

Iot Base Detection of Faulty Street Lamp and Smart Street Light System

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ABSTRACT: This project aims at designing and executing the advanced development in embedded systems for energy saving of street lights and increasing the security on the streets, data sharing, and surveillance of the respective areas. Nowadays, human has become too busy, and is unable to find time even to switch the lights wherever not necessary. The present system is like, the street lights will be switched on whenever the presence of human is detected on the road. For this, IR sensor will be used in this project. This project gives the best solution for electrical power wastage. Also the manual operation of the lighting system is completely eliminated. Along with this, to solve the issues regarding woman's safety, a switch will be provided on the pole of the street light. When someone is in danger, that person just need to reach upto that switch and press it once. That switch will be further connected to microcontroller. When the command is received by ESP32 microcontroller, it will send live location and messages to the end user. It may be Police station or parents. Simultaneously, the image of suspicious activity will be captured by the IP camera (ESP32 module) mounted on the pole of Street light. Thus, project works together for maintaining security of women as well as minimizing energy consumption using solar panels.

I. INTRODUCTION

With the intensification of energy crisis all over the world, all the countries are looking for the way to solve this serious problem. One way is to search the new energy and take advantage of the renewable energy. Solar energy is the most direct, common, and clean energy on our planet we have already found until now. The proposed system uses solar energy for overall operation of Street lighting. In addition, the proposed street lighting system does not require complicated and entrenched wiring systems unlike those presently being utilized today. The project at hand can be easily installed and moved and delivers free renewable

energy which is stored in a battery ready to be used when darkness falls. This system has the capability of real time flow control. These sensors are connected to the microcontroller in which data has been processed and adjust the lighting levels. Whenever the passer is identified by sensor, it will communicate to neighboring street lights, which will brighten the surrounding lights. The Street lights will dim to low voltage level when no activity is identified and brightens to high voltage level when movement is detected.

This project provides a simple mechanism of switch will be available on the road side pole, which will be connected directed to the police control room or local police station through and microprocessor. The smart street pole, which will be having a Panic button linked with a camera, LED bulb, and microcontroller ESP32. Whenever, someone becomes the victim or witness any crime near the road side (in an empty road specially), it will be very easier for her/ him to reach out to the police station with in fraction of seconds by those street pole switches, just by a simple click. The clicking button will give access with co-ordinate system through microcontroller ESP32 on the monitor of police control room so that the nearby police can reach out there and search over there within few radii of the smart pole. This program is giving real time response with certain programming module which provides quick access.

II. METHODS

Now-a-days, the two major problems regarding energy consumption and safety of pedestrians during night period are to be given special focus on. As crimes like robbery, kidnapping, etc. occur more during the night period when women, children or aged people walks through the street. They must feel secure. For this, we are developing a system which will be microcontroller based and will be having an IP camera attached to it. So that, crime or suspicious activity will be captured by the camera and will be

proof in the police station. Along with this, energy consumption is a need of time. Here, we will be using IR sensors, so street lights will be ON only when presence of anything is detected. This will

minimize total energy consumption by street lights at great extent.

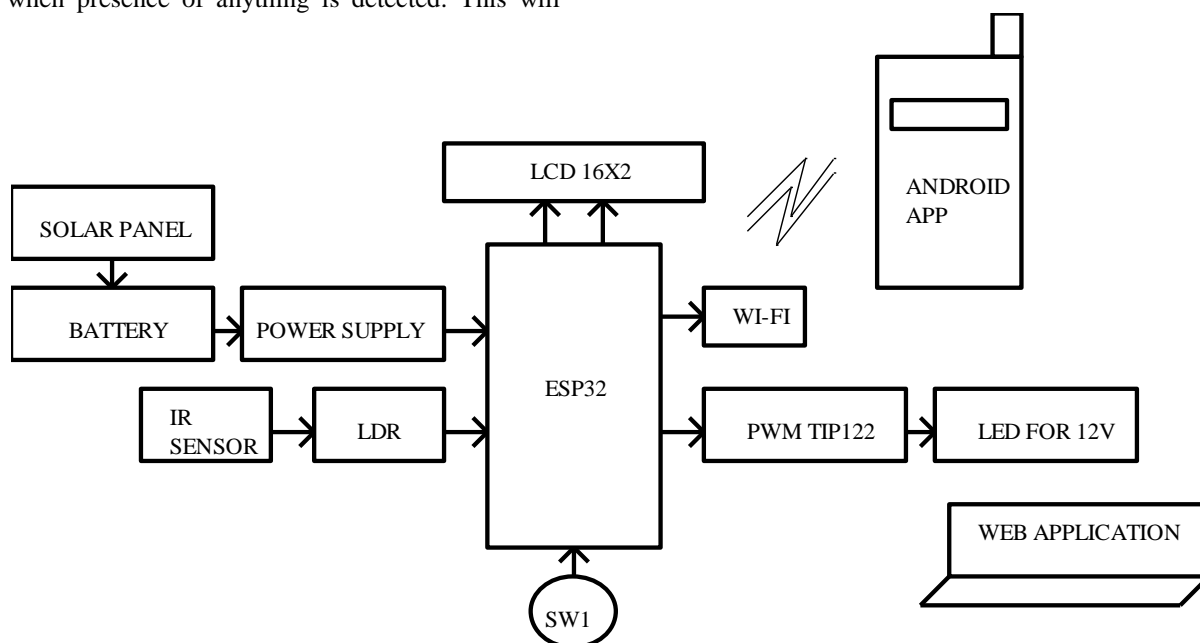


Fig.1 Block Diagram of the system

I. Solar Panel

Solar panels are those devices which are used to absorb the sun's rays and convert them into electricity or heat. A solar panel is actually a collection of solar (or photovoltaic) cells, which can be used to generate electricity through photovoltaic effect. These cells are arranged in a grid-like pattern on the surface of solar panels. Thus, it may also be described as a set of photovoltaic modules, mounted on a structure supporting it. A photovoltaic (PV) module is a packaged and connected assembly of 6×10 solar cells.

