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Smart Traffic Management-IOT

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Abstract: *So basically, As the population and number of cars in towns grow, traffic congestion is one of the most pressing problems. In addition to adding to the delay and stress experienced by drivers, traffic jams also result in higher fuel usage and air pollution. Despite appearing to be present everywhere, megacities are the ones most impacted by it. For improved signal control and efficient traffic management, the road traffic density must be calculated in real-time due to the road traffic's ever-increasing volume. One of the key elements influencing how traffic moves is the traffic controller. So, in order to better meet this growing demand, traffic management needs to be optimised. In order to calculate traffic density, our suggested system will use real-time images from the cameras at traffic intersections.*

INTRODUCTION

Managing traffic efficiently and effectively has become an increasingly challenging task in modern urban areas. The rise in vehicle density and the complexity of traffic patterns have rendered traditional approaches to traffic signal switching inadequate. However, the emergence of smart traffic management systems, empowered by advanced technologies such as deep learning, offers promising solutions to address these challenges.

Smart traffic management encompasses a range of innovative techniques and technologies that leverage real-time data and intelligent algorithms to optimize traffic flow, reduce congestion, and enhance road safety.

One key aspect of smart traffic management is the utilization of deep learning algorithms to make informed decisions regarding signal timings and traffic control. Deep learning algorithms have demonstrated remarkable capabilities in learning complex patterns and making accurate predictions based on large datasets.

By leveraging these algorithms, it becomes possible to analyze real-time traffic data, including vehicle counts, speeds, and travel times, to predict traffic conditions and dynamically adjust signal timings accordingly.

This project aims to explore the potential of deep learning-based smart traffic management systems. It focuses on utilizing advanced deep learning models, such as convolutional neural networks (CNNs) and You Only Look Once (YOLO) networks, to predict traffic patterns accurately.

These models excel in object detection tasks, enabling the identification and counting of vehicles in real-time videos, live feeds, or images. By deploying the YOLOv3 algorithm, this project seeks to precisely count vehicles on different sides of the road and make informed decisions regarding signal switching.

The vehicle count information is fed into an ESP32 platform, which enables real-time vehicle counting, and the resulting data is used to control LED lights that toggle the traffic signals accordingly. The switching time of the signals is determined based on the detection of real-time images, ensuring timely adjustments even in densely congested traffic scenarios.

The integration of deep learning into smart traffic management has the potential to revolutionize urban transportation systems. By accurately predicting traffic patterns and dynamically optimizing signal timings, these systems can significantly improve traffic flow, reduce congestion, and enhance overall road safety.

However, further research is needed to evaluate the effectiveness of these techniques in real-world scenarios and address the practical challenges of implementing deep learning-based smart traffic management systems

I. METHODOLOGY

A. Relevance of the project)

Advanced technology is the importance of the IoT-based Smart Traffic Management System. It includes the latest technology and concept that is assured of profitable outcomes.

Due to its design and implementation of every concept on IoT-based Smart Car Parking, it makes it very easy to manage and supervise. Because of the well-organized structure, this Car Parking System can be easily handled by the owner and all the staff members who implement this system in their parking area.

In this Car Parking System, the sensors that we use are of low cost, and also the system gives real-time data and application. This makes the user identify the available and unavailable slots for parking easily.

The motive to make this system automatic is that it decreases the time that is spent during searching for parking slots or floors and even the parking lot manually. Also, some other solutions include services in their Parking Systems like online payment of slots, pre-booking of the slot, parking time notifications, and also car searching functionalities for huge parking lots that give more importance to the Car Parking System. Lastly, this IoT based Car Parking System can give greatly to both the users and the parking lot owner.

B. Problem Statement

According to the Latest research, mostly in urban and metro cities, the traffic problem is getting worse day by day as a high number of vehicles getting sold every day, and this results in parking problems as it is very difficult in finding parking slots in the traffic area. In search of parking slots in the parking area, drivers waste their time and effort and finally end up parking their vehicles on the street which further leads to traffic and space congestion. In most of the worst-case driver fails in finding safe parking area, especially during the festive season and peak hours.

