A Smart Way Of Reducing Power Usage Using IoT Gadget

[1]N. Venkata Ramana , [2]D.Tejaswi, [3]P. Venkatesh, [4]S. Arun Kumar, [5]ch Yaswanth

[1,2,3,4,5] *Computer Science Engineering Department, KL University,*

Abstract— The Internet of Things is interconnection of vivid systems of different domains which describes the network of home appliances, vehicles, physical devices and all electronic items like sensors, actuators which enables these things to connect, exchange data and communicate through internet. It results in efficiency improvements, reduced human exertions and economic benefits. This paper represents an analysis on dynamic street lightning system which is built on renowned IOT frameworks. The moto is to save energy using automation which is one of the best solutions proposed for saving the electric current. For smart cities manual operations for street light system is very difficult to operate as there might be human negligence and cost of maintenance is very high. In this project, a sensor is being used to measure intensity of light based on which the light will be turning. If intensity is high, then street-light will in off mode and if low then it'll be in on mode. There are huge advantages associated through the implementation like optimal power consumption, limiting flow of green-house gases, cost reduction..

Keywords: AT89S52Microcontroller, GSM module, capacitor, Relays

I. INTRODUCTION

Street lights are the lights that illuminate the streets. The primary good thing about street lighting is safety for each pedestrian and drivers. Well-lit roads facilitate each pedestrian and drivers navigate simply, alert them to attainable obstacles and approaching vehicles. It is the torch bearer to reduce the number of fatal accidents that happens due to lack of enough lighting. So many studies have shown that the accident ratio involving pedestrians is 3 is to 1 that happens in the darkness and daylight respectively. Also crime rate is additionally lower in areas with sensible street lighting, as criminals usually use the quilt of darkness to harass pedestrians. The electrification of local streets is considered as a prime energy expenses for metropolitan cities. A street lightening is an important setup for the security of the citizens as well as the goods. A clever street lightning infrastructure would be efficient and cost effective.
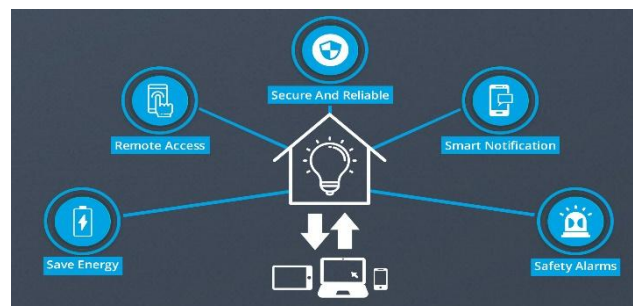

Fig.1 IOT Based Light System

The street light model which is proposed contains a microcontroller assisted with various sensors and remote module. The road light controller is efficient in manipulating LED road lighting depends upon activity stream and propagates information between every light present in the street. The information from the street light controller is exchanged to the base station through new methodologies. This can be exhibited using either manual or auto mode. The object distance with respective to light is the key to the functioning of control frame work. This paper contains 1. Brief Introduction about scheme, 2. Problem definition, 3.Related work, 4. Proposed scheme, 5. Results and Analysis of new scheme, 6. Conclusion, 7. Reference papers

II.PROBLEM DEFINITION

In many towns road lighting fixtures are considered to be a huge parameter for power price billing. As, per present scenario a manual tool is used by which the light can be turned on within the night time and vice versa during sunset. Light will be switched off if enough intensity of light is observed.Lot of energy wastage is observed duing mode switching. . Lighting will account between 10–38% of the entire energy bill in most of the cities worldwide. Inefficient lighting wastes significant amount of resources and poor lighting may lead to the conditions which are not safe. Energy economical technologies which are latest in arrival and their working style will cut street lighting prices dramatically which may range between 25% and 60%.

