iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 12 **Issue:** V **Month of publication:** May 2024

DOI: https://doi.org/10.22214/ijraset.2024.62063

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 12 Issue V May 2024- Available at www.ijraset.com

Smart Car Parking System and Generation of Piezoelectric Energy

Shreyansh Dubey[1], Siddharth Srivastava[2], Srijit Pandey[3], Ritu Agarwal[4]
Department of Electronics and Communication Engineering, ABES Engineering College, Ghaziabad, Uttar Pradesh, India

Abstract: ***In the past few years, parking has become a costly commodity in virtually every major urban region on the earth, and scarcity is a contributing factor to traffic jam and air pollution in urban areas. The most popular method to obtain a parking place is to do it manually, in which the drivers looks for a parking area either through experience or by luck. This method takes time and effort, and it may result in the worst-possible situation of not finding a parking place if vehicle is in a place with a high vehicle density. An effort is made here to park the vehicle as well as to find a parking space for the vehicle with a framework of Smart Parking System(SPS) which is based on the law of conservation of energy in we basically convert the elements from mechanical energy into electrical energy. This document Allow user to Automatically find a free site for parking at low cost without wasting much fuel and time.***

Indexed Terms: Elements, Car Parking, Electrical & Mechanical energy, Smart Parking, Law of conservation of energy, Smart City

I. INTRODUCTION

All over the world people living in the urban space are facing a significant issue of lack of parking space. Number of vehicles is far more than the number of members in the family, thus making situation worse, and demanding a smart and better solution to the concerned issue. On weekdays, approximately 40% of the roads have been covered by vehicles in the parking lot. The growing ability of Low salary group to own vehicles, especially cars has additionally complicated the situation. Cities and towns are facing supply and demand proportion issue, thus creating problems for both drivers or space providers. The existing parking system learns the user's dissatisfaction. All vehicles must be parked somewhere if the drivers leave. People have trouble finding and remembering parking places because they are disorganized. As you reach the region, time is lost looking for a parking space, and we wander around several sites looking for any available free space. Sometimes, the driver may not see the empty space or wander around unaware that the parking space is full, until and unless driver re-contact to the parking space, he will not be able to identify vehicles in large areas while fetching them. This consumes valuable time and allows for irritation, wastage of fuel, pollution, and traffic jam. For Overcoming such issues, these types of smart parking systems are important in big cities. Here comes the importance of a smart car parking system (SPS) framework. The main goal of a smart piezoelectric-based parking system is to use power using the piezoelectric element. The Piezoelectric element holds potential to generate electricity by converting mechanical energy into electrical energy. The system uses various sensors and controls that control the system automatically. This paper describes the Piezoelectric Based Smart Parking System that uses, the LDR sensor, the IR sensor and the L293D Motor Driver IC used for automated parking. This program contains an LDR sensor that controls light function by turning on or they are automatically extinguished in the parking lot. The system has automatic exit gates operated by the RFID System for cash withdrawals. The energy generated by the piezoelectric solar panel and roof is used to power the entire system and help save energy from the power grid. The main aim of the project is to generate energy from the electric part of the Piezo when the car enters the parking garage. For example, a car entering a piezoelectric parking garage will bring power as a result of the opening left will continue to show the green of the empty space and red in the operating area.

II. HARDWARE REQUIRED

1) *Battery:* As shown in figure 2.1. it stores the quantity of power created by the piezoelectric and solar panels for future generations.



Figure.2.1-Batteries

©IJRASET: All Rights are Reserved

2) *LDR Sensor:* As shown in figure 2.2. An LDR is a component whose resistance varies with the amount of light that strikes it.



Fig.2.2- A LDR sensor

3) *IR Sensor:* As shown in figure 2.3. Radar technology is used by infrared sensors to radiate out and strikes objects in its vicinity to bounce back to the device's receiver.



Fig.2.3-A IR sensor

4) *AT Mega16:* As shown in figure 2.4. This microcontroller is utilized to control the entire system.



Fig2.4.-A AT MEG16

5) *Printed Circuit Board:* As Shown in Figure A zero-level PCB is used to house the microcontroller, voltage regulator, and integrated circuits.



Fig.2.5.- A PCB Board

6) *Jumper Wires:* As shown in figure 2.6. a jumper wire is used to connect the components to the microcontroller.



Fig2.6.-Jumper wires

7) *L293D Motor Driver:* As shown in figure. This motor assists in driving a dc motor.



