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ABSTRACT:

The Word Smart is an acronym for the 5 elements of specific, measurable, achievable, relevant, and time-based. IOT describes the large and growing set of digital devices as now numbering in the billions which operate across networks of potentially global scale. As the world is growing a bit faster people are being attracted to this word smart. India is one of the fastest growing economies in the world taking this as a factor we are implementing a switch to smart technique - Namely Smart street light system. The manual streetlight system lights powered from sunset to sunrise with maximum intensity even when power is available. The Saved energy can be utilized in various purposes like residential, commercial etc. This is done by using the LDR sensor. Considering the intensity of light, we can turn a light on/off. The power supply to the system is the main supply and converting them using a Relay. Every city need to have street light system which is essential. In order to save the energy, we are using the project through an IOT module. As there is a tremendous change in the world everything is changing into automation. This is a smart control and intelligent decision making devices based on accurate real time field data.

I.INTRODUCTION OF PROJECT

IOT meant to transmit data from the devices to master controller through gate ways & existing network structure. IOT market developments and analysis implies that unlicensed and licensed spectrums are essential. IOT system[1]operates with field sensors and data analyzing on the internet which can communicate them to share and transfer information using unique id assigned to every device. Automation plays an important role in the modern society and where IOT along with LoRa can help to fulfill the needs. For the Street lighting & Electrical systems due to the conventional on/off system there is a huge loss of electrical power noted and studies conducting in the area to minimize the power loss by various technology. Mobile based surveillance with web uses IOT cloud server used here for more energy conservation and early resolution in case of any fault detection. Lot of research is conducting in this field to minimize energy loss in remote locations by implementing user friendly applications. The main idea of this research is to develop an automated and controlled street light according to requirement the roads, pedestrians & Vehicles. A user friendly control system to monitor & control the lighting systems from remote locations with using IOT & LoRa can fulfill the requirements with minimal infrastructure cost by using the existing networks & un licensed radio frequencies. From remote locations, Field Sensor data can be transmitted to the master control stations through LoRa gateways, after reaching gateways signals will be transferred to the User end through existing network server & vice versa. Every gateway forwards the received packet from the end-node to the cloudbased network server via some backhaul either cellular,

Ethernet, satellite, or Wi-Fi. Hence the power consumption can be cut down by switching off the circuit when there is no requirement of lighting in particular area. Successful implementation of IOT & LoRa systems can bring lot of benefits in the fields of Home automation [2], Temperature Monitoring, patient health monitoring, Vehicle monitoring etc.

II. LITERATURE SURVEY

A public Street Lights & Electrical system in remote city locations consumes a lot of energy due to the unavailability of control devices due to the large setup cost. Presently most of street lamps turn on the street lights in night and turns off the street lights in day using LDR based control system [3]. Street lamp or Electrical systems still consumes a lot of electricity when there are few vehicles around or no people in the office due to the lack of monitoring and controlling based on the actual requirements [4]. For a wireless control monitoring system each street light must be equipped with different types of sensors that are connected to a microcontroller to monitor its environment with regards to its working needs like light intensity, current capacity, voltage load and temperature which are collected and transferred by the means of radio frequency communication

III.DESIGN OF HARDWARE

This chapter briefly explains about the Hardware. It discuss the circuit diagram of each module in detail.

ARDUINO UNO

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode. Arduino board has the following new features:

- 1.0 pin out: added SDA and SCL pins that are near to the AREF pin and two other new pins placed near to the RESET pin, the IOREF that allow the shields to adapt to the voltage provided from the board. In future, shields will be compatible both with the board that use the AVR, which operate with 5V and with the Arduino Due that operate with 3.3V. The second one is a not connected pin, that is reserved for future purposes.

- Stronger RESET circuit.

- Atmega 16U2 replace the 8U2.

"Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform; for a comparison with previous versions, see the index of Arduino boards.