II. Battery

Lithium-ion batteries are the most common type of battery used in today's mobile devices—including laptops and tablets. These batteries charge quickly, discharge at a steady rate, and they have high-energy density that allows for small cell sizes in batteries.

III. IR Sencor

An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment. Infrared radiation was accidentally discovered by an astronomer

IV. IDR Sencor

Photoresistors, also known as light dependent resistors (LDR), are light sensitive devices most often used to indicate the presence or absence of light, or to measure the light intensity. In the dark, their resistance is very high, sometimes up to 1 MΩ, but when the LDR sensor is exposed to light, the resistance drops dramatically, even down to a few ohms, depending on the light intensity. LDRs have a sensitivity that varies with the wavelength of the light applied and are nonlinear devices. They are used in many applications, but this light sensing function is often performed by other devices such as photodiodes and phototransistors. Some countries have banned LDRs made of lead or cadmium over environmental safety concerns.

V. ESP32

ESP32 can perform as a complete standalone system or as a slave device to a host MCU, reducing communication stack overhead on the main application processor. ESP32 can interface with other systems to provide Wi-Fi and Bluetooth functionality through its SPI / SDIO or I2C / UART interfaces.

VI. PWD TIPi122

The TIP122 is a Darlington pair NPN transistor. It functions like a normal NPN

transistor, but since it has a Darlington pair inside it has a good collector current rating of about 5A and a gain of about 1000. It can also withstand about 100V across its collector- Emitter hence can be used to drive heavy loads. The Darlington pair inside this transistor is shown clearly as its internal circuit schematic below

VII.LED

A light-emitting diode (LED) is a semiconductor device that emits light when current flows through it. Electrons in the semiconductor recombine with electron holes, releasing energy in the form of photons.

VIII. Android

Android is a mobile operating system based on a modified version of the Linux kernel and other open-source software, designed primarily for touchscreen mobile devices such as smartphones and tablets. Android is developed by a consortium of developers known as the Open Handset Alliance and commercially sponsored by Google. It was unveiled in November 2007, with the first commercial Android device, the HTC Dream, being launched in September 2008. Most versions of Android are proprietary. The core components are taken from the Android Open Source Project (AOSP), which is free and open-source software (FOSS) primarily licensed under the Apache License. When Android is installed on devices, ability to modify the otherwise FOSS software is usually restricted, either by not providing the corresponding source code or preventing reinstallation through technical measures, rendering the installed version proprietary. Most Android devices ship with additional proprietary software pre-installed,[4] most notably Google Mobile Services (GMS)[5] which includes core apps such as Google Chrome, the digital distribution platform Google Play, and associated Google Play Services development platform.

IX. Web app

A Web application (Web app) is an application program that is stored on a remote server and delivered over the Internet through a browser interface. Web services are Web apps by definition and many, although not all, websites contain Web apps. According to Web.AppStorm editor Jarel Remick, any website component that performs some function for the user qualifies as a Web app. Web applications can be designed for a wide variety of uses and can be used by anyone;

from an organization to an individual for numerous reasons. Commonly used Web applications can include webmail, online calculators, or e-commerce shops. Some Web apps can be only accessed by a specific browser; however, most are available no matter the browser.

III. FUTURE SCOPE

We can add emergence ambulance button
We can add air pollution sensor that will help us to get the data for perdition of air pollution and take the action

IV. RESULT

The system will help to reduce the crime in that area the system is work on solar energy our system save the energy and it is not waste the Electricity people feel save and it inform the munshi party office which light is fault and which light is clear and working properly people will not afraid to come out in the night because there is light there is safety we add the gas sensor which help in industrial area the gas is leak and warning alarm after 6PM the light will automatically get ON

At average speed i.e the valve opening or closing time is 40ms

For 1 sec 25 openings and closings is possible

For 1 min for one valve $25 \times 60 = 1500$

With a force of 1.31N the inlet valve opens for 1500 times and exhaust valve opens fo 1500 times.

V. CONCLUSION

This paper proposes a street lighting management system consisting of one Web-based cloud management platform, one set of edge devices (a single-board computer, a microcontroller, sensors, and an IP camera), and the real-time lighting control function. The system can provide street pole information to the user in real-time and three major functions, including the historical data query API, which has been verified and discussed in detail. We put forward a novel architecture differing from that of the existing street lighting management systems. The architecture integrates the container-based virtualization technology, Docker, to provide a strong and highly scalable solution to the deployment of the cloud and edge services. Furthermore, our design protects the communication between the edge and the cloud, including token authentication and SSH-based encryption (with public key authentication). In general, the proposed system is modular, scalable, easy to deploy, and security-oriented. Therefore, this system has a high commercial value.

It is suggested that future studies explore the development of some smart applications and integrate them into our system. For instance, the machine learning algorithm can be applied to the development of a smart lighting control mechanism based on the environment data provided by the sensors. Besides, the neural network can be integrated into edge devices through the IoT edge devices installed on light poles to execute low-latency AI applications, such as real-time target detection (e.g. pedestrian or vehicle detection). As a result, the application value of this system architecture will be raised.

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