Iot based Smart Street Light Management

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ABSTRACT

As urbanization has increased rapidly over the last few decades, city logistics and last-mile logistics have become active fields of research with applications in industry as well as academia. With the increase of road networks and vehicles, traffic congestion has become an enormous problem in all megacities in the world. During rush hours, it is very common for motorists to be stuck in long vehicle queue for several hours. Traffic congestion has huge impact on public health and national economies.

However, traffic congestion can be disastrous following a catastrophic event by disrupting the rescue and recovery operation and delaying the transportation of emergency deliveries. This project is automatic switching of Lights and to intimate vehicle movement with the help of IOT Module.

1.1 INTRODUCTION

Traffic lights, developed since 1912, are signalling devices that are formed to regulate the traffic flows at road intersections, pedestrian crossings, rail trains, and different locations. Traffic lights accommodates 3 varied coloured lights: the green light permits traffic to proceed within the indicated direction, the yellow light warns vehicles to prepare for slowdown, and also the red signal stops all vehicles from proceeding. The aim of this project is to resolve traffic congestion that could be a severe problem in several modern cities over the globe in efficient cost management. The present dynamic system employed in the developed country is just too much costly to install in real world. to resolve this drawback, we've designed a frame work for a dynamic traffic control system and developed a simulation model that facilitate to create the system in less price for developing

countries like India. Generally, every traffic signal on an intersection is appointeda constant green signal time. It's possible to propose dynamic time-based coordination wherever the green signal time of the traffic lights is allotted based on the current conditions of traffic. Each time while changing the status of signal according to our algorithm it'll automatically check for the emergency vehicles in its surrounding space which can help to indicate the alert for the usual traffic by special signal at the traffic light. This system additionally features a subsystem for emergency vehicles that uses a transmitter and receiver to clear the road for the emergency vehicle by setting the priority to that road, by that the signal set to green till vehicle passes from that junction

1.2 EXISTING SYSTEM:

Conventional traffic light system is based on fixed time concept allotted to each side of the junction which cannot be varied as per varying traffic density.

Junction timings allotted are fixed, Some times higher traffic density at one side of the junction demands longer green time as compared to standar

d allotted time.

2.1. BLOCK DIAGRAM

In this system we won't control the traffic and vehicle stolen in the metro cities and also emergency vehicles suffers here.

1.2.1 DISADVANTAGES:

Waiting time in signals are more

Chances for disobey traffic rules

1.3 PROPOSED SYSTEM:

In this project, IR sensor is used to detect the Vehicle to Turn ON the Street Light.

If it detects the Street Light will glow when the Vehicle detects at the IR Sensor.

If the Vehicle gets high movement, the Vibration Sensor will activated then the IoT Notification along with location will be Send through the Wi-Fi Module.

Also when the Vibration Sensor goes above the threshold limit Value the Motor also Stops to Stop the Vehicle.

