Siddaganga Institute of Technology

Department of Artificial Intelligence of Data Science

X BROWSE

Smart Street Lights

A SMART AND EFFECTIVE ARRANGEMENT OF SENSOR FITTED STREET LIGHTS AND NORMAL STREET LIGHTS.

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PROBLEM STATEMENT :

- The current arrangement of street lights lacks efficiency and results in unnecessary energy consumption. There is a need to develop an optimized arrangement that maximizes energy savings while ensuring adequate illumination for pedestrians and vehicles.

EDITION 🇮🇳 IN ∨   📍DELHI ☁ 41°C   THE TIMES OF INDIA

City   **Indore** Mumbai Delhi Bengaluru Hyderabad Kolkata Chennai Agra Agartala Ahmedabad Ajm

WEATHER   MP ELECTIONS

NEWS / CITY NEWS / INDORE NEWS / 8,000 Street Lights On 24 Hours, Cost IMC Rs 12L/ Mon...

🔴 TRENDING   Mumbai Murder Case   Cyclone in Mumbai   Bangalore Electricity Bill   Cyclone Bipa ‹ ›

🕒 THIS STORY IS FROM APRIL 18, 2019

8,000 street lights on 24 hours, cost IMC Rs 12L/ month

India's 35 million street lights consume 1.5 percent of the country's energy—equal to all the energy consumed by Costa Rica every year.

~Ministry of MSME, Government of India

ABSTRACT :

- The proposed arrangement aims to reduce energy consumption by activating sensor lights only when motion is detected, while ensuring that normal lights provide continuous illumination.

- The arrangement will be designed to ensure sufficient lighting levels for the safety and visibility of pedestrians and vehicles.

- The successful implementation of an optimized arrangement will lead to significant energy savings, reduced carbon footprint, and improved sustainability of street lighting systems.

- The project will consider the cost implications of implementing the proposed arrangement and assess the potential return on investment through energy savings.

IMPLEMENTATION -

- The implementation of this arrangement is quite simple.

- The sharp turns, blind spots, accident prone areas as well as the areas that require sufficient lighting will still be provid ed with arrangement of normal on/off street lights to ensure safety.

- Sensor lights will be introduced in between normal lights in such a way that the normal lights would still provide enough illumination on roads and sensor fixed lights will be provide greater illumination on detection of heavy motion viz a viz motion of heavy objects, along with this these sensor fixed lights will keep on providing small amount of illumination.

- Hence, the sensors will be formed in such a way that they detect heavy motions and ignore simple daily life motions like swaying of leaves, trashes etc.

- Investigating agencies (Police):

  - The control of these smart lights can be given to investigating agencies like the police department so that in case of criminal activities lets say in a car chase the police department can analyze the routes the criminal would take and track down the criminal by altering the lights on the same routes.

  - Similarly, the police can control the lights of the area where they might want to conduct an operation aur where a criminal activity might be going on.

DESIGN :

- The sensor circuits of smart street lights will be designed in such a way that they will be able to detect the motion of an incoming potential moving object in advance so that they react in time to provide required and sufficient illumination.

- When the road movements are silent and there is very less movement on the roads the smart street lights will remain on lower intensity viz a viz saving energy.

- Suppose the illumination range of a normal street light is of radius 15 metre, now we can say that in the circle of area $1257m^2$ there is continuous an proper illumination, now in succession with this light is a sensor fixed light. This sensor fixed light will detect the moving object well before it enters the illumination circle of the sensor fixed light.

- The moment the movement of such heavy objects will be detected in the $79m^2$ area illumination circle for the normal light, the sensor fixed light will detect it and shift to higher intensity to illuminate the road ahead.

