

# AUTOMATED STREET LIGHTING AND SMART WASTE MANAGEMENT

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**Abstract** - 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. Automation play a vital job on the world's economy and in day by day experience. 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.

This Waste management is one of the serious challenges of the cities, the system now used in cities, we continue to use an old and outmoded paradigm that no longer serves the entail of municipalities, Still find over spilled waste containers giving off irritating smells causing serious health issues and atmosphere impairment. The Smart Waste Management System will simplify, with the Web applications and mobile phone, the solid and hydric waste inspecting process, and the management system of this presentation's total collection process.

In daily operations related to watering is the most important practice and the most labor-intensive task. No matter whichever weather it is, either too hot and dry or too cloudy and wet, you want to be able to control the amount of water that reaches your plants. Modern watering

systems could be effectively used to water plants when they need it. But this manual process of watering requires two important aspects to be considered: when and how much to water. In order to replace manual activities and making gardener's work easier, we have create automatic plant watering system.

**Key Words:** ATmega328pmicrocontroller, Passive infrared sensor, Soil moisture sensor, IR sensor, Wi-Fi Module(ESP8266), LCD 16x2.

## 1. INTRODUCTION

A smart city uses a framework of information and communication technologies to create, deploy and promote development practices to address urban challenges and create a joined-up technologically-enabled and sustainable infrastructure. Needs no manual operation for switching on and off. When there is a need of light it automatically switches ON. When darkness rises to a certain level then sensor circuit gets activated and switches ON and when there is other source of light i.E. Daytime, the street light gets OFF. The sensitiveness of the street light can also be adjusted.

It is project which supports Swach Bharat Abhiyan.This concept helps to maintain our environment clean and pollution free. We have also implemented Sensor Based Waste Collection Bins is used to identify status of waste bins if it is empty or filled so as to customize the waste collection schedule accordingly and also save the cost. Real time waste mangement system by using smart dustbins to check the fill level of dustbins whether the dustbins are full or not, through this system the information of all smart dustbins can be accessed from anywhere and anytime by the concern person. It will inform the status of each and every dustbin in real time so that concerned authority can send the garbage collection vehicle only when the dustbin is full. By implementing this system resource optimization, cost reduction, effective usage of smart dustbins can be done.

In daily operation related to watering the plants are the most important cultural practice and the most labor-intensive task. No matter whichever weather it is, either too hot and cold or too dry and wet it is very crucial to control the amount of water reaches to the plants. So, It will be effective to use an idea of automatic plant watering system which waters plants when they need it.In this system or project, the soil moisture sensors sense the moisture level in the soil and automatically switch on the water pump accordingly to supply water to the plants.

The Smart City Water System is another interesting way to help manage water better. Rather than focusing on improving efficiency, it uses a network of sensors to monitor urban sewer systems. Naturally, it can find efficiency solutions, but it also pays attention to illegal discharges or unusual contaminants.

## 1.1 Objective

- The main purpose of this project “automatic street light control with different light intensity and to save energy.
- The major objective of this proposed system is to stop the dustbin overflowing around the road side and localities as smart bins are used in real time. This can create the surrounding area a neat and clean while eliminating the overflow of the wastage outside the dustbin due to regular cleaning of the dustbin.
- Making watering system automated. Ensure enough moisture essential for plant growth.

## 2. LITERATURE SURVEY

- 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, ne 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 deveVC X loped to give the benefits of operating and controlling light intensity, automatic running of street lights and scheduling through web browser.

