

Smart Street Light System -Using IR Sensor and Solar Energy

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Abstract – Territories in the whole world are confronting issues identified with expanding vitality utilization and carbon outflows prompting worldwide issues, which is a known supporter of environmental change. Because of ill-advised and wasteful diminishing control and low effectiveness, current road lighting is inefficient as far as vitality spending, and this non advanced records for a noteworthy piece of legislative power costs. In this manner, it has turned into a matter of genuine concern and of incredible significance to build another shrewd lighting framework that is all the more proficiently enhanced and earth cordial. This undertaking depends on the implanted framework and microcontroller 8051. An implanted framework is blend of PC equipment and programming that is programmable, which is intended for a particular capacity inside a bigger framework to be executed. The venture is intended to distinguish vehicle development to switch ON just a square of road lights in front of it (vehicle), and to turn OFF the trailing lights to spare vitality. Coordinated sensors and controllers are utilized to outline this venture. . The proposed framework is suitable and productively upgraded for road lighting in remote and also urban zones both where activity is low during the evening . Alongside vitality sparing it likewise handles with the issue of intensity burglary.

Index Terms – IR Sensor, solar energy, microcontroller 8051, octal D- type latch 74HCT573, real time clock DS3107, Hall sensor.

1. INTRODUCTION

Mechanization assumes an inexorably critical job on the planet economy and in day by day life. Programmed frameworks are being favored over manual framework. The examination work indicates programmed control of streetlights because of which control is spared to some degree. In the extent of industrialization, robotization is a stage past automation. While motorization furnished human administrators with apparatus to help the clients with solid prerequisites of work, mechanization enormously diminishes the requirement for human tangible and mental necessities also. Fundamentally, road lighting is one of the critical parts. In this manner, the road lights are moderately straightforward however with the improvement of urbanization, the quantity of lanes increments quickly with high activity thickness. There are a few components should be considered keeping in mind the end goal to plan a decent road lighting framework, for example, evening time security for network individuals and street clients, give

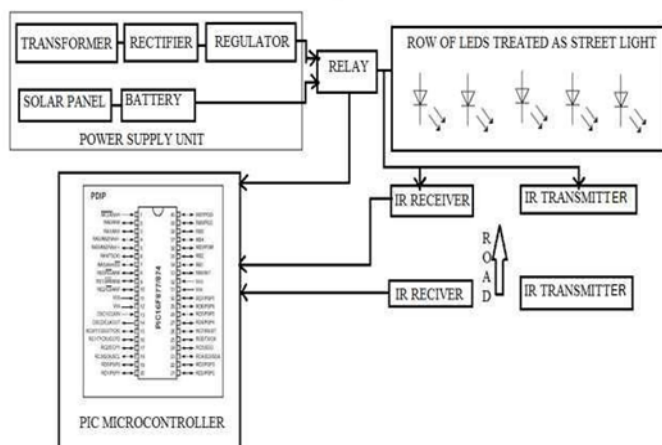
open lighting at financially savvy, the decrease of wrongdoing and limiting it is impact on the earth. Toward the starting, road lights were controlled by manual control where a control switch is set in every one of the road lights which is known as the original of the first road light. From that point forward, another technique that has been utilized was optical control methodology done using high weight sodium light in their structure. Nowadays, it is seen that the technique is broadly utilized in the nation. The technique works by set up an optical control circuit, change the opposition by utilizing of light touchy gadget to control road lights illuminate consequently at nightfall and kill naturally after sunrise early in the day. Because of the innovative improvement these days, street lighting can be arranged by the establishment zone and execution, for a model, lighting for activity courses, lighting for backup streets and lighting for urban focus and open pleasantry zones. The LED is viewed as a promising answer for current road lighting framework because of its conduct and focal points. Aside from that, the benefits of LED are probably going to supplant the customary road lights, for example, the radiant light, fluorescent light and High Pressure Sodium Lamp in future yet LED innovation is a to a great degree troublesome process that requires a blend of cutting edge generation lines, top quality materials and high-exactness fabricating process. Hence, the exploration work features the vitality productive arrangement of the road lights framework utilizing LED lights with IR sensor interface for controlling and overseeing. The sun oriented board will be introduced over the shaft and will change over light vitality to power amid day time and that will be utilized amid the evening time and if there are mists or some other reason that the sunlight based cells were not charged then a reinforcement battery is associated with the post so it very well may be utilized without sun oriented power.