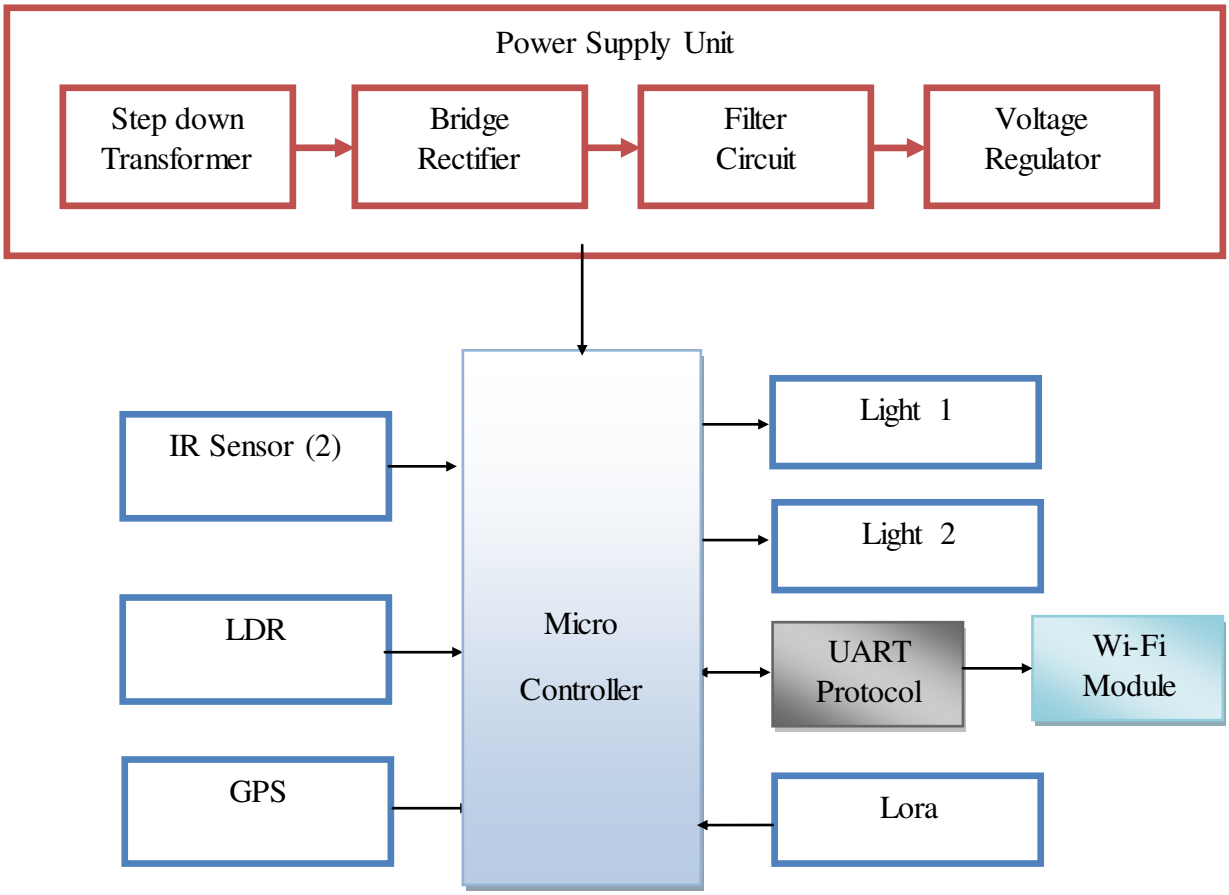
Depends upon LDR, the Street Light will glow on Night time.

1.3.1 ADVANTAGES:

Avoid unwanted Power Consumption.

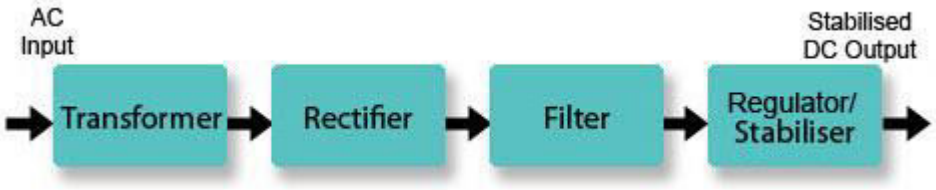
Accident can be Reduced

Economical and Important to all Vehicles.


Power Supply Unit
Step down Transformer
Bridge Rectifier
Filter Circuit
Voltage Regulator
IR Sensor (2)
LDR
GPS
Micro Controller
Light 1
Light 2
UART Protocol
Wi-Fi Module
Lora

2.2 MONITORING UNIT:

Power supply is a reference to a source of electrical power. A device or system that supplies



electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others.

Fig 3.1 Power Supply unit

2.3 HARDWARE REQUIREMENTS

- Microcontroller
- Power supply Unit
- IR sensors
- GSM Modem
- GPS
- LDR
- Lo-Ra-Transmitter
- Lo-Ra-Receiver

2.4 SOFTWARE REQUIREMENTS

- Arduino IDE
- Embedded C

3.1 POWER SUPPLY UNIT:

3.1.1 STEP DOWN TRANSFORMER

Basic power supply the input power transformer has its primary winding connected to the mains (line) supply. A secondary winding, electro-magnetically coupled but electrically isolated from the primary is used to obtain an AC voltage of suitable amplitude, and after further processing by the PSU, to drive the electronics circuit it is to supply.

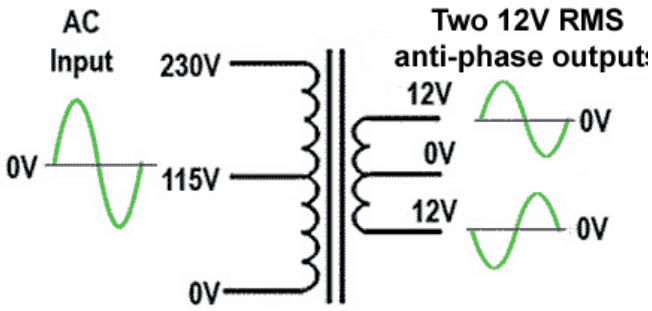


Fig 3.1.1 Step down Transformer

3.1.2 THE RECTIFIER STAGE

Rectifier circuit is used, to convert the AC input is converted to DC. The full wave bridge rectifier uses four diodes arranged in a bridge circuit to give full wave rectification without the need for a centre-tapped transformer. An additional advantage is that, as two diodes are conducting at any one time, the diodes need only half the reverse breakdown voltage capability of diodes used for half and conventional full wave rectification. The bridge rectifier can be built from separate diodes or a combined bridge rectifier can be used.

