Automated Street Lighting System

T. Santhi Sri, Rajesh Varma, V VS. Hari Krishna, K. Varun Chowdary

Abstract: Smart Street light is a robotized framework which automate the road. The primary point of Smart Street light is to reduce the power utilization when there are no vehicle moments on road. The Smart road light will turn to be ON when there are vehicles out and about generally the lights will be turned OFF. With improvement in technology, things are getting to be easier and simpler for everybody around the world today. Robotization is the utilization of control frameworks and information technologies to decrease the requirement for human work in the production of services and enterprises. In the extent of industrialization, robotization is a stage past mechanization, though motorization gave human operators apparatus to help the clients with the solid prerequisites of work, robotization enormously diminishes the requirement for human sensory and mental requirements also. Automation play a vital job on the world's economy and in day by day experience. Programmed frameworks are being favored over manual framework. The experimental work demonstrates programmed control of streetlights because of which control is spared to a degree. The Smart road light gives an answer for energy recusing and saving which is accomplished by detecting a moving toward vehicle utilizing the IR sensors and after that exchanging ON a block of road lights in front of the vehicle. As the vehicle moves by, the street lights turn OFF naturally. Subsequently, we save a great deal of energy. So at the point when there are no vehicles on the roadway, at that point every one of the lights stay OFF

Index Terms: IR(infrared motion sensor),LDR(Light dependent resistor),LED(light emitting diode),HID(High intensity Discharge lamps).

I. INTRODUCTION

Internet of Things (IoT) is the networking of physical objects that contain electronics embedded within their architecture in order to communicate and sense interactions amongst each other or with respect to the external environment. In the upcoming years, IoT-based technology will offer advanced levels of services and practically change the way people lead their daily lives. Advancements in medicine, power, gene therapies, agriculture, smart cities, and smart homes are just a very few of the categorical examples where IoT is strongly established.

With increment in urbanization and improvement of the city life, the utilization of street lighting is expanding day by day.

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For the street lightening, it has kept forward higher necessities. Basically, a typical road lights does not keep up the power consequently.

When the lights are on it will dependably stay on until any labor turns off them. So that the support and the financial consumption utilization is more. It might require checking the board frequently. The inadequacies of conventional street lighting frame work not only convey monitory burden to the nearby money related part. Yet in addition it confines the administration and upkeep of the lighting system which leads to the inconvenience to the public since several lights aren't glowing and complaints for them hasn't been made. The advancement of green lighting is basic. An emerge among the most fundamental human advancement records is the improvement of a drop transportation association. These streets and roads must be ideally lit up with the target that an adequate perceivable quality is ensured to diminish the fiasco rate and expansion of the snapshot of vehicle.

To solve these problems, a solution is developed with the help of solar energy to develop the street lights, to connect them with the solar panels like photovoltaic panels (PV). To gather the energy from sun PV panels are used. These panels are associated with group of batteries and also with a charge controller. In the interim of day time the energy that is obtained from sun can be saved to these batteries in the course of electrical energy. At the end of the day the gathered energy can be made available with the help of batteries during the entire night. Make a point that at night time also there is a chance of wastage of energy whenever there is no traffic on the streets. To avoid this case, the motion sensing circuit can be used to make use of energy to make the street lights glow. This situation can be distinguished with the assistance of the PIR sensors. We are also adding the dust circuits to the entire setup which are used to clean the PV panel from the outside obstacles or dust particles which affects the top surface of solar panel.

Thus, the paper basically has three outputs to discuss, first that the street lights must get electricity so that there are connected to the rechargeable battery which will energize in day time with the help of day light. Secondly, Street lights are attached with a resistor sensor which dependent on light that will help change them on and off by its own nature. For example, if the detection of LDR is daytime then the street lights gets turned OFF automatically and the detection of LDR is night time then the street lights get turned ON automatically and remains ON for the entire night without the closeness of individuals or vehicle. By cause of this, there is an imaginable wastage of power. To eliminate this wastage of power or electricity a new setup contains automation of street lights to glow ON/OFF based on the traffic on the streets and glows with low severity of 50% at night time to look after battery from reducing the charging of MPPT charge controller, secondly

that the LEDS lightening will be controlled by three parameters which are timely based, light intensity and also the available vehicle

. The light sensors will detect the nearness of light capacity and inactive infrared PIR movement sensor will be utilized to distinguish movement. Lastly, because of dust, regularly solar panels lost 70% of efficiency.