III.RELATED WORK

This internal design of dynamic street lighting system is a combination of various components like LDR, AT89S52 micro controller, relay, UART wireless module and GSM. [2] Street light synchronously switches in middle of night and based on the intensity of light observed in day time. In this present system the street light will be turned on and off automatically by using microcontroller. The aim is to switch on or off circuits by using GSM. Power consumption is controlled with reducing and boosts the strength of any enquiry usage of LDR sensor. Vehicles are sensed by the usage of IR sensor and relays to update functionality of switches on the street. [6] The microchip acts as a receiver to control computer's interface. In the midst of the night time every light by default is operated in auto mode, but bundle operates on the crux which is misused. Parallel, there is no car improvement on the thoroughfares. The sensors used in the model are of simple accord. They are coined to be dependent resistor sensor. An unconventional switch is being used in the gadget. When the light is considered to be below the minimal requirement for vison. Then light is subsequently switched. LDR has similar functionality as a human eye. [10] Similarly, on the component as in the daylight, it usually diminishes lighting fixtures.
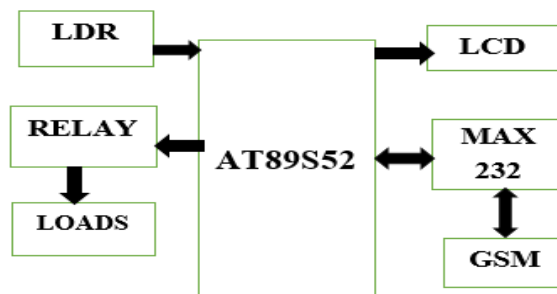

Fig2. ARCHITECTURE

Description of components

AT89S52 Microcontroller

The AT89S52 is a low power consuming and efficient 8-bit microcontroller with 8 KB of PRAM. This microcontroller has four vivid ports in which each port takes 8 input/output lines. In this microcontroller, most of the ports performs "dual functions". The first port is extensively pinnacle for input/output operations. Another port is used for implementation of counting external pulses, interrupting the program execution. Each port has 8 pins which is invariably a 8-bit variable termed as a 'register'. Further, the AT89S52 is designed to enhance the experience to achieve zero frequency, to choose strength saving modes. Ram timers/counters, serial port and interrupt device keeps function parallely, idle mode stops CPU. Fig1 depicts the AT89S52 microcontroller.
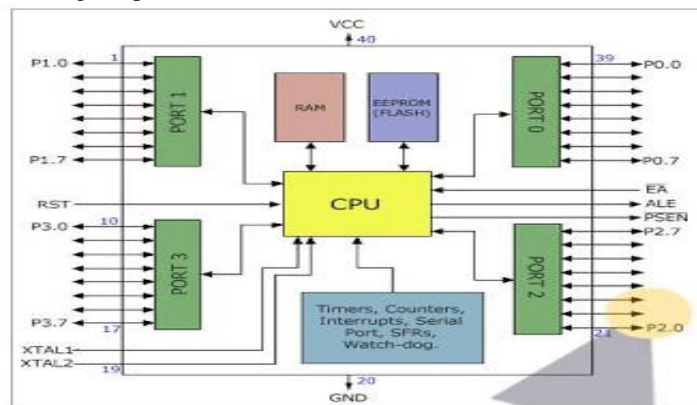

Figure 3: AT89S52 microcontroller

LDR

With light intensity on incident electromagnetic radiation a Light Dependent Resistor (LDR) is an electronic device whose resistivity varies. LDR is made by using semiconductor materials which have effictive resistance.LDR is also termed as image conductors and photo cells. It is used in sensing circuits.[3] LDR works with the principle of photo conductivity is stated to be an optical phenomenon where the conductivity of materials diminish proportionally to the light which is absorbed through the fabric.

Relays

A relay is an electromechanical device which is used only through the AC current flow. [7] Consider two circuits; current flown in one circuit stimulates the second circuit working. Even though relays are commonly related to electrical circuit, there are huge varieties like pneumatic and hydraulic. [5] Relays perform 2 important tasks. One them deals with low-slung voltage software,another deals with excessive voltage. For the low-slung voltage programs aim to reduce the sound of circuit.

Capacitor

A capacitor is considered as an aloof terminal electric segment that stores electrical power in electric vicinity. [9] The impact of capacitor is termed as capacitance. On the same time as capacitance exists among any electric powered conducts of a circuit in very well nearness, a capacitor is supposed to give and enhance this impact to the collection of purposeful packages through belief of period, form, and situating of firmly divided transmitters, and the mediating dielectric cloth. A capacitor changed into this way without a doubt first known as an electric powered condenser.

GSM module

The GSM is a device which connects a huge contingent of mobile devices of a specific mobile network in a confined coverage area. [2] The GSM has mainly four frequency bands. Maximum frequency bands of 900MHz and 1800MHzFew highly developed nations like the United States use these types of frequencies which are allocated to them.