2. SYSTEM ARCHITECTURE

The square chart of programmed light framework as appeared in fig.1, utilizing the LDR we can work the lights. At the point when the light is accessible then it will be in the OFF state and when it is dull the light will be in ON state, it implies LDR is conversely corresponding to light. At the point when the light falls on the LDR it sends the directions to the microcontroller that it ought to be in the OFF state then it turn OFF the light.

This direction are sent to the controller at that point as indicated by that the gadget works. We utilize a hand-off to go about as an ON/OFF switch.

The fig(1) portrays the square chart of the Street light framework



Fig(1) System Architecture

2.1 Microcontroller chip

1.) The as a matter of first importance rule for picking a microcontroller is that it must meet the main job productively and cost adequately. In dissecting the requirements of a microcontroller-based venture, it is seen whether a 8-bit, 16-bit or 32-bit microcontroller can best deal with the figuring needs of the errand generally viably. Among alternate contemplations in this class are:

- Speed – What is the most noteworthy speed that the microcontroller underpins?
- Packaging – Does it come in 40-stick DIP (double inline bundle) or a QFP (quad level bundle), or some other bundling position? This is imperative as far as space, gathering, and prototyping the final result.
- Power utilization – This is particularly basic for battery-fueled products. The number of I/O pins and the clock on the chip.
- How simple it is to move up to higher – execution or lower utilization variants.
- Cost per unit – this is vital regarding the last expense of the item in which a microcontroller is utilized.

2.) The second measure in picking a microcontroller is that it is so natural to create items around it. Key contemplations incorporate the accessibility of a constructing agent, debugger, a code – effective compiler, specialized help.

3.) The third feature in deciding a microcontroller is its ready availability in needed quantities for both now and in the later.

Currently only leading from ahead of 8-bit microcontrollers, largest suppliers are of 8051 of its usage. By supplier means a producer and the creator of the microcontroller. Several companies liken intel and many others are working in the process of creation of 8051 as of its high usage value today.

The basic architecture of 8051 consists of the following features:

- 1.) An eight bit ALU
- 2.) 4 groups of 8 32 distinct I/O pins
- 3.) Two 16 bit timer/counters
- 4.) UART full duplex
- 5.) 6 interrupt sources with 2 priority levels
- 6.) 128 bytes of on board RAM

2.2. External Memory

The microcontroller 8051 that has been utilized in outlining a Smart Street light Control System has inside memory of 8k. In the plan of the Street Light Control System, the need is to store Look up table information of every day dawn and dusk in view of the land area in the memory that is the reason utilizing the outside memory is noteworthy as it isn't conceivable to compose information in inward memory of microcontroller. For this application 64 K RAM 6264 has been utilized which is gotten to like a Static RAM for the cycles without the requirement for outer parts.

Features:

- High speed -Fast access time: 85/100 ns (max)
- Low power-Standby: 10 μ W (typ) Operation
- Single 5 V supply
- Completely static memory
- No clock or timing strobe required
- Equal access and cycle times
- Common data input and output Three state output
- Directly TTL compatible All inputs and outputs
- Battery backup operation capability

2.3 Octal D-type latch 74HCT573

The external memory interfacing with the microcontroller needs a Latch IC for hooking the status of Address lines from the Address/Data port. 74HCT573 IC tackles the reason. The 74HC573; 74HCT573 is a fast Si-door CMOS gadget and is stick perfect with Low-control Schottky TTL (LSTTL). It is

indicated in consistence with JEDEC standard no. 7A. The 74HC573; 74HCT573 has octal D-type straightforward locks including separate D-type contributions for each hook and 3-state genuine yields for transport arranged applications. A lock empower (LE) input and a yield empower (OE) input are normal to all hooks. At the point when LE is HIGH, information at the Dn inputs enter the hooks. In this condition, the locks are straightforward, i.e. a hook yield changes express each time its comparing D input changes. At the point when LE is LOW the hooks store the data that was available at the D-inputs a set-up time going before the HIGH- to-LOW progress of LE. At the point when OE is LOW, the substance of the 8 hooks are accessible at the yields. At the point when OE is HIGH, the yields go to the high-impedance OFF-state. Activity of the OE input does not influence the condition of the locks.