Dust circuit is employed to clean the solar panels once a month. However, this avenues and streets are enlightened always for over 13 hrs every day. Formidable measure of electrical energy is required to light every one of these avenues and streets. Around 30% of the aggregate electrical energy of any country is used in lightening the streets and the lanes.

The speed breakers, paths and roadways must be adequately enlightened so that an acceptable perceivable quality is ensured with a specific extreme target to restrain the disaster or the accident rate and increment the stream of the vehicles and security. Be that as it may, these avenues and streets are lit up always for over 13 hours day by day. For this it requires an endless measure of electrical vitality to light each one of the roads and avenues. The spending cost for the vitality is high. Furthermore, condition contamination by the transmitted CO_2 is moreover high. That explains estimated number of Kilowatts every year, estimated yearly power cost for streetlights, estimated yearly CO_2 outflows because of streetlights for the number of residents available in the cities. In the course of most recent years, LED road lights have transformed into genuine items that one can see out and about. They bode well for some reasons, for example, their minimized size, high viability (lumens per watt), life span, and vigour. Driven sources additionally take into account intriguing new structure frames, regularly with slimmer profiles than conventional metal halide circular segment lights. Driven is viewed as a promising answer for current road lighting framework because of its conduct and focal points as underscored. Aside from that, the upsides of LED are probably going to supplant the customary road lights, for example, the brilliant light, fluorescent light and High-Pressure Sodium Lamp in future. However, LED innovation is an incredibly troublesome procedure that requires a mix of cutting-edge creation lines, top quality materials and high-accuracy fabricating process. Along these lines, this paper features the vitality effective of road lighting configuration utilizing LED lights through clever sensor interface for controlling and overseeing. The first commitment of this theory is to structure of a streetlight hub dependent on which the framework can be set to keep running in programmed mode, which control streetlight as per Sunrise and Sunset Algorithm and light power. This control can make a sensible change as indicated by the regular variety.

I. LITERATURE SURVEY

Some authors mentioned the use of LED DC road lights as opposed to conventional AC lights in view of their longer lifespan, higher effectiveness, lower support costs and mercury free, thus eco-friendly. Some others suggested that changing lights with LED will save 50% energy from the street lights. To control and manage the street lights several new technologies are being developing as of what many research endeavors in the writing talk about.

Tang, Hengyu [1] proposed a control core framework based on AT89S52 which controls street lights. This framework combines the various technologies of LCD, digital clock and a timer, photosensitive induction etc. when vehicles crossed by to conserve electricity the lights will turn on and vice versa. With this technology a large amount of power can be saved. In order to get the details of spoiled light and its information an auto-alarm function is used in this framework.

Xudan, Siliang [2] came up with a system with wireless sensor networks frame work to observe the progress. Based on latitude and longitude information the system is adjusted. Using sunset and sunrise procedures and the information of light intensity the system controls the street lights being kept in automatic programming mode. The system in addition makes use of digital temperature humidity sensor to humidity, real time and temperature of street lights.

Priyasree and Radhi [3] nominated control arrangement for a LED road lighting framework. The proposed control organization empowers disconnection of the road lighting framework from the mains amid pinnacle load time, lessening its effect in the distributed power framework natural utilization, decline the administration cost and screen the status data of every road lighting unit. A.C. Kalaiarasan [4] volunteered a solar powered vitality-based road light with auto-following framework for augmenting power yield from a solar system that is desirable to increase the efficiency. So as to expand the power yielded from the sun light-based boards, one needs to keep boards lined up with the sun. by utilizing this approach, we can gain the maximum utilization from sun rays. This is a far most financially savvy arrangement than buying extra solar panels.

Budike. E.S. Lothar [5] invented a lightening control system consisting of modules like ballast control module, data processing module. The data processing module is connected with number of repeaters. The connections between data processing module, ballast module, repeaters and computer system through wireless connection comprises of a local area network. This system is developed to give the benefits of operating and controlling light intensity, automatic running of street lights and scheduling through web browser.

