ISSN: 2395-7852

International Journal of Advanced Research in Arts, Science, Engineering & Management (IJARASEM)

Volume 11, Issue 2, March 2024

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

IMPACT FACTOR: 7.583

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| ISSN: 2395-7852 | www.ijarasem.com | Impact Factor: 7.583 | Bimonthly, Peer Reviewed & Referred Journal|

| Volume 11, Issue 2, March 2024 |

Study on Energy Efficient Smart City

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ABSTRACT : Rapid migration from rural to urban areas leads to the emergence of urbanization and sustainability problems. Management and monitoring of resources and infrastructures are getting more important today in crowded cities. Energy consumption is increasing with the growing population and intensified in highly populated parts of cities. This increased energy consumption results in high energy demand as well as the production of more pollutants and heat in these city parts. The management of pollution and heat problems leads to an additional energy demand. Therefore, energy efficiency is becoming central challenge for urban life similar to energy efficient structuring of living organisms. Practically, all activities arranging city life require energy. For instance, job activities, transportation, security, climate, catering, entertainment, commerce etc. In this study, we review active and passive approaches, which can be utilized for improvement of energy efficiency and thus sustainability of urbanization in today's cities. We give a discussion to present a vision for future smart cities in term of improvement of energy utilization and efficiency, and relieve of environmental issues. These approaches can be helpful for future cities for relieving issues originating from population increase.

PMC is the first urban local body in the country to take up implementation of environment friendly housing program since 2007 - Adopted green rating system (GRIHA) - which is a green building design evaluation system - Rooftop solar mandatory for certain buildings in PMC area.

Achieve maximum savings on energy utilized and controlled under public realm such as Street lights, government buildings etc. - Promote the use of energy efficient technologies by putting in proper incentive structure

Following projects proposed in local area - LED street lighting to go from the current level of 7% to 85% - Use of dimmers for sodium vapor lamps which cannot be replaced by LEDs - Incentive structure already in place to promote green buildings (extra FSI depending on the star rating of the building) - Increase in solar through RESCO model

KEYWORDS: Energy Efficient Smart Street Light For Smart City Using Sensors, Solar Panel With Sun Position Tracking, Smart Waste Dustbin With Alarming System, Wireless Car Charging.

I. INTRODUCTION

Smart street light is an intelligent control of street lights to optimize the problem of power consumption of the street, late in night. Conventional street lights are being replaced by Light Emitting Diode (LED) street lighting system, which reduces the power consumption. The focus of this project is to design a system of street lights controller to provide a reduction in power consumption.

The aim of this project is to ensure the sunlight rays are falling perpendicularly on the solar panel to give the maximum solar energy. Normally a solar panel converts only 30 to 40 per cent of the incident solar radiation in to electrical energy. An automated system is required to get a constant output, which should be capable to constantly rotate the solar panel. The sun tracking system was made as a prototype to solve the problem.

The present waste management disposal methods in our nation, such as burial, open-air burning, and open dumping, were found to be ineffective and detrimental to public health and the environment. The outdated waste management method, where cleaners are saddled with the responsibilities to empty the waste bins periodically. Such plan has a lot of demerits. The present day situation shows that waste bins positioned in

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our environment are often times spill over due to the significant rise in waste generated daily. Thus creating an unhealthy environment for the citizens and producing foul odour around such location. This bring about the spread of some diseases and human illness. Routine checks for disposing the waste are not efficient as waste bin often get filled early. The sight of overfull waste bin and waste being spilled out of it is common all around our nation, Large number of diseases causing organisms and insects bred on it. An improper urban waste collection may indulge in causing several problems such that it affects the environment, the nations and the citizens. In the recent times, management of waste is of crucial interest in the urban cities. Therefore, the use of smart dustbin in our nation can minimize, if not eradicate this challenge

The cost of energy sources like petroleum and diesel has been consistently increasing due to the rising number of vehicles and excessive fuel consumption. The depletion of these exhaustible sources of energy is also a significant cause for concern. Conventional vehicles are major contributors to greenhouse gas emissions.