## 3. METHODOLOGY

### 3.1 System Block Diagram

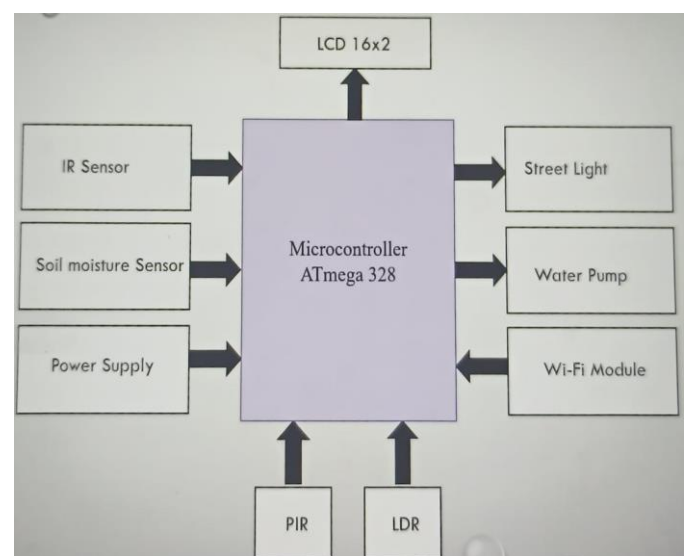


Fig 1. Basic Block Diagram

### 3.2 Hardware Requirements

**1]AT-Mega 328 :** The AT-mega 8-bit AVR RISC-based microcontroller combines 32 KB ISP flash memory with read-while-write capabilities, 1 KB EEPROM, 2 KB SRAM, 23 general-purpose I/O lines, 32 general-purpose working registers, 3 flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, 6-channel 10-bit A/D converter (8 channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and 5 software-selectable power-saving modes. The device operates between 1.8 and 5.5 volts. The device achieves throughput approaching 1 MIPS/MHz.

**2]Passive infrared sensor :** A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often

used in PIR-based motion detectors. PIR sensors are commonly used in security alarms and automatic lighting applications.

PIR sensors detect general movement, but do not give information on who or what moved. For that purpose, an imaging IR sensor is required.

PIR sensors are commonly called simply "PIR", or sometimes "PID", for "passive infrared detector". They work entirely by detecting infrared radiation (radiant heat) emitted by or reflected from objects.

**3]Soil moisture sensor :** Soil moisture sensors measure the volumetric water content in soil. Since the direct gravimetric measurement of free soil moisture requires removing, drying, and weighing of a sample, soil moisture sensors measure the volumetric water content indirectly by using some other property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture content.

**4]IR sensor :** The IR sensor or infrared sensor is one kind of electronic component, used to detect specific characteristics in its surroundings through emitting or detecting IR radiation. These sensors can also be used to detect or measure the heat of a target and its motion. In many electronic devices, the IR sensor circuit is a very essential module. This kind of sensor is similar to human's visionary senses to detect obstacles.

**5]Wi-Fi Module(ESP8266) :** The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all WiFi networking functions from another application processor.

This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime. . The ESP8266 supports APSD for VoIP applications and Bluetooth co-existence interfaces, it contains a self-calibrated RF allowing it to work under all operating conditions, and requires no external RF parts.

**5]LCD 16x2 :** 16x2 LCD is one kind of electronic device used to display the message and data. The term LCD full form is Liquid Crystal Display. The display is named 16x2 LCD because it has 16 Columns and 2 Rows. it can be displayed (16x2=32) 32 characters in total and each character will be made of 5x8 Pixel Dots. These displays are mainly based on multi-segment light-emitting diodes.

### 3.3 Software Requirements

Proteus, Arduino, Node MCU

Language Used : C, C++

## 4. CONCLUSIONS

### 4.1 Advantages

1. Huge reduction of energy and maintenance cost.
2. Increased public safety from improved lighting.
3. Safer traffic due to increased visibility of hazards.
4. Measurable environmental impact due to reduced energy consumption.

### 4.2 Disadvantages

1. The automatic street light system requires a higher initial investment in comparison to conventional street lights.
2. LDRs are highly inaccurate with high response time (about 10s or 100s of milliseconds).

### 4.3 Applications

1. Government Units & Municipalities – Government organizations can save large sums of money by using an automatic solar street light system for outdoor lighting.
2. Along Roads & Highways – High-quality automatic street light systems can enhance night-time visibility on rural roads, main roads & highways. These are also very easy to install & are affordably priced.
3. Parks & Recreational Areas – Areas which are mainly donned by children can make good use of automatic street light systems. They are safe & secure & provide uniform lighting & the right amount of luminosity to parks.
4. Corporate & Big Businesses – Many companies nowadays are applying green energy technologies & practices to reduce their carbon footprint. Installing automatic street light system can prove to be a step in this direction.

### 4.4 Conclusion

- It combines safe lighting protocols with consumption of minimal amount of power. The energy savings, as discussed before are phenomenal.
- 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 in further saving of energy and reduction in operational costs.
  - The Smart City agenda entails improving the citizens' quality of life, strengthening and diversifying the economy while prioritizing environmental sustainability through adoption of smart solutions.
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