S.H. Jeong [6] set forth the development of Control System for street lights using Zigbee communication system. This system is presented in order to reduce the difficulties in maintenance of the lighting systems as well as to decrease the uneasiness of handling the same. This is monitoring and control system of street lights which makes use of system's control command to make the street lights on and off automatically. Rajput and katav [7] propounded an intelligent street lighting system to lessen the large amounts of power wasted in street lightening system. This system makes use of different kind of sensors like CO_2 sensor, noise sensor, light intensity sensor etc. To receive and send data between concentrator and system GSM modules are utilized.

Somchai Hiranvarodom [8] describes a similar analysis of photovoltaic (PV) road lighting framework in three distinct lights. To be specific, a low weight sodium light, a high weight sodium light and a fluorescent light have been utilized for establishment in every pole to decide the reasonable framework to introduce in a regular provincial zone of Thailand.

II. EXISTING SYSTEM

Industry of road lighting frameworks are developing quickly and going with fast development of industry and urban areas. Mechanization, Power utilization and Cost Effectiveness are the imperative contemplations in the present field of gadgets and electrical related advances. To administer and keep up complex road lighting frame of reference all the more financially, different road light control frameworks are created. These frameworks are created to control and diminish vitality utilization of a town's open lighting framework utilizing distinctive advancements. The current work utilizes the high power release light (HID). Stowed away by and utilized for urban road light and is dependent on rule of gas release,

In this manner the power isn't been controllable by any voltage decrease technique as the release path is broken. HID lamps are a category of electrical gas remittance lamp which bring forth light by means of an electric arc in middle of tungsten electrodes resided inside a translucent or crystalline fused quartz or inter fuse alumina arc tube. Gas and metal salts are recycled to permeate the tube. The arc's fundamental opening is done with the benefit of gas. Once the arc is initialized, it heats and disperse the metal salts materializing plasma, the plasma thus generated greatly boosts the concentration of light emitted by the arc and power consumption is curtailed. Arc lamps belongs to the category of high intensity exoneration lamps.

The existing system possess the main disadvantage of want of people to turn off and on the street lights to hand-operate which, requires formidable human competency to monitor the process. Also, we need to check regularly weather all the street lights are functioning properly or not. If the street lights stop functioning properly many accidents may occur. So regular monitoring of street lights is also required. We propose a contemporary method of which reduces cost, human potential and energy consumption.

III. PROPOSED SYSTEM

The Proposed work is to control exchanging of road light naturally as indicated by light force to create stream based powerful control measurements utilizing infrared identification innovation and keep up remote correspondence among lamp post and control terminal utilizing Zig-Bee Wireless convention. This proposed framework uses the most recent innovation for the wellsprings of light as LED Lamps rather than for the most part utilized road lights, for example, High compression Sodium Lamps, and so forth. The LED innovation is favoured as it offers a few points of interest over other conventional advancements like vitality sparing because of high current iridescent productivity, low upkeep cost, high shading rendering list, quick start up speed, long working life and so forth. The main components used in the proposed system include are explained below.

A. LDR

The analytical idea of the light sensor lies in the back ground, which is utilized in this circuit as a darkness detector. The LDR is a type of resistor and based on quantum of light plunging on its exterior blocking of resistor shifts. At the point when the LDR distinguish light its obstruction will get diminished, consequently on the off chance that it recognizes darkness its resistance will increment.

Fig. 1 LDR

B. Infrared LED:

An IR LED, also termed as IR transmitter, is known for its special purpose LED that funnel infrared beams in the compass of 760 nm wavelength. Such LEDs are typically made of gallium arsenide or aluminum gallium arsenide. They, alongside IR recipients, are generally utilized as sensors. Its appearance is same as a typical LED. Since the human eye can't see the infrared radiations, it isn't feasible for an individual to recognize whether the IR LED is working or, much the same as a typical LED.
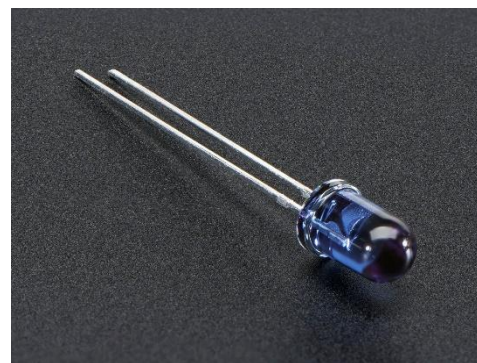