Fig.2.7- A L293D Motor driver

8) Display: As shown in Figure 2.8. a Display indicates if a parking place is empty or occupied.



Fig.2.8- Display

9) Solar Cell: As Shown in figure 2.9.a Solar cells use the photovoltaic effect that convert light energy into electricity, results in electrical charges which travels freely in semiconductors.



Fig2.9.- A Solar Cell

III. WORKING OF SMART PARKING SYSTEM

When the automobile arrives at the entry of parking space, the infrared sensors detect its presence and open the gate, allowing the car to enter. The vehicle then passes through a door with a piezoelectric element, and the power output of the vehicle is precisely proportional to the piezoelectric output. The solar panel on the roof generates daytime energy as well, and both types of energy are stored in batteries to keep the system working. Using IR sensors, the display portion in the parking lot exhibit the amount of unoccupied lots and lodging space in the parking space. The system also includes an LDR sensor, which regulates the operation of parking lights. If the drivers leave, all vehicles must be parked somewhere. People have a difficult time finding and remembering a parking spot because of the parking lots. Time is spent looking for a parking space, hence the parking system is meant to solve the problem.

IV. CIRCUIT DIAGRAM

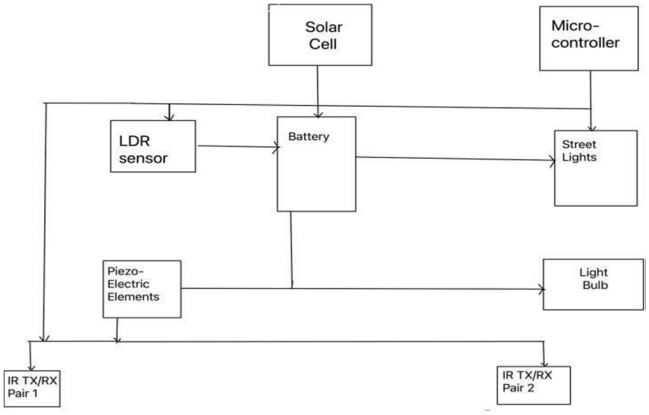


Fig. 4.1- Circuit Diagram

V. CONCLUSION

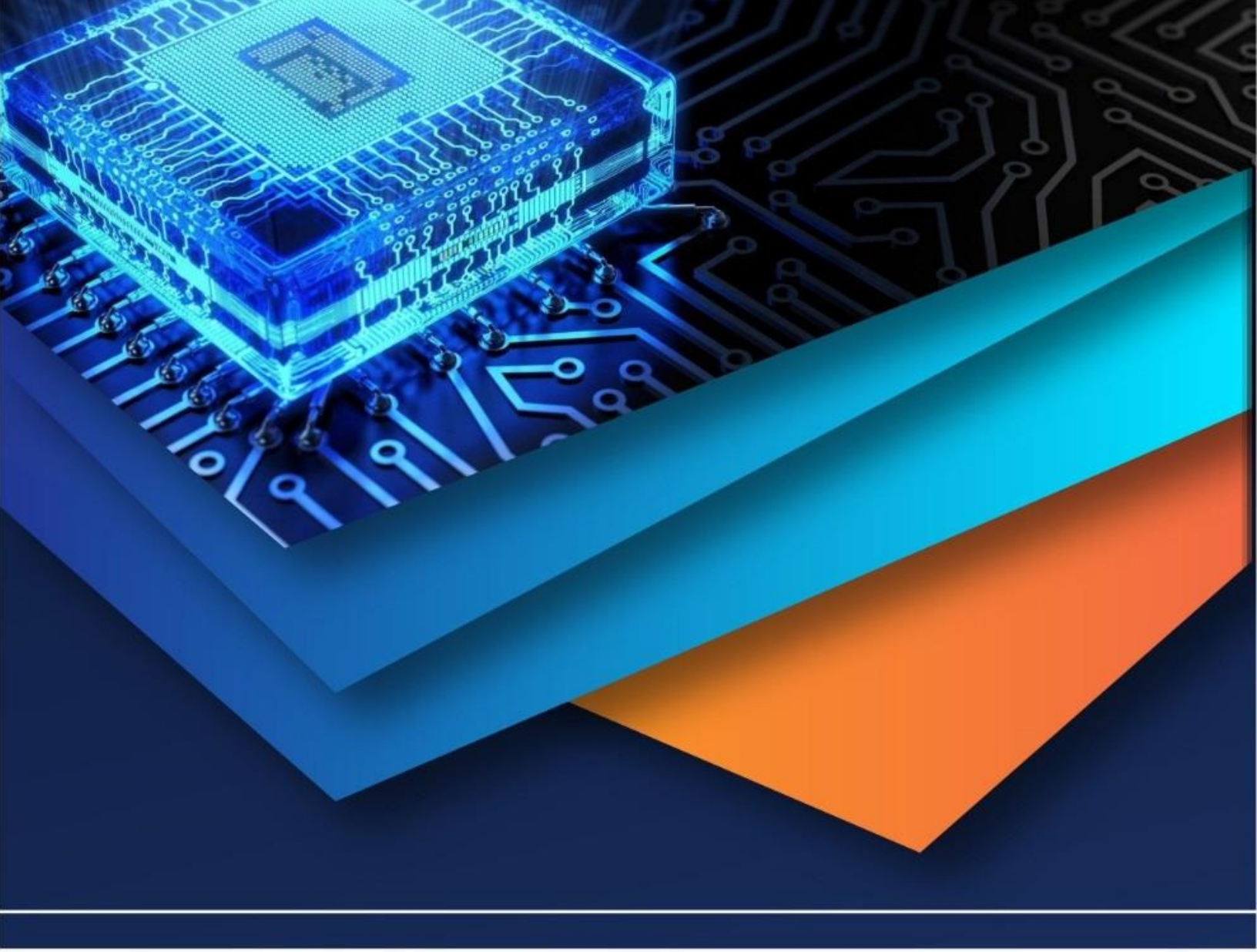
Suggested work includes an excellent system of parking which directs several cars to nearest parking lot at a given time based on location of the parking spot. The Parking Control Unit is required by the client to monitor the availability of easily accessible parking spots. When a client requests it, all free access points are displayed to the client. Parking is continuously monitored in real scenario, and spot status is updated. We can simplify parking and cut fuel usage by leveraging knowledge. People will be able to travel for free thanks to the automatic parking costs structure. It will also reduce waiting time, long lines, difficulty, and pressure while increasing the parking frame's efficiency. A smart parking management framework can be used to govern air, sea and land transportation. The gadget can be connected to the Home Automation framework, which can manage the various home appliances by analyzing if the client arrives or exits the parking lot, with private and indoor parking frameworks.

©IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 |

REFERENCES

[1] Fabrication of Car Parking Prototype using Piezoelectric Sensors Mr. S. Nagakalyan, Research Fellow, Dr. B. Raghukumar, Professor, L. University, India522502
[2] Smart Car Parking System Jayakshei dadaji Bachhav, Prof. Mechkul M. A.2 1Dept. Of Electronics and Telecommunication, SNJB's COE, Chandwad, Maharashtra, India 2SDept. Of Electronics and Telecommunication, SNJB'sCOE, Chandwad, Maharashtra, India
[3] Gautschi, G. (2002). Piezoelectric Sensorics: Force, Strain, Pressure, Acceleration and Acoustic Emission Sensors, Materials and Amplifiers
[4] International Energy Agency(IEA) (2014) World Energy Outlook 2014. London.
[5] Ashutosh, T. and Lokman, U. (2014) d Advanced Functional Materials. Wiley Scrivener Publishing.
[6] Eichhorn, C., Chasm, N. Wilhelm, N. Biancuzzi, G. and Woias, P. (2011) An Energy. Autonomous Self-Tunable Piezoelectric Vibration Energy Harvesting System.Proceedings of the IEEE International Conference on Micro Electro - Mechanical Systems, 1, 1293-1296.
[7] Gregg.C.G. Pillatsch and P.K. Wright(2014) Passively self tunning piezoelectric energy harvesting system.14th International conference on micro and nano technology for power generation and energy conversion application ,557,53-59.
[8] Yoash Levron; Doron Shmilovitz; Luis Martínez-Salamero (2011) A Power Management Strategy for Minimization of Energy Storage Reservoirs in Wireless Systems with Energy Harvesting. IEEE Transactions on Circuitsand Systems I: Regular Papers, 58, 633- 643
[9] Jiahui WU, Haiyun WANG, Qiang ZHANG (2013) Performance Evaluation Method of Wind-Coal Coordinating Operation. Automation of Electric Power Systems, 37, 1-8
[10] Park, Y.M., Lee, N.H. and Choung, T.R. (2010) Effect of Noise and Low Frequency Noise Generated by Wind Power Plant (Wind Farm). 39th International Congress on Noise Control Engineering, Lisbon, Vol. 3, 2061-2067

©IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 |



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)