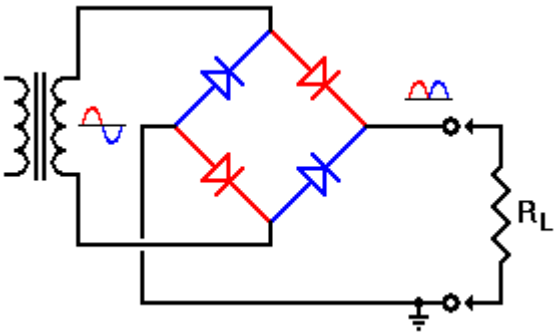


Fig 3.1.2 Bridge Rectifier

3.1.3 FILTER:

A typical power supply filter circuit can be best understood by dividing the circuit into two parts, the reservoir capacitor and the low pass filter. Each of these parts contributes to removing the remaining AC pulses, but in different ways.

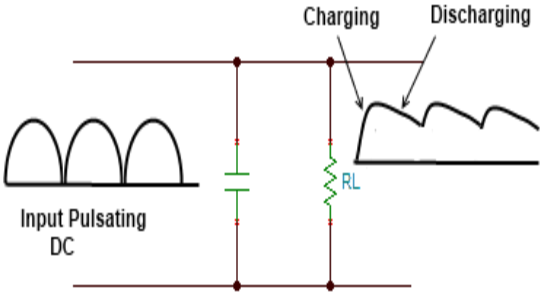


Fig 3.1.3 Filter Circuit

3.1.4 VOLTAGE REGULATOR:

Voltage regulator ICs are available with fixed or variable output voltages. They are also rated by the maximum current they can pass. Negative voltage regulators are available, mainly for use in dual supplies. Most regulators include some automatic protection from excessive current and overheating.

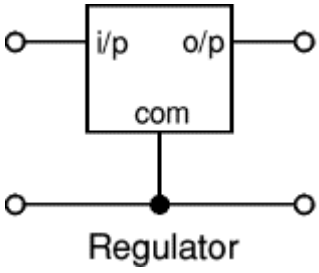


Fig 3.1.4.1 Regulator Circuit

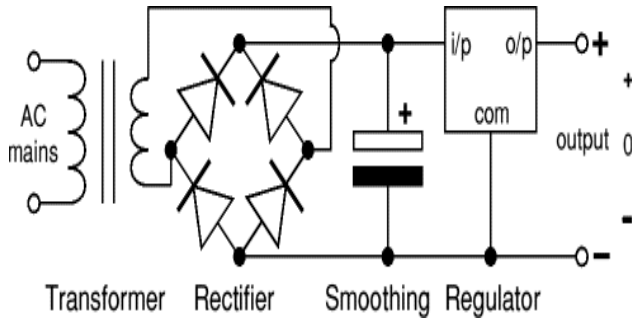


Fig 3.1.4.2 Power Supply Circuit

3.2 ARDUINO UNO

An Arduino is actually a microcontroller based kit which can be either used directly by purchasing from the vendor or can be made at home using the components, owing to its open source hardware feature. It is basically used in communications and in controlling or operating many devices. It was founded by Massimo Banzi and David Cuartielles in 2005.

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, 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.

3.3 LED

Light Emitting Diodes (LEDs) are the most widely used semiconductor diodes among all the different types of semiconductor diodes available today. Light emitting diodes emit either visible light or invisible infrared light when forward biased. The LEDs which emit invisible infrared light are used for remote controls.

A light Emitting Diode (LED) is an optical semiconductor device that emits light when voltage is applied. In other words, LED is an optical semiconductor device that converts electrical energy into light energy.

