INTELLIGENCE POWER GENERATION AND AN OPTIMAL LIGHTING SYSTEM

[1]Akshay R Narayanakar, [1]Anvitha T R., [1]Archana G S., [1]Poornima, [1]Shivangi G R., [2]Mrs. Latha B.M.

[1]8th Semester Students, [2]Assistant Professor
Department of ECE, GMIT, Davanagere

Abstract: This project aims for designing and executing the advanced development in embedded systems for energy saving of street lights. Currently we have a manual system where the street lights will be switched ON in the evening before the sunsets and they are switched OFF in the next day morning after there is sufficient light on the outside. But the actual timing for these lights to be switched ON is when there is absolute darkness. With this, the power will be wasted up to some extent. This project gives solution for electrical power wastage. Also the manual operation of the lighting system is completely eliminated. The proposed system provide a solution for energy saving. This is achieved by sensing and approaching a vehicle using ultra sonic sensor. Upon sensing the movement the sensor transmit the data to the computer which furthermore the Light to switch ON. Similarly as soon as the vehicle or an obstacle goes away the Light gets switched OFF as the sensor sense any object. At the same time the status (ON/OFF) of the street light can be accessed from anywhere and anytime through internet. This project is implemented with smart embedded system which controls the street lights based on detection of vehicles or any other obstacles on the street. Whenever the obstacle is detected on the street within the specified time the light will get automatically ON/OFF according to the obstacle detection. The real time information of the street light (ON/OFF Status) can be accessed from anytime, anywhere through internet.

Keywords: Internet of Things, sensors, Thingspeak, cloud computing, security monitoring

1. INTRODUCTION

The street lighting is one of the largest energy expenses for a city. An intelligent street lighting system can cut municipal street lighting costs as much as 50% - 70%. An intelligent street lighting system is a system that adjusts light output based on usage and occupancy, i.e., automating classification of pedestrian versus cyclist, versus automotive. An intelligent street light management proposes the installation of the wireless based system to remotely track and control the actual energy consumption of the street lights. The street light controller should be installed on the pole lights which consist of microcontroller along with various sensor and wireless module. The street light controller installed on the street light pole will control led street lighting depending on traffic flow, communicate data between each street light. The data from the street light controller can be transferred to base station using wireless technology to monitor the system. The control system will switch on-off the lights at required timings and can also vary the intensity of the street light according to requirement. Our work aims at unification of the these prospects, making an intelligent street lighting system, which uses high power LEDs, and using solar energy as the alternative energy. The proposed method is implemented using raspberry pi.
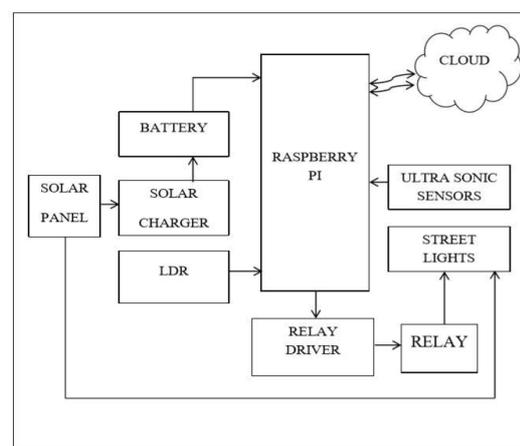
2. BLOCK DIAGRAM AND DESCRIPTION

Fig: Block diagram

Fig 1: Block Diagram of Intelligence power generation and optimal lighting system.

3. SYSTEM IMPLEMENTATION

Fig 3.1.Ultrasonic sensor

The project aims were to reduce the side effects of the current street lighting system, and find a solution to save power. In this project the first thing to do, is to prepare the inputs and outputs of the system to control the lights of the street. It has been implemented and works as expected and will prove to be very useful and will fulfill all the present constraints if implemented on a large scale. In this project power supply will be from Solar panel. Solar panel cannot be directly connected to electronic kit due to variations in supply. Supply from the panel is saved in battery then supplied to electronic kit. LDRs are light dependent devices whose resistance decreases when light falls on them and increases in the dark. When a light dependent resistor is kept in dark, its resistance is very high and it turns on LED. The vehicle which passes by the street light is detected and measures its distance by using ultra sonic sensor .Relay are used as a switch to switch on/off the street light bulb. cloud computing provides us to stores the information about the status of lights and distances between obstacles ,even if any changes in the matters like distances ,intensity time are also added for further process and analysis.