- The sensor fixed light can keep it's intensity high if the motion of such heavy objects is followed by the movement of other heavy objects or it can turn it's intensity low to save energy.
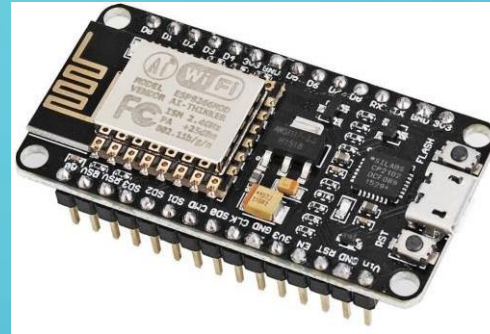
OVERVIEW :
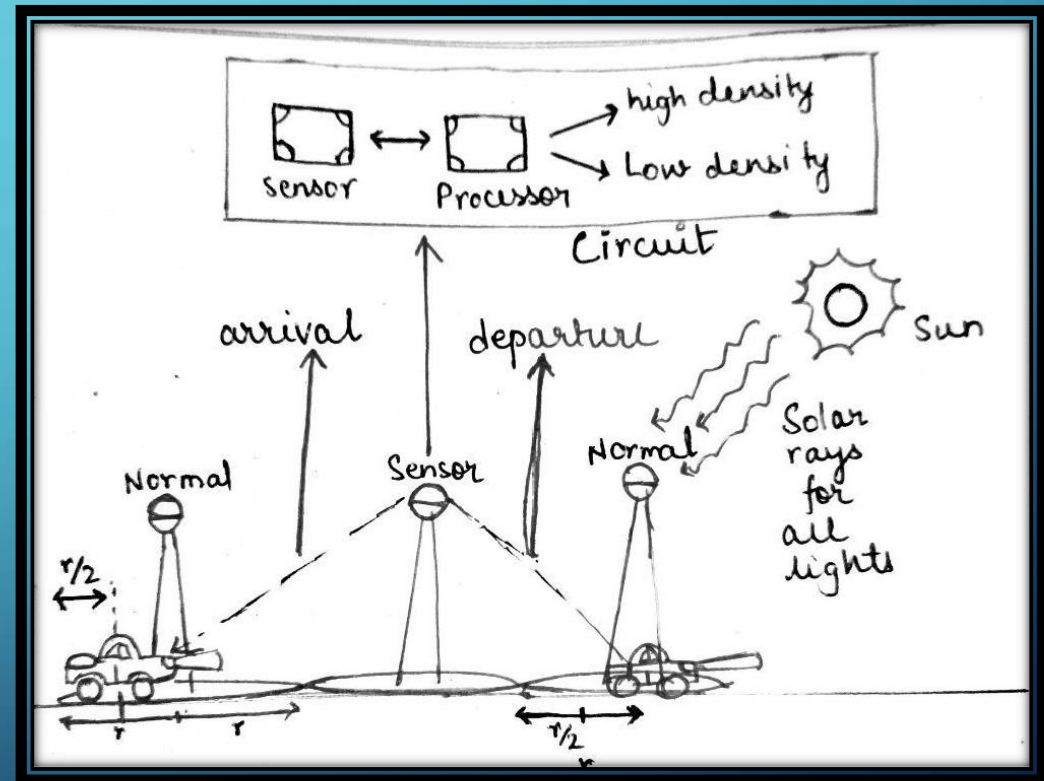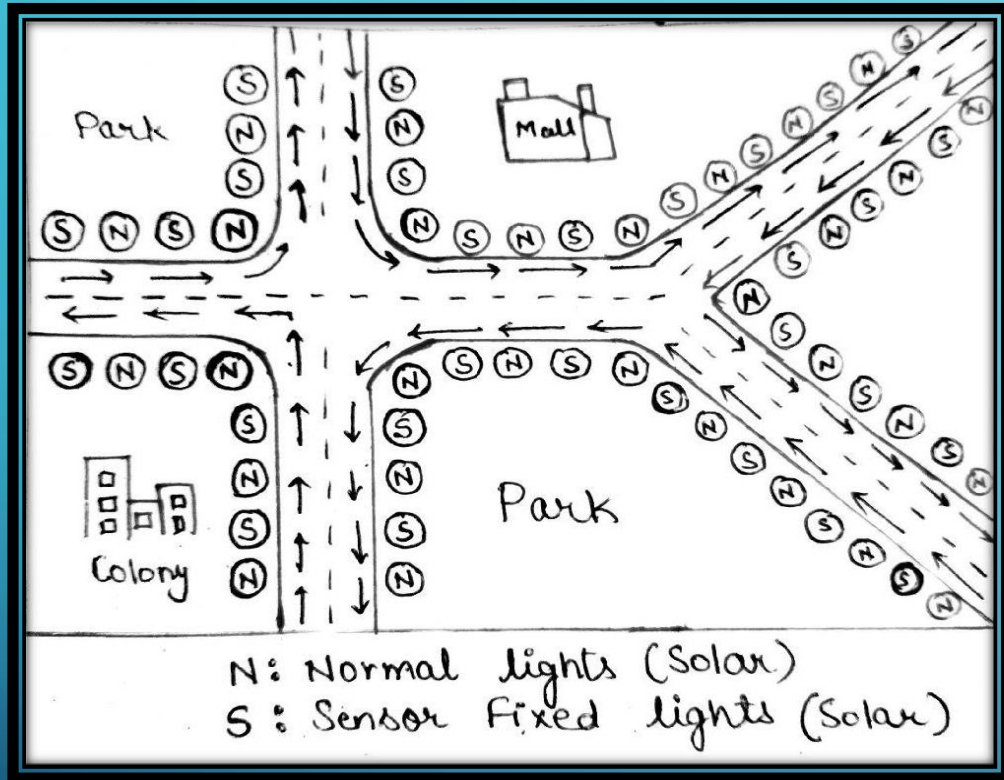
Motion sensor

