ENERGY- SAVING SMART LIGHT INTENSITY CONTROL SYSTEM USING AURDINO AND RENEWABLE ENERGY SOURCE

DR.N.Sambasiva rao[1],S.Bhavani [2], T.Krishnapriya[3], G.rajeswari[4,],CH.Harika[5],R.V.S.Charan[6]

[1]*Professor and Head ,Department of EEE.NRI Institute of Technology(Autonomous) ,Vijayawada,India.*
[2]*Assistant professor ,,Department of EEE.NRI Institute of Technology(Autonomous) ,Vijayawada,India.*
[3 ,4,5,6,]*Department of EEE.NRI Institute of Technology(Autonomous) ,Vijayawada,India.*

ABSTRACT

Efficient street lighting systems are essential for ensuring safety and security in urban environments while minimizing energy consumption and environmental impact. Traditional street lighting systems often rely on fixed schedules or manual controls, resulting in unnecessary energy wastage and inadequate illumination levels during periods of low activity. This paper presents a novel approach to street lighting optimization using Arduino-based control mechanisms that incorporate both vehicle movement detection and external light sensing.The proposed system utilizes infrared sensors to detect the presence of vehicles on the road. When a vehicle is detected within a predefined range, the system triggers the activation of nearby street lights, ensuring adequate illumination along the vehicle's path. Additionally, the system incorporates external light sensors to measure ambient light levels. During periods of sufficient natural light, such as daytime or well-lit conditions, the street lights remain dimmed or switched off to conserve energy.

Keyword:*Arduinouno,solarpanel,Battery,LDR,Sensor,Arduino software,Arduino c language*

1. INTRODUCTION

Smartlight system plays a vital role in the reduction of energy consumption. As the energy resources are getting degraded day by day saving of this energy is very important. If these natural resources are not saved our next generation may face lot of problems. In this project street lights are designed in such a way that it automatically switches ON and OFF based on the Light Dependent Resistor (LDR) sensor. The LDR sensor also controls the intensity of light automatically based on the movement of vehicle or persons it dims and brightens. The movement of vehicle is detected by the IR sensor. The proposed system uses the latest technology LED lamps instead of general lamps. The LED technology is preferred over the other lamps because an LED lamp saves the energy due to the high current luminous and maintenance cost is low, life of LED is long etc. The lamps that we use presently are based on gas discharge. Thus, the intensity of these lamps is not controllable. This system ensures to provide right amount of light where and when needed

2.EXISTING SYSTEM

In the present situations ,street lights are on/off manually, the main drawback with this system is switch on/off the system in the major cities,highways will be time takenIn recent days due to the fast development of industries and urban communities connectivity, the road lighting frameworks are also developing quickly. The mechanization of

effective utilization of power and cost reduction is important factor in thepresent day to day life. The different types of road light control frameworks are implemented to control and keep up complex road lighting systems. For controlling and diminishing energy utilization of a town's open lighting system, the effective systems are created. The current work is shows utilizing High intensity discharge (HID) lights. As of now, the HID is utilized for urban road light where power is not managed by any of the methods to reduced or switch off the lights during less density or unmanned areas. High intensity discharge lights are a kind of electrical gas release light which delivers light by methods for an electric circular segment between tungsten terminals fixed inside glassy or simple combined quartz (colourless glass made of almost pure silica or melded alumina curve tube). The gas and metal salts are loaded in tube. The gas excites the circular segment's underlying it. Once the circular segment is begins, it warms and evaporates the metal salts forming plasma which enormously builds the force of light delivered by the curve and decreases its energy utilization. High force release lights are a sort of circular segment light.

ARDUINO: LAYOUT OF ARDUINO

Arduino is an open-source electronics platform based on easy-to use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

Over the years Arduino has been the brain of thousands of projects, from everyday objects to complex scientific instruments. A worldwide community of makers - students, hobbyists, artists, programmers, and professionals - has gathered around this open-source platform, their contributions have added up to an incredible amount of accessible knowledge that can be of great help to novices and experts alike.

Arduino was born at the Ivrea Interaction Design Institute as an easy tool for fast prototyping, aimed at students without a background in electronics and programming. As soon as it reached a wider community, the Arduino board started changing to adapt to new needs and challenges, differentiating its offer from simple 8-bit boards

LCD 16*2

The term LCD stands for liquid crystal display. It is one kind of electronic display module used in an extensive range of applications like various circuits & devices like mobile phones, calculators, computers, TV sets, etc. These displays are mainly preferred for multi-segment light-emitting diodes and seven segments. The main benefits of using this module are inexpensive; simply programmable, animations, and there are no limitations for displaying custom characters, special and even animations, etc.

Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to othersThis power supply section is required to convert AC signal to DC signal and also to reduce the amplitude of the signal. The available voltage signal from the mains is 230V/50Hz which is an AC voltage, but the required is DC voltage(no frequency) with the amplitude of +5V and +12V for various applications.