However, the future of automobile technology is changing, with electric vehicles being seen as a replacement for traditional combustion engine vehicles, leading to a reduction in CO2 emissions. Plug-in electric vehicles, which are powered by alternate sources of energy, have been proposed as a solution for eco-friendly transportation.

Although the usage of plug-in electric vehicles is increasing, there is a need for further advancements to overcome the current limitations of battery technology. Moreover, charging-related issues have prevented many consumers from choosing plug-in electric vehicles. This is the most significant issue being investigated in this field currently.

To address this problem, this proposed project uses Faraday's laws of electromagnetic induction to transfer power without physical force connectors. According to Faraday's law, when a coil is stimulated, electromagnetic field lines are induced in the coil, which can be connected to the magnetic field lines generated by another coil.

The transfer of electrical power without physical connections is known as Wireless Power Transfer. The proposed Wireless Power Transfer system is activated when the vehicle arrives at the charging area. The primary coil is activated, and it induces the secondary coil available in the EV, which is then connected to the battery, leading to its charging.

II.LITERATURE REVIEW

No.	Paper Title	Author Name	Key Points	Remark
1	In this paper, "Energy efficient street light controller for smart cities.	N. khatavkar, A. A. Naik and B. Kadam	Smart street light is an intelligent control of street lights to optimize the problem of power consumption of the street, late in night.	The aim of this project is to ensure the sunlight rays are falling perpendicularly on the solar panel to give the maximum solar energy. Normally a solar panel converts only 30 to 40 per cent of the incident solar radiation in to electrical energy. An automated system is required to get a constant output, which should be capable to constantly rotate the solar panel. The sun tracking system was made as a prototype to solve the problem.

2	In this paper Microcontroller Based Automatic Solar Power Tracking System.	Nirmal, H. B., and Naveed, S. A., 2013	This project is to ensure the sunlight rays are falling perpendicularly on the solar panel to give the maximum solar energy. Normally a solar panel converts only 30 to 40 per cent of the incident solar radiation in to electrical energy.	An automated system is required to get a constant output, which should be capable to constantly rotate the solar panel. The sun tracking system was made as a prototype to solve the problem. It will be automatic and keeps the panel in forward-facing of sun until that is visible.
3	In this paper " IOT Based Intelligent Bin for Smart Cities".	Meghana K C, Dr. K R Nataraj	The present day situation shows that waste bins positioned in our environment are often times spill over due to the significant rise in waste generated daily. Therefore, the use of smart dustbin in our nation can minimize,By using Smart bin.	The sight of overfull waste bin and waste being spilled out of it is common all around our nation, Large number of diseases causing organisms and insects bred on it. An improper urban waste collection may indulge in causing several problems such that it affects the environment, the nations and the citizens. In the recent times, management of waste is of crucial interest in the urban cities. Therefore, the use of smart dustbin in our nation can minimize, if not eradicate this challenge.
4	In this paper "Wireless Charging of Electric Vehicle." International Research Journal of Engineering and Technology,	S. Manurkar, H. Satre, B. Kolekar, P. Patil, S Bailmare,	Wireless charging systems can also provide more flexibility in terms of where and how electric vehicles can be charged. With wireless charging, charging pads can be installed in a wider range of locations, including parking lots, garages, and even on the street.	The development of wireless charging technology also presents an opportunity for innovation. As the technology improves, we may see new applications emerge, such as dynamic wireless charging that can charge electric vehicles while they are in motion.

III. METHODOLOGY

The Light Dependent Resistor (LDR) will act as sensor that can adjust the light intensity for different situation. If less than 80% of sunlight is detect, light will turn on. the overall of the system has been showed. Arduino Uno will have two ways of communication with street light. A 9V battery is used to support the voltage from the Arduino. Two types of sensors are used in this project which is LDR to detect the darkness of surrounding and IR sensor to detect the speed of object.