An Ultrasonic sensor is a device that can measure the distance to an object by using sound waves. It measures distance by sending out a sound wave at a specific frequency and listening for that sound wave to bounce back. By recording the elapsed time between the sound wave being generated and the sound wave bouncing back, it is possible to calculate the distance between the sonar sensor and the object.

Fig 3.2: IR Sensor

An infrared sensor is an electronic instrument which is used to sense certain characteristics of its surroundings by either emitting and/or detecting infrared radiation. Infrared sensors are also capable of measuring the heat being emitted by an object and detecting motion.

Fig 3.3: Web Cam

The term webcam is a combination of "Web" and "video camera." The purpose of a webcam is, not surprisingly, to broadcast video on the Web. Webcams are typically small cameras that either attach to a user's monitor or sit on a desk. Most webcams connect to

the computer via USB.
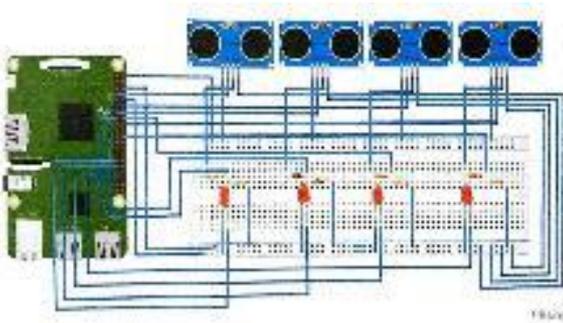
Fig 3.4: Interfacing of ultrasonic sensor and LED's with Raspberry pi.

The above diagram shows the interface of the IR sensor and ultrasonic sensors with the Raspberry pi kit.
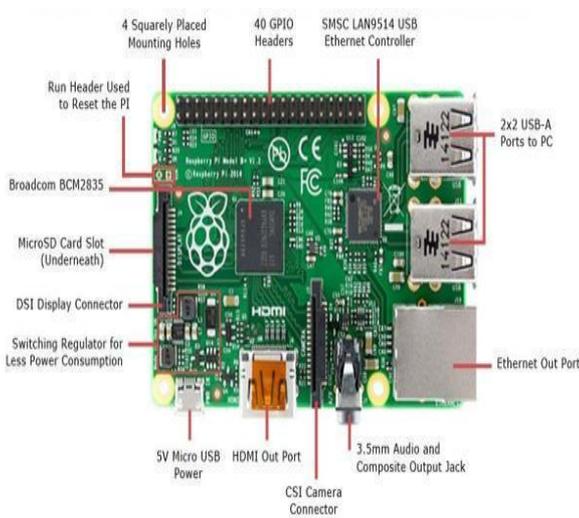
Fig 3.5: pin Raspberry Pi 3 Model Board

Raspberry pi is a mini computer that can be plugged with monitor or TV, a keyboard and a mouse. This small device is used by people of all ages to learn and explore computing. Pi can be used to learn python and scratch programming. It is capable of doing everything from browsing the internet, playing video and games. The raspberry pi has the ability to interact with the real time applications, and is used in different projects, like weather stations, gaming, etc.

Fig 3.6: Thingspeak Cloud Storage

ThingSpeak is an open source Internet of Things (IOT) application and API to store and retrieve data from things using the HTTP protocol over the Internet or via a Local Area Network. ThingSpeak enables the creation of sensor logging applications, location tracking applications, and a social network of things with status updates. It is especially useful for smaller hardware projects where connectivity over the Internet is required but in which the maintenance of a dedicated communication server is not practical.

Alternative IOT services exist but tend to require payment for some of their functionality and are consequently not open source. ThingSpeak is a platform providing various services exclusively targeted for building IOT applications. It offers the capabilities of real-time data collection, visualizing the collected data in the form of charts, ability to create plugins and apps for collaborating with web services, social network and other APIs.