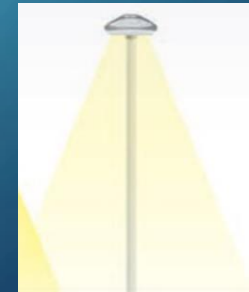**NodeMcu Wi-Fi Development Board - ESP8266**

Motion detection

High density triggered

Low density triggered

LITERATURE SURVEY :

- Market potential:

The market potential for Smart Street Lights is significant, given the increasing focus on sustainable development and smart city initiatives. With the rising need for energy-efficient solutions and advancements in IoT technologies, there is a strong demand for upgrading traditional street lighting infrastructure. Our project targets municipalities, city authorities, and urban development agencies seeking to enhance their lighting systems and transform their cities into smarter, more efficient urban environments.

- Financial Considerations:

The financial aspects of the project will be structured based on the specific requirements and scope of implementation. The costs will include equipment procurement, installation, software development, and ongoing maintenance. Revenue generation can be through a combination of project contracts, maintenance contracts, and potential partnerships with utility companies for energy savings sharing.

- Maintenance Cost Reduction:

Smart Street Lights equipped with remote monitoring and predictive maintenance capabilities can help reduce maintenance costs. Traditional street lights require periodic physical inspections, which can be time-consuming and costly. With your project, you can estimate the reduction in maintenance costs by minimizing manual inspections and enabling targeted maintenance based on real-time data.

- Improved Lighting Control:

By implementing motion sensors and adaptive lighting features, you can estimate the potential reduction in energy consumption during low-traffic or late-night hours. Studies suggest that adaptive lighting systems can save an additional 20-30% of energy by dimming or turning off lights when not needed.

- Operational Efficiency:

Smart Street Lights can offer operational benefits such as real-time fault detection, instant notification of malfunctions, and remote-control capabilities. These features can help reduce response and repair times, resulting in improved operational efficiency and minimized downtime.

COMPONENTS :

ITEM	QUANTITY	PRICE
Solar LED Lights	1	7500 Rs.
Motion Sensors	1	1500 Rs.
NodeMcu Wi-Fi Development Board - ESP8266	1	600 Rs.
Communication Modules (Bluetooth/Wi-Fi/Cellular)	1	700 Rs.

Total Price: 15,990 Rs./Light Module

Price of Solar Conventional Street Lights : 23,000 Rs./Light Module

FUTURE ADVANCEMENTS -

- Image Processing: Including cameras with object identification capabilities to demote the possibilities of theft in illuminated, targeted areas.

- Use of machine Learning: To identify, analyse and control the intensities of light depending on the area.

- Inclusion of GPS trackers, Weather sensors.

COMPARISON :

- The current arrangements of sensor fixed lights in cities of London, New York and San Francisco include 100000, 300000 and 250000 of sensor fixed street lights but as per the surveys their arrangement can be made more efficient.

- The reason of such inefficiency is due to use of only sensor fixed street lights and specifically only them.

- Hence, our arrangement focuses on creating an arrangement of sensor fixed lights and conventional street lights.

REFERENCES -

- [1]   Ameen, M., et al. (2018). Smart street lighting control and monitoring system for electrical power saving by using VANET. Sustainable Cities and Society, 41, 402-410.

- [2]   Tsanakas, P., et al. (2019). Adaptive smart lighting control for energy efficiency in smart cities. Energies, 12(2), 202.

THANKYOU

Let's build a better energy efficient future