The principal source of light energy, the Sun, moves from east to west. This movement of the Sun causes the variation in the level of light intensities falling on the two LDRs. The designed algorithm compares the variation in the light intensities inside the microcontroller and the motor then is operated to rotate the solar panel, so it moves aligned with the trail of the light source.

This project work is the implementation of Automatic Garbage Fill Alerting system using Ultrasonic sensor, Arduino Uno, Buzzer and Wi-Fi module. This system assures the cleaning of dustbins soon when the garbage level reaches its maximum. It will take power supply with the help of Piezoelectric Device .If the dustbin is not cleaned in specific time.

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| Volume 11, Issue 2, March 2024 |

According to Ampere's law, an alternating current generates a magnetic field around the primary coil. The resulting time-varying magnetic field induces an electromagnetic coupling effect in the secondary coil. This induced field creates a voltage across the secondary loop, which is in accordance with Faraday's law. The primary coil, commonly referred to as the charging paddle or inductive coupler in Magne-Charge systems, is integrated into the vehicle's charging port.

Fig.1 Automatic Street Light

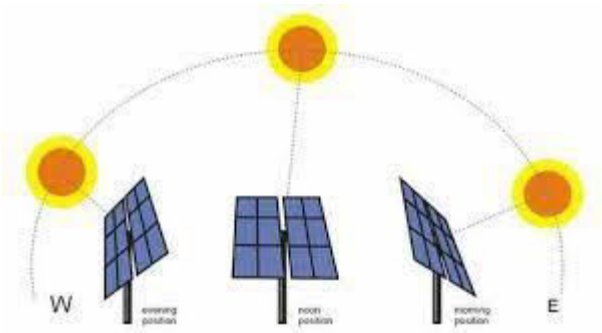

fig.2 solar tracker system

Fig.3 Reading of Column

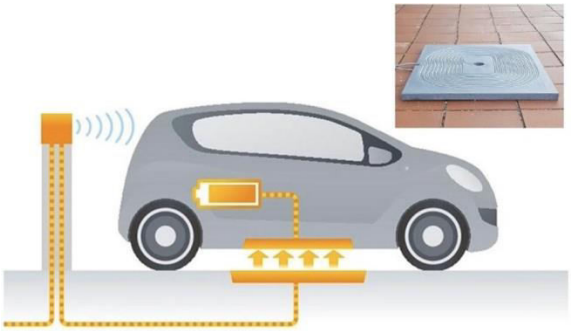

fig.4 Wireless Car Charging

IV. CONCLUSION

1. The goal of this project was to control the intensity of the street lights between 7.00 pm until 7.00 am. This project is really important to be implemented because it can reduce the huge waste of power consumption
by conventional street lights.
2. An Arduino solar tracker was designed and constructed in the current work. LDR light sensors were used to sense the intensity of the solar light occurrence on the photovoltaic cells panel.
3. This project work is the implementation of Automatic Garbage Fill Alerting system using Ultrasonic sensor, Arduino Uno, Buzzer and Wi-Fi module. This system assures the cleaning of dustbins soon when the garbage level reaches its maximum. It will take power supply with the help of Piezoelectric Device .If the dustbin is not cleaned in specific time.
4. The primary opportunity presented by wireless charging technology is convenience. By eliminating the need for physical cables and plugs, drivers can simply park their cars over a charging pad, which can save time and hassle.