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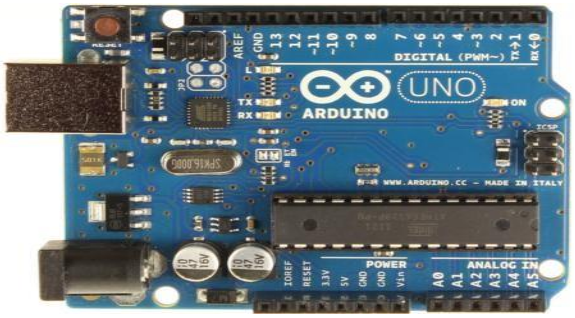


Fig: ARDUINO UNO

POWER SUPPLY:

The power supplies are designed to convert high voltage AC mains electricity to a suitable low voltage supply for electronic circuits and other devices. A power supply can by broken down into a series of blocks, each of which performs a particular function. A d.c power supply which maintains the output voltage constant irrespective of a.c mains fluctuations or load variations is known as "Regulated D.C Power Supply".

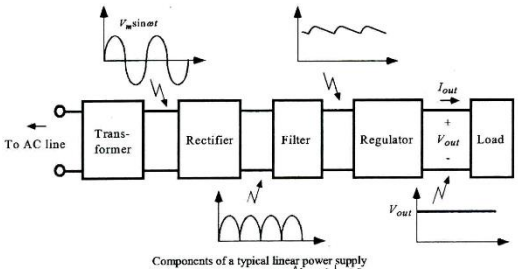


Fig: Block Diagram of Power Supply

LCD DISPLAY

A model described here is for its low price and great possibilities most frequently used in practice. It is based on the HD44780 microcontroller (Hitachi) and can display messages in two lines with 16 characters each. It displays all the alphabets, Greek letters, punctuation marks, mathematical symbols etc. In addition, it is possible to display symbols that user makes up on its own. Automatic shifting message on display (shift left and right), appearance of the pointer, backlight etc. are considered as useful characteristics.

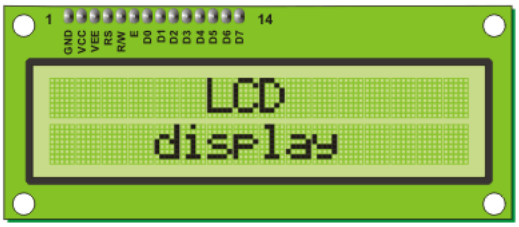
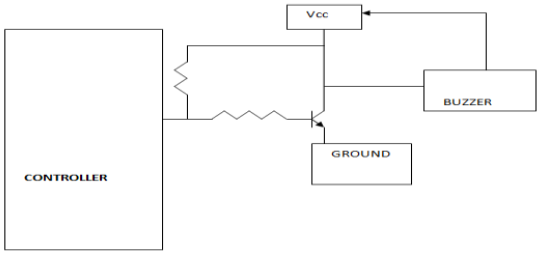


Fig: LCD

BUZZER

Digital systems and microcontroller pins lack sufficient current to drive the circuits like relays, buzzer circuits etc. While these circuits require around 10milli amps to be operated, the microcontroller's pin can provide a maximum of 1-2milli amps current. For this reason, a driver such as a power transistor is placed in between the microcontroller and the buzzer circuit.



WIFI MODULE:

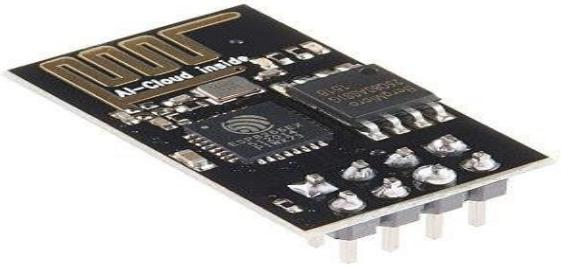
The **ESP8266** is a low-cost Wi-Fi microchip with full TCP/IP stack and microcontroller capability produced by Shanghai-based Chinese manufacturer, Espressif Systems.[1]