4. SYSTEM FLOWCHART
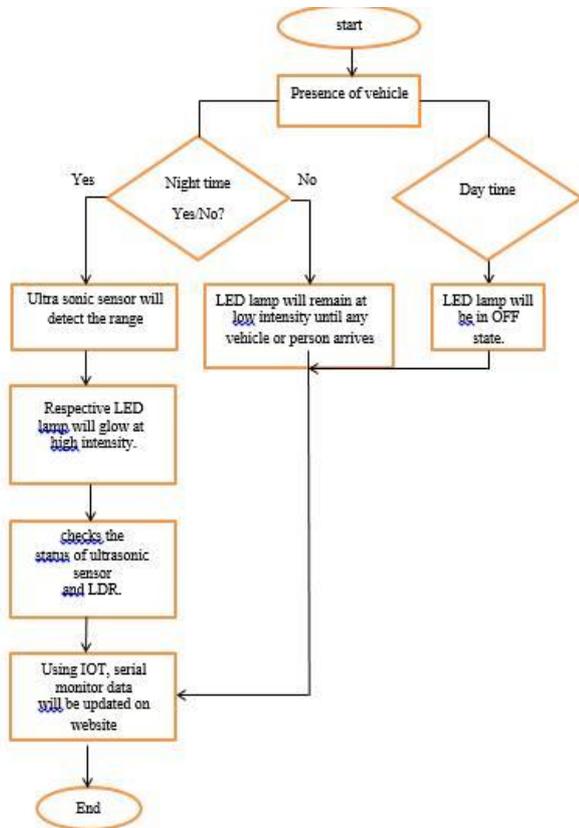
The above flowchart shows the complete illustration working of the project.

5. RESULT

The analysis of the result is obtained as per expected. The street lights on, during night with little brightness and as soon as any moving object is detected in the ultrasonic sensor range the brightness increases to 100 percent and when the object moves out of the sensor range the brightness decreases. As there are many street lights the records are being saved using Raspberry pi to cloud storage (Thingspeak). The cameras are used to record criminal activities if any happened and to record the traffic rule breakers where it captures the images of the vehicles and forwards it to the destination saved.

Fig 5.1: Snap shots of the ultrasonic distance measurement

Fig 5.2: Android application

Android is a mobile operating system developed by Google, based on the Linux kernel and designed primarily for touchscreen mobile devices such as smartphones and tablets. Android's user interface is mainly based on direct manipulation, using touch gestures that loosely correspond to real-world actions, such as swiping, tapping and pinching, to manipulate on-screen objects, along with a virtual keyboard for text input. A gadget is just a gadget. However, with the right app to and software to help it run and perform different tasks, it becomes much more. Apps are what make it possible to use IOT devices. Android is currently the world's largest app platform.

6. CONCLUSION AND FUTURE SCOPE

The use of Power Electronics is increasing exponentially across various sectors of human life. The components used in this project, like raspberry pi and sensors are slowly becoming an indispensable part of our daily routines. So, it is only fitting that we use then to improve in every walk of life. Keeping in mind the urgent need for energy conservation. Intelligent power generation and an optimal lighting system with IOT is an excellent and effective solution. It combines safe lighting protocols with consumption of the monomial amount of power The energy savings, as discussed before are phenomenon. The future scope of this project expands into speed detection and customizable area of illumination. An Additional component which would lead to better functioning of the concept would be the use of LED bulbs. Despite their high initial costs, they are a viable option as they drastically reduce the power consumption. They will Aid further saving of energy and reduction in operational costs.

REFERENCES

[1]Archana. G, Aishwarya N, Anita J "Intelligent Street Light System" International Journal of Recent Advances in Engineering & Technology, Vol-3, Issue-4, 2015.

[2]J.Sherly1, D.Somasundareswari "INTERNET OF THINGS BASED SMARTTRANSPORTATION SYSTEMS" International Research Journal of Engineering and Technology Volume: 02 Issue: 07 | Oct-2015

[3]Akshay Balachandran, Murali Siva, V. Parthasarathi, Surya and Shriram K. Vasudevan "An Innovation in the Field of Street Lighting System with –p, Cost and Energy Efficiency Indian Journal of Science and Technology, Vol-8, August 2015

[4]Deepanshu Khandelwal, Bijo M Thomas, Kritika Mehndiratta, Nitin Kumar "Sensor Based Automatic Street Lighting system" International Journal of Education and Science Research Review Volume-2, Issue-2 April- 2015.

[5] Bezbradica M,Trpovski Z,"Advanced street light maintenance using GPS, light intensity measuring and incremental cost effectiveness ratio", International conference on High Peformance Computing andSimulation,2014.