Fig. 2 Infrared LED

C. Micro Controller

With a domestic core of 8000 bytes, 8-bit microcontroller which is of CMOS based, and embedded system programmable Flash memory acknowledged as AT89S52 is tuned to account which is of subsided power and immense attainment. By bringing together an adaptive 8- bit CPU with embedded programmable on a firm chip of Flash category, the Atmel AT89S52 is an authenticated microcontroller which accommodates a highly-formable and cost compelling explanation to many embedded control applications. The AT89S52 accommodates the typical features of 16-bit counter and timers which are three in number, 32 Input and Output lines, timer with logic of Watchdog, two data pointers, 256 bytes of Main Memory, with two-level implementation of a six-vector interrupt architecture, clock circuitry, serial port with full duplex nature and an oscillator. In extension, the AT89S52 is originated with constant logic of operation which is down to zero prevalence and comforts two power saving modes which are software selectable. By

disqualifying all alternative chip activities up till next interrupt or hardware rest, the power down mode economizes the RAM contents and the oscillator is freeze.

C. Lamp Unit

It consists of power adjustable LED array, the brightness sensor, the motion sensor, the communication device such as zig bee module and the controller. To detect the motion in defined area, it is on for several minutes so that motion can be detected by sensors along with its own sensor. It turns off or reduced power under the condition that any motion in not detected in the defined area.

D. Sensor Unit

It dwells of controller, motion sensor, and the communication device. As soon as motion is detected message is communicated to other units. This unit can be placed in many regions such as electric poles, house gates etc to assure that every street light turns on or off.

IV. PROPOSED METHODOLOGY AND RESULTS

When the IR sensor detects the vehicle moment on the road it sends the signal to the microcontroller where the microcontroller turns the street light on. If the vehicle detection was not there then the street lights still glows but glows with only ¼ intensity of light. If the moment of vehicle was detected then the street light glows with 100% intensity. The proposed method was depicted in fig. 3.

The IR transmitter is put straightforwardly in viewable pathway with IR sensor, so the IR receiver persistently gets infrared beams. When the IR collector gets infrared beams, the microcontroller will detect Logic 1. If the infrared beams are hindered by certain means the microcontroller will identify logic 0. Thus, the program for the microcontroller must be written so that it will turn ON the LEDs, which implies here the road light, when it identifies Logic 0 and it will turn off the LEDs, when it recognizes Logic 1.

Consider the two IR sensors for example IR Transmitter and IR Receiver are set on the either side of the street. According to the circuit graph, the IR collectors are associated with the PORT0 and the LEDs are associated with the PORT2 of the microcontroller.
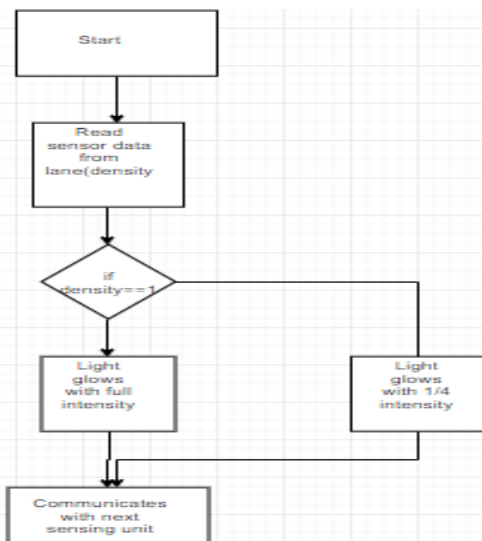
At beginning, when there is no object, the IR recipient continuously identifies IR light transmitted by the IR Transmitter. At the point when a vehicle or some other vehicle hinders any of the IR sensor, the microcontroller will turn ON the immediate three LEDs.