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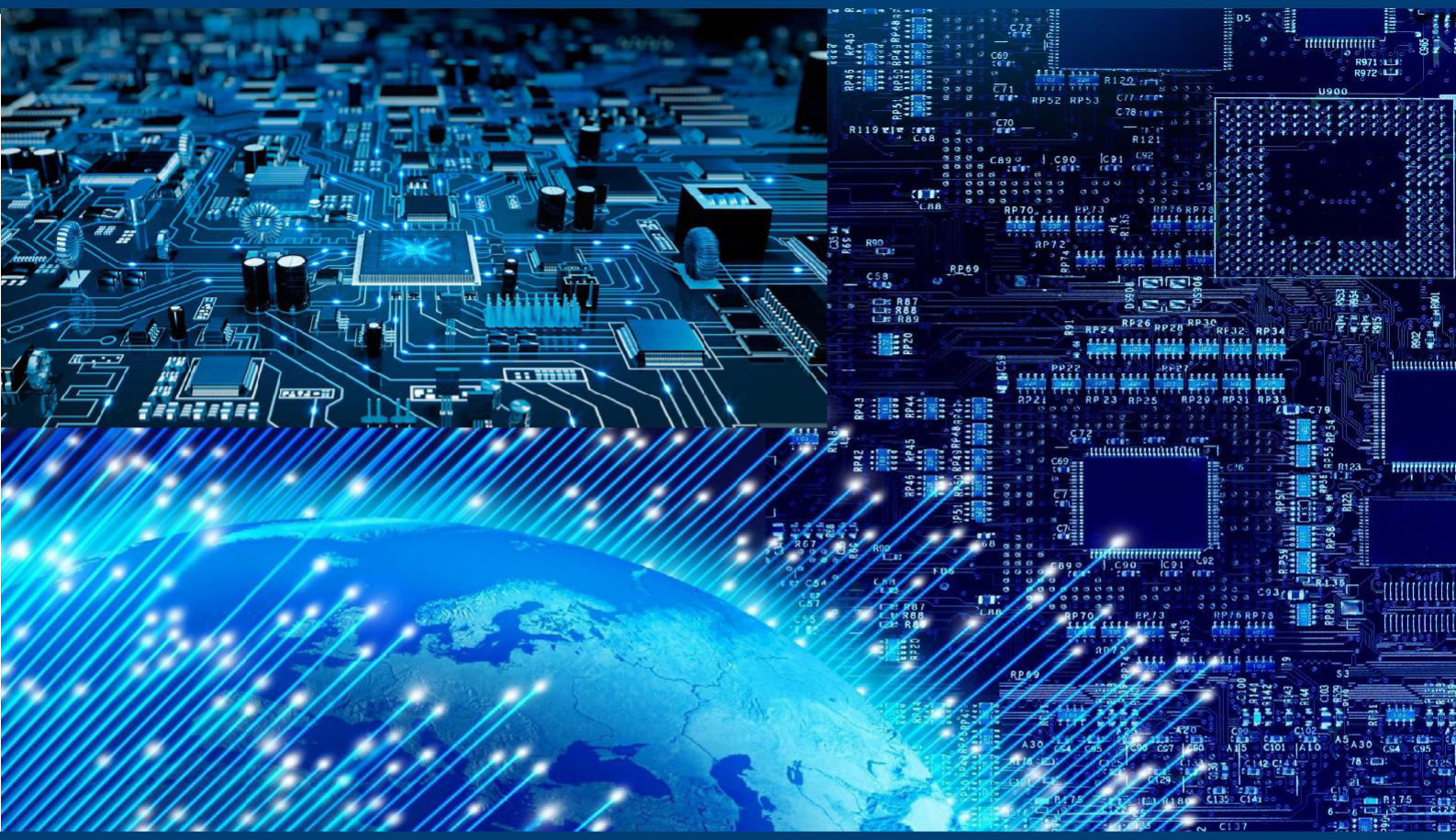
[4] S. Manurkar, H. Satre, B. Kolekar, P. Patil, S Bailmare, Wireless charging systems can also provide more flexibility in terms of where and how electric vehicles can be charged. With wireless charging, charging pads can be installed in a wider range of locations, including parking lots, garages, and even on the street.



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