WORKING PRINCIPAL

Like a normal diode, the LED consists of a chip of semi conducting material impregnated, or *doped*, with impurities to create a *p-n junction*. As in other diodes, current flows easily from the p-side, or anode, to the n-side, or cathode, but not in the reverse direction. Charge-carriers electrons and holes flow into the junction from electrodes with different voltages. When an electron meets a hole, it falls into a lower energy level, and releases energy in the form of a photon.The wavelength of the light emitted, and therefore its color, depends on the band gap energy of the materials forming the *p-n junction*. In silicon or germanium diodes, the electrons and holes recombine by a *non-radiative transition* which produces no optical emission, because these are indirect band gap materials. The materials used for the LED have a direct band gap with energies corresponding to near-infrared, visible or near-ultraviolet light. LED development began with infrared and red devices made with gallium arsenide. Advances in materials science have made possible the production of devices with ever-shorter wavelengths, producing light in a variety of colors. LEDs are usually built on an n-type substrate, with an electrode attached to the p-type layer deposited on its surface. P-type substrates, while less common, occur as well. Many commercial LEDs, especially GaN/InGaN, also use sapphire substrate.

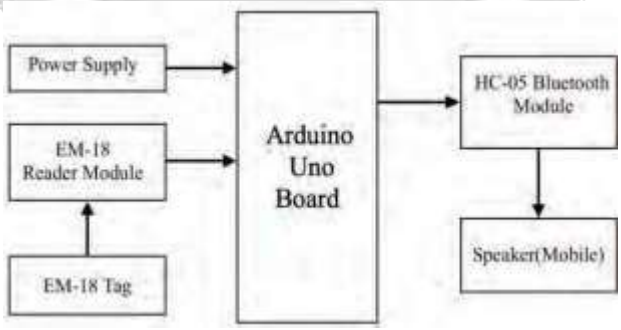

Chart -BLOCK DIAGRAM

ADVANTAGES

Energy Efficiency: The primary advantage of such a system is improved energy efficiency. By dynamically adjusting the intensity of street lights based on factors such as ambient light levels and traffic patterns, the system can significantly reduce energy consumption during periods of low activity or when natural light is sufficien**t.**Cost Savings: Reduced energy consumption leads to cost savings for municipalities and organizations responsible for street lighting. Over time, these savings can be substantial, contributing to budget optimization**.**Environmental Benefits: Lower energy consumption translates into a reduced carbon footprint and decreased greenhouse gas emissions. This aligns with sustainability goals and environmental initiatives, promoting a greener and more eco-friendly community.Extended Lifespan of Lighting Fixtures: Dimming or turning off street lights when they are not needed can extend the lifespan of the lighting fixtures. This reduces maintenance costs associated with replacing bulbs and fixtures, as well as the inconvenience of streetlight outages.Adaptive Lighting: Smart systems can adapt to changing conditions in real-time. For example, they can brighten street lights when motion is detected, improving safety for pedestrians and drivers. This adaptive behavior enhances overall security in the area.

DISADVANTAGES:-Initial Cost: Implementing the system requires an upfront investment in technology and installation, which can be expensive.Maintenance Complexity: Smart systems may require regular maintenance and technical to ensure they function correctly.Dependency on Technology: If the system malfunctions or experiences technical issues, it could result in periods of inadequate lighting.

CONCLUSIONS

A usage of energy consumption increases every year because of demand and usage by human. Electricity usage is very important for human kind to do work or daily routine, such as run machine, wash cloth in washing machine, do coffee with coffee maker and other daily routine. So the usages of electricity increase every year. The objective of this project is to investigate and reveal the details process on their approach, method and technique use in order to develop the energy saving smart light control system.

ACKNOWLEDGEMENT :-

The future scope of automatic light intensity control using LDR includes integration with IoT for remote monitoring and control, as well as energy-efficient adaptive lighting algorithms for enhanced sustainability

REFERENCES

1. Shafie, S.M., Mahlia, T.M.I., Masjuki, H.H. and Andriyana, A. (2011) Current energy usage and sustainable energy in Malaysia: A review, Renewable and Sustainable Energy Reviews, Vol. 15(9), pp. 4370-4377. https://doi.org/10.1016/j.rser.2011.07.113

2. Geun Young Yun, Hyo Joo Kong, Hyoin Kim, and Jeong Tai Kim (2012) A field survey of visual comfort and lighting energy consumption in open plan offices, Energy and Buildings, vol. 46 (2012), pp. 146-151.

3. Azlina, A.A. and Kamaludin, Mahirah & Abdullah, E.S.Z.E. & Radam, Alias (2016) Factors influencing household end-use electricity demand in Malaysia. 22. 4120-4123. 10.1166/asl.2016.8189.

4. Tejman Chaim, Henry (2012) Bends of light explanation, retrieve from http://www.grandunifiedtheory.org.il/Book9/Bends oflight.htm 5. Welhenge, Anuradhi (2014) Lighting Control System for Energy Saving. 8 th Asia Modelling Symposium, pp. 53-55