The chip first came to the attention of western makers in August 2014 with the **ESP-01** module, made by a third-party manufacturer, Ai-Thinker. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands. However, at the

time there was almost no English-language documentation on the chip and the commands it accepted.[2] The very low price and the fact that there were very few external components on the module which suggested that it could eventually be very inexpensive in volume, attracted many hackers to explore the module, chip, and the software on it, as well as to translate the Chinese documentation.[3]

The **ESP8285** is an ESP8266 with 1 MiB of built-in flash, allowing for single-chip devices capable of connecting to Wi-Fi.[4]

The successor to these microcontroller chips is the ESP32.



LED:

A light-emitting diode (LED) is a two-lead semiconductor light source. It is a p–n junction diode that emits light when activated.[5] When a suitable voltage is applied to the leads, electrons are able to recombine with electron holes within the device, releasing energy in the form of photons.

This effect is called electroluminescence, and the color of the light (corresponding to the energy of the photon) is determined by the energy band gap of the semiconductor. LEDs are typically small (less than 1 mm^2) and integrated optical components may be used to shape the radiation pattern.

Early LEDs were often used as indicator lamps for electronic devices, replacing small incandescent bulbs. They were soon packaged into numeric readouts in the form of seven-segment displays and were commonly seen in digital clocks. Recent developments have produced LEDs suitable for environmental and task lighting. LEDs have led to new displays and sensors, while their high switching rates are useful in advanced communications technology.

LEDs have many advantages over incandescent light sources, including lower energy consumption, longer lifetime, improved physical robustness, smaller size, and faster switching. Light-emitting diodes are used in applications as diverse as aviation lighting, automotive headlamps, advertising, general lighting, traffic signals, camera flashes, and lighted wallpaper. They are also significantly more energy efficient and, arguably, have fewer environmental concerns linked to their disposal.

IR SENSOR

Infrared is a energy radiation with a frequency below our eyes sensitivity, so we cannot see it Even that we can not "see" sound frequencies, we know that it exist, we can listen them.

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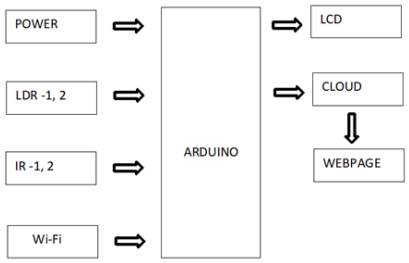
Even that we can not see or hear infrared, we can feel it at our skin temperature sensors. When you approach your hand to fire or warm element, you will "feel" the heat, but you can't see it. You can see the fire because it emits other types of radiation, visible to your eyes, but it also emits lots of infrared that you can only feel in your skin.

INFRARED IN ELECTRONICS

Infra-Red is interesting, because it is easily generated and doesn't suffer electromagnetic interference, so it is nicely used to communication and control, but it is not perfect, some other light emissions could contains infrared as well, and that can interfere in this communication. The sun is an example, since it emits a wide spectrum or radiation.

The adventure of using lots of infra-red in TV/VCR remote controls and other applications, brought infra-red diodes (emitter and receivers) at very low cost at the market.
From now on you should think as infrared as just a "red" light. This light can means something to the receiver, the "on or off" radiation can transmit different meanings.Lots of things can generate infrared, anything that radiate heat do it, including out body, lamps, stove, oven, friction your hands together, even the hot water at the faucet.

IV. BLOCK DIAGRAM:



V.CONCLUSION

This IOT based device surveillance and control system is exclusively used to keep surveillance on the electrical devices working condition and also to control the on/off functionality from a central remote location. The designed system works efficiently for both indoor and outdoor lighting. On the one hand it improves efficiency of the system by sending alert signal in case of any defect and on the other hand it drastically reduces the electric energy consumption by providing central control over the appliances. The graphical App based mobile controlling gives a user friendly and easily accessible platform to the user. This system can be installed as energy

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