In the event that the vehicle hinders the primary IR sensor, the initial three LEDs are turned ON by the microcontroller. As the vehicle pushes ahead and obstructs the second IR sensor, the comparing next three LEDs will be turned ON and the principal LED of the past set is killed. The procedure proceeds with along these lines for all the IR Sensors and LEDs. The following fig.4 shows the circuit for proposed methodology.
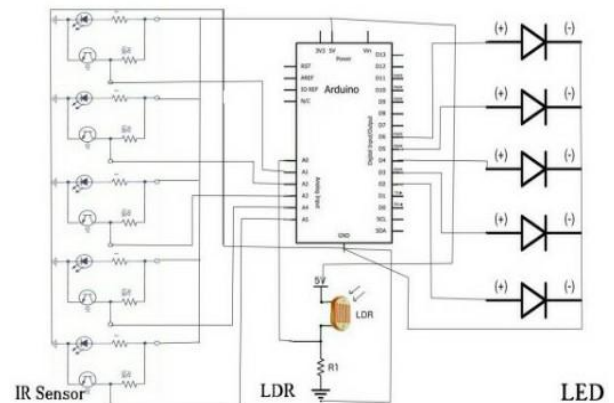
Fig. 4. Circuit design for smart street lighting control system

V. CONCLUSION

This paper explains the design and improvement of Smart Street lighting control system circuit. Circuit meets desires suitably to turn street light ON/OFF. In the wake of designing the circuit which controls the light of the street as outlined in previously sections. LDR sensor and the item sensors are the two basic conditions in satisfying the desires of the circuit. In case the two conditions have been satisfied the circuit will do the needed work as demonstrated by the specific framework. Each sensor controls the killing ON or the lighting section. The street lights have been successfully constrained by Microcontroller. With requests from the controller, the lights will be ON in the spots of the developments. Other than the drawback of the street light system using clock controller has been succeeded, where the system depends on upon photoelectric sensor. Finally, this control circuit can be used as a piece of a long roadway between the urban zones just as the provincial zones.

The endeavor indicates were diminish the responses of the present road lighting structure and find a response for power misfortune. In this endeavor, the main activity is to set up the data sources and yields of the structure to control the lights of the road. The model demonstrations of course and will end up being uncommonly profitable and will fulfill all the present restrictions whenever completed on an immense scale.

Fig.3. flow chart for proposed methodology

REFERENCES

1. Hengyu Wu, Minli Tang and Guo Huang, "Design of multi-functional street light control system based on AT89S52 single-chip microcomputer," *The 2nd International Conference on Industrial Mechatronics and Automation*, Wuhan, 2010, pp. 134-137. DOI: 10.1109/ICINDMA.2010.5538068.
2. X. Shentu, W. Li, L. Sun and S. Gong, "A new streetlight monitoring system based on wireless sensor networks," *The 2nd International Conference on Information Science and Engineering*, Hangzhou, 2010, pp. 6394-6397. DOI: 10.1109/ICISE.2010.5691530.
3. Priyasree, Radhi & H Kauser, Rafiya & E, vinitha & Gangatharan, N. (2012). "Automatic Street Light Intensity Control and Road Safety Module Using Embedded System," International Conference on Computing and Control Engineering (ICCCE 2012), At Coimbatore Institute of Information Technology, 2012.
4. C.Bhuvaneswari, R.Rajeswari and C.Kalaiarasan "Analysis of Solar Energy Based Street Light with Auto Tracking System," International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol. 2, Issue 7, July 2013.
5. "Wireless internet lighting control system", Budike. E.S. Lothar (Power web Technologies), US patent 7,167,777, Jan 23, 2007.
6. J. d. Lee, K. y. Nam, S. h. Jeong, S. b. Choi, H. s. Ryoo and D. k. Kim, "Development of Zigbee based Street Light Control System," 2006 IEEE PES Power Systems Conference and Exposition, Atlanta, GA, 2006, pp. 2236-2240. DOI: 10.1109/PSCE.2006.296311.
7. K.Y.Rajput, Gargeyee Khatav , Monica Pujari , Priyanka Yadav, "Intelligent Street Lighting System Using Gsm," International Journal of Engineering Science Invention, Volume 2, Issue 3, March, 2013, PP.60-69.
8. "Intelligent Street Lighting System Using Gsm" International Journal of Engineering Science Invention ISSN (Online): 2319 – 6734, ISSN (Print): 2319 – 6726Volume 2 Issue 3 March. 2013.

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