IV. Proposed scheme

The first task will be to manipulate the street lights by recording proper inputs and setting desireds goals or outputs for the model. The main purpose is to enhance dynamic road light devices in pursuit of definning an sustainable approach. Model which is proposed below is surely feasible .As, it could fulfil all specific requirements with easy production values.It immediately gives out scope for mass production.As, per fig 4 the components are essential for operating the model as per required proportions.As, far as IoT is primarily established by smart sensible lightening fixture devices for a smart city. The model thieves on using LDR for object identification,which depicts a hindrance.As, per lighting obstacle detection which emmits light. LDR repute will get switched on automatically after properly checking and detecting if there was any obstacle on the street.
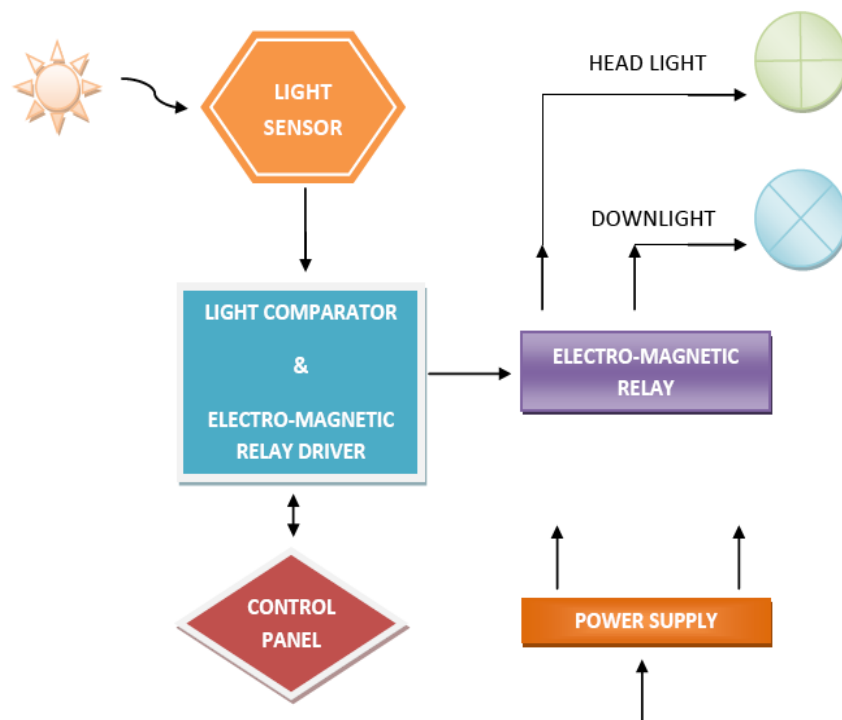

Fig.4 FLOW DIAGRAM FOR DYNAMIC STREET LIGHT SYSTEM

Algorithm

```
STEP1. LCD COMMAND MODE

void lcdcmd(unsigned char value)
{
send msb 4 bits
select command register
enable the lcd to execute command
}
```

```
STEP2. LCD INITIALISING MODE
void lcd_init(void)
{
initialise the lcd in 4 bit mode
initialise the lcd in 8 bit mode
cursor blinking
move the cursor to right side
clear the lcd
}
```

```
STEP3. LCD DATA MODE
void lcddata(unsigned char value)
{
send msb 4 bits
select data register
enable the lcd to execute data
send lsb 4 bits
select data register
enable the lcd to execute data
}
```
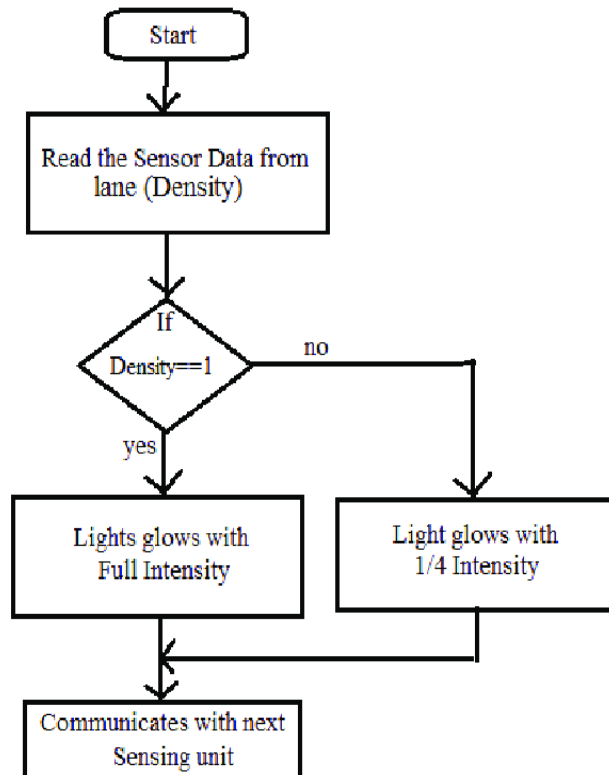
DIAGRAMATICAL REPRESENTATION OF ALGORITHM