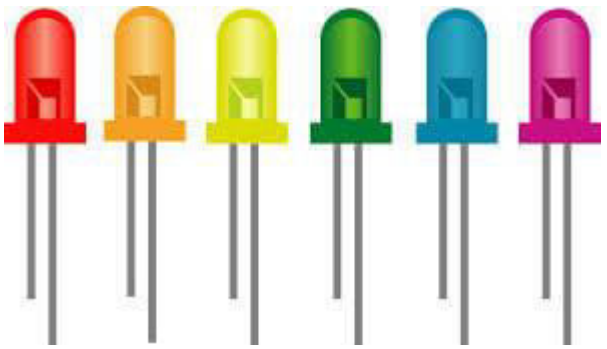


Fig 3.3.0 LED

3.4 UART

The Universal Asynchronous Receiver/Transmitter (UART) controller is the key component of the serial communications subsystem of a computer. UART is also a common integrated feature in most microcontrollers. The UART takes bytes of data and transmits the individual bits in a sequential fashion. At the destination, a second UART re-assembles the bits into complete bytes.

Serial transmission of digital information (bits) through a single wire or other medium is much more cost effective than parallel transmission through multiple wires. Communication can be "full duplex" (both send and receive at the same time) or "half duplex" (devices take turns transmitting and receiving).

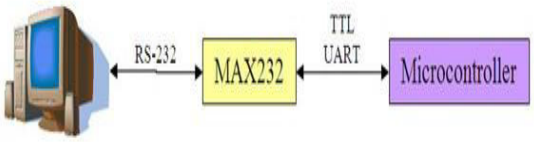


Fig 3.4.0 UART

3.5 GSM:

GSM is a mobile communication modem; it is stands for global system for mobile communication (GSM). The idea of GSM was developed at Bell Laboratories in 1970. It is widely used mobile communication system in the world. GSM is an open and digital cellular technology used for transmitting mobile voice and data services operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands.

Fig 3.5 GSM MODEM

3.6 IR SENSOR

Infrared sensors are the most often used sensor by amateur robots. Understanding how they behave can help address many of your requirements and would suffice to address most of the problem statements for various robotics events in India. Be it a typical white/black line follower, a wall follower, obstacle avoidance, micro mouse, an advanced flavor of line follower like red line follower, etc, all of these problem statements can be easily addressed and granular control can be exercised upon your

robots performance if you have a good operational understanding of Infrared sensors.

3.7 LDR

A Light Dependent Resistor (LDR) or a photo resistor is a device whose resistivity is a function of the incident electromagnetic radiation. Hence, they are light sensitive devices. They are

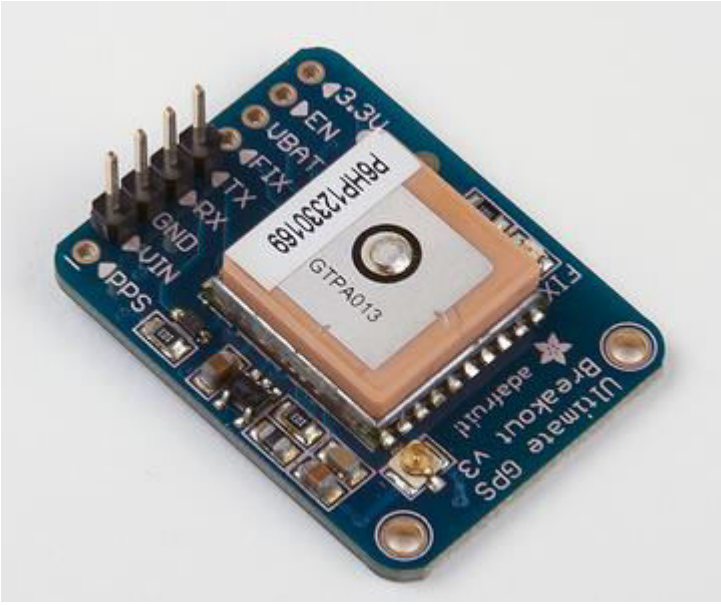
also called as photo conductors, photo conductive cells or simply photocells. They are made up of semiconductor materials having high resistance.

3.8 GPS

GPS stands for Global Positioning System and was developed by the US Department of Defence as a worldwide navigation and positioning facility for both military and civilian use. It is a space-based radio-navigation system consisting of 24 satellites and ground support. GPS provides users with accurate information about their position and velocity, as well as the time, anywhere in the world and in all weather conditions.

Navigation in three dimensions is the primary function of GPS. Navigation receivers are made for aircraft, ships, ground vehicles, and for hand carrying by individuals. GPS provides specially coded satellite signals that can be processed in a GPS receiver, enabling the receiver to compute position, velocity and time.

Good GPS receivers can calculate their position, anywhere on earth, to within one hundred metres and can continuously update their position more than once a second. Of course, various factors, such as terrain and atmospherics can affect the GPS signals. In spite of this however, accuracy of one hundred metres for GPS will commonly be exceeded.



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