2.4 Real time clock (DS1307)

1. Since a methodology of detecting the season of day has been utilized in this theory, so there is the need of a Real time clock device. DS1307 IC is appropriate for the reason as it runs the clock and additionally the timetable and gives this information which is accessible by means of its support memory. This RTC gets voltage reinforcement from an interfaced battery, therefore supporting its usefulness at control disappointments rather it isn't at all ward upon outer power. The client needs to set the right time and date once just through a reasonable program code in the microcontroller in the wake of utilizing the I2C interfacing strategy.
2. The DS1307 serial constant clock (RTC) is a low power, full parallel coded decimal (BCD) clock/date-book in addition to 56 bytes of NV SRAM. Address and information are exchanged serially through an I2C, bidirectional transport. The clock/date-book gives seconds, minutes, hours, day, date, month, and year data. The month's end date is naturally balanced for quite a long time with less than 31 days, including redresses for jump year. The check works in either the 24-hour or 12-hour design with AM/PM marker.

3. EXISTING AND PROPOSED SYSTEM

1. Movement Detection: A movement location sensor will guarantee that the lights just light up when movement is distinguished.
2. Remote Communication: The system will empower the lights to transmit and get information between one another. This guarantees when movement is distinguished close to one light, the neighboring lights will turn on, along these lines giving enough light to people on foot or autos.
3. Microcontroller: The microcontroller will go about as the handling unit. It will have the accompanying capacities:

- a. Process Data: It must process the information got from the sensor.
- b. Control Output: This yield controls the power of the light as indicated by the consequences of information preparing.
- c. Correspondence with remote interface: It must have the capacity to get and send control motions through the system.
4. Diminishing: This includes changing the lighting levels of LEDs with the end goal that lower lighting levels are utilized when there are no person on foot or autos in the city.
5. Control: Intelligent calculations will be utilized to adroitly control the lights to rapidly react to the requirements of street clients.

4. CONCLUSION AND FUTURE WORK

In the proposed postulation an endeavor has been made to plan a microcontroller based Street light Control framework.

The proposed framework utilizes a Microcontroller 8051, RTC DS1307 and outside memory SRAM 6464. The control rationale is composed in 'C' dialect utilizing 'KEIL' compiler. The assessment of the circuit and code has been done in Proteus programming. Computations have been improved the situation yearly power funds. It has been discovered that vitality spared per Street light is 10.84KWhr every year and 18.766 KWhr.

A period based force control arrangement of LED Street lighting has been effectively planned. The framework is straightforward and financially savvy when contrasted with remote sensor arrange based frameworks. Additionally its execution does not rely on dust, dampness, temperature not at all like sensor based frameworks.

On the off chance that this framework is utilized with existing lattices in India with a large number of lights per matrix, there would be an immense vitality sparing.

REFERENCES

- [1] shagun Malhotra ,vivek kumar , "smart street lighting system : an energy efficient approach " ,international journal of science and research.(2014)
- [2] chetna badgaiyan ,palak sehgal , " smart street lighting system " , international journal of science and research (2013).
- [3] prof K.Y.Rajput , Gargeyee khatav , monica pujari , Priyanka Yadav , " Intelligent Street lighting system using Gsm " , international journal of engineering science invention (march , 2013).
- [4] yusnani Mohd Yussoff ,Mustaffa samad , " sensor node development for street lightning monitoring system " , institute of electrical and electronics engineers , (2016) .
- [5] Yusaku fujii , noriaki yoshiura , akihiro takita , naoya ohta " smart street light system with energy saving function based on sensor network " ,conference 04 ,month 1-2 ,2004