Fig.5.Dynamic street light control system

V. RESULTS AND ANALYSIS OF NEW SCHEME

Emphasis is on the optimal power consumption. [9] The crucible of the paper is to limit the power consumption with proper set of tools. All the components in the model are very simple,cost effective in nature.But, invariably build up a assured intelligent system.
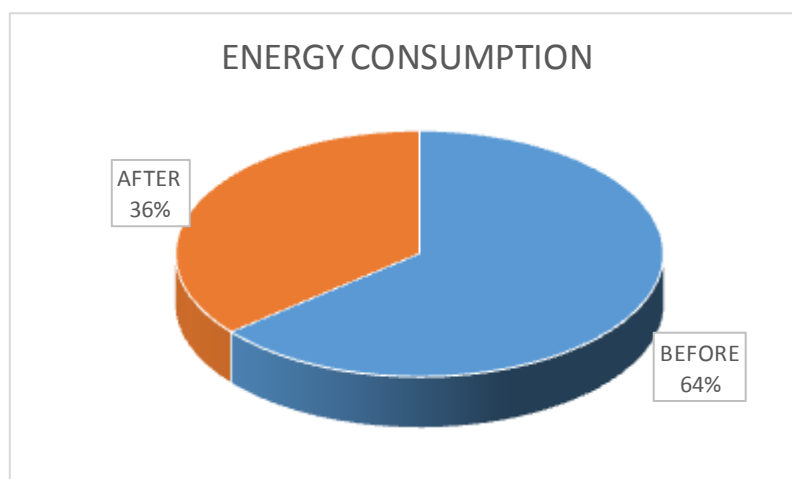
Fig.6 Energy consumption before and after the usage of dynamic street lights

The proposed model of dynamic street light control and management system provides efficiency as we use the model for long time. As time passes the efficiency will gradually increases and the cost for the electricity will be reduced. Consumption of electricity will be decreased results in increase in efficiency and reduction in the electricity bill.

SNO	AUTHOR	PROPOSED WORK	ADVANTAGES	DISADVANTAGES
1	Ouerhani.N	His model nearly saves 56% of energy which is static and time based street light system	Energy consumption	Very expensive model
2	Anil. A. A.	His model uses relays and LDRs for automatic switching	Decrease in manual power	Maintaining the model will be difficult
3	M. A. Wazed	Light circuit is designed on the basis of intensity of light	Wastage of energy will be reduced and manual work will be decreased	This model consumes huge amount of time
4	Murali Siva	His model uses piezo electric sensors which produces electricity depends upon the amount of pressure	Piezo electric sensors works independently and there is no need of any external sources of electric current.	The piezo can't give digital HIGH, if any of automobile halts for longer time.
5	Saad, M	His model mainly depends upon the photoelectric sensors.	Less consumption of electricity which eventually saves money.	This model of street light is under the control of timer.

Fig.7 various models with advantages and disadvantages

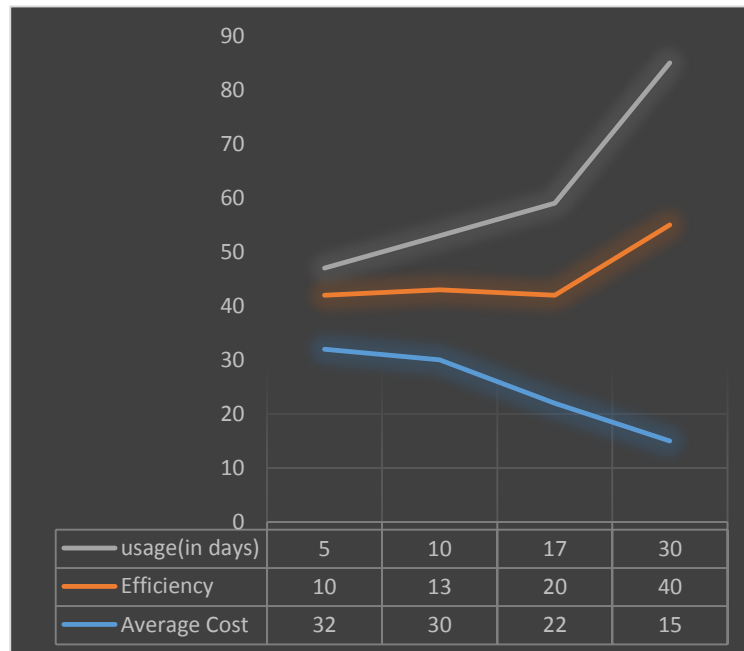| usage(in days)	5	10	17	30
Efficiency	10	13	20	40
Average Cost	32	30	22	15

Fig.8 efficiency vs cost vs usage graph of the proposed mode

VI.CONCLUSION

The Streets would be more secure and digitalized by the implementation of proposed model. It is robust, feasible, easy to maintain and engages prominent standards of technology. The information derived can be globally retrieved. The main functionality of this model is to save power and to decrease the use of lamps and by enhancing the standards of society. As the time frame goes by, proper use of the resources will bring down the maintenance cost used in parts of periodic assessment. Integration of new technologies had been implemented in this smart street lighting system which offers ease of maintenance and energy saving. Saving power and furthermore decreasing the use of lamps is one of the most useful parts of this system. As the generation goes, the rightful use of these resources decreases the price of maintenance and can be used in phrases of periodic assessment. So, we can say that this model is an epitome of saving power and making the use of technology eco-friendly.IOT proposes better technological solutions for the evolution of digital space in the contempary world. This model is very reliable, feasible and easy to produce in huge proportions. The traffic lighting system is appreciable, dynamic in nature and propagates optimal energy consumption.

VII.REFERENCES

[1] Ouerhani, N., Pazos, N., Aeberli, M., & Muller, M. (2016, May). IoT-based Dynamic Street light control for smart cities use cases. In Networks, Computers and Communications (ISNCC), 2016 International Symposium on (pp. 1-5). IEEE.

[2] Sharma, D., & Singh, M. D. (2014). Microcontroller based smart street light control system (Doctoral dissertation).

[3] Sudhakar, K. S., Anil, A. A., Ashok, K. C., & Bhaskar S. S. (2013). Automatic street light control system. International Journal of Emerging Technology and Advanced Engineering, 3(5), 1-2.

[4] Rajput, K. Y., Khatav, G., Pujari, M., & Yadav, P. (2013). Intelligent street lighting system using GSM. International Journal of Engineering Science Invention, 2(3), 60-69.

[5] Mohamed, S. A. E. (2013). Smart street lighting control and monitoring system for electrical power saving by using VANET. International Journal of Communications, Network and System Sciences, 6(08), 351.

[6] Saad, M., Farij, A., Salah, A., & Abdaljalil, A. (2013). Automatic street light control system using microcontroller. Mathematical Methods and Optimization Techniques in Engi ISBN, 978-960.

[7] Venkata Ramana N., Nagesh P., Lanka S., Karri R.R. (2019), "Big Data Analytics and IoT Gadgets for Tech Savvy Cities". In: Omar S., Haji Suhaili W., Phon-Amnuaisuk S. (eds) Computational Intelligence in Information Systems. CIIS 2018. Advances in Intelligent Systems and Computing, vol 888. pp 131-144, Springer Nature.

[8] Soni Lanka., Madhavi M. R., Abusahmin, B.S., Puvvada, N., Lakshminarayana, V., (2017), "Predictive data mining techniques for management of high dimensional big-data". Journal of Industrial Pollution Control vol 33, pp 1430-1436.

[9]Krishna M., Chaitanya D. K., Soni L., Bandlamudi S.B.P.R., Karri., R.R.: (2019), "Independent and Distributed Access to Encrypted Cloud Databases". In: Omar S., Haji Suhaili W., Phon-Amnuaisuk S. (eds) Computational Intelligence in Information Systems. CIIS 2018. Advances in Intelligent Systems and Computing, vol 888. pp 107-116, Springer Nature.

[10] Saifuzzaman, M., Moon, N. N., & Nur, F. N. (2017). IoT based street lighting and traffic management system. 2017 IEEE Region 10 Humanitarian Technology Conference (R10-HTC). doi:10.1109/r10-htc.2017.8288921