- 1) *Optimized Parking:* This Smart Parking System makes the user save time, resources, to find the best and safe parking slot available and also the effort in finding the parking slot. Also, this system utilizes the parking area properly in filling the parking lot efficiently by all entities like commercial and corporate.
- 2) *Reduced Traffic:* As time reduced in finding parking slot in the parking area and this makes lower in traffic flow.
- 3) *Reduced Pollution:* In searching for parking slots in parking areas, a lot of fuel gets burned in a day. And this Smart Parking System significantly will decrease the time and fuel that gets burned while searching parking area, so by all this, the daily emissions of the vehicle will decrease and ultimately will help in reducing the pollution.
- 4) *Increased Safety:* This Parking System increases the security that prevents violation and suspicious activity in the parking area as it gathers real-time data and also license plate recognition cameras that help parking employees and security guards.
- 5) *Decreased Management Costs:* As this Parking System makes the parking activity more automated and less manual that saves cost on labor and resource exhaustion.
- 6) *Enhanced User Experience:* As this system makes Parking a smart parking solution that will integrate the user experience. It makes all the activity more user friendly in which driver's payment, parking notifications and also slot searching and identification and many processes get more interactive and user friendly.

II. LITERATURE SURVEY

- 1) *"The Smart Traffic Management System Using Ultrasonic Control Sensors"* Yousif Allbadi, Jinan N Shehab, Musaab M Jasim IOP Conference Series: Materials

Science and Engineering 1076 (1), 012064, 2021 - Over the past decade, the concept of smart cities has become very popular thanks to the Internet of Things (IoT) development and expansion for increasing the reliability of building the infrastructure of cities. The continuous increase of vehicles in the streets with the lack of car parking is becoming a problem in most urban cities. Therefore, the demand for smart car parking systems is increased for helping drivers to find a suitable car space quickly. This paper presents a smart parking system using infrared and ultrasonic sensors, which is controlled by Arduino Mega 2560. The Radio Frequency Identification (RFID) reader provides authorization to enter the smart parking system. On the other hand, a mobile application is added to allow users to know about the empty spaces based on the WiFi application. This smart parking system is implemented in a smallscale model, and the results show that simulates the car parking with the mobile application, all the sensors, and the Liquid Crystal Display (LCD) screen display, to describe a view of the system architecture.

- 2) *"IoT-based Smart Traffic Management System using Android Application"* Nor Bakiah Abd Warif, Mohd Izzat Syahmi Saiful Azman, Nor- Syahidatul N Ismail, Muhammad Akmal Remli 2020 Emerging

Technology in Computing, Communication, and Electronics (ETCCE), 16, 2020. In this paper, a userfriendly mobile application, named Android-based Car Parking Monitoring System (ACPMS) is built to aid in locating a particular parking place. ACPMS can provide a user with the ability to check vacant parking spaces and locate the nearest parking lot. ACPMS obtained the parking location from the current user's position with the sensor located in the shopping complex's parking lot. ACPMS is tested in a realistic environment for movement detection and location service to notify users using the mobile application. By considering seven test case scenarios, the combination of the ACPMS mobile application with a parking prototype kit shows the proposed work is to solve the parking problem. "The Smart Parking Management System" Amira A Elsonbaty International Journal of Computer Science & Information Technology (IJCSIT) Vol 12, 2020 With growing, Car parking increases with the number of car users. With the increased use of smartphones and their applications, users prefer mobile phone-based solutions. This paper proposes the Smart Parking Management System (SPMS) that depends on Arduino parts, Android applications, and is based on IoT. This gave the client the ability to check available parking spaces and reserve a parking spot. IR sensors are utilized to know if a car park space is allowed. Its area data are transmitted using the WI-FI module to the server and are recovered by the mobile application which offers many options attractively and with no cost to users and lets the user check reservation details. With IoT technology, the smart parking system can be connected wirelessly to easily track available locations.

- 3) *"Smart Traffic Management System Solution for the Internet of Things in Smart Cities"* Wael Alsafery, Badraddin Alturki, Stephan Reiff-Marganiec, Kamal Jambi 2018

1st International Conference on Computer Applications & Information Security (ICCAIS), 1-5, 2018 - This study has proposed a smart parking system that enhances the performance of saving users time to locate an appropriate parking space and reduces the general costs for moving to chosen parking space. The most obvious finding to emerge from this study is that they proposed a smart car parking system that will make ensure the reduction of transmitted data through the network and save energy in the perception layer. While in the application layer side is to save the user time, avoid traffic congestion, find available parking spaces, and reduce cars gas emissions from drivers while searching for the empty parking spaces.

- 4) *"IoT Based Sensor Enabled Smart Car Parking for Advanced Driver Assistance System"* Mahendra B M, Dr. Savita Sonoli, Nagaraj Bhat, Raju, Raghu T. 2017 2nd IEEE International Conference On Recent

Trends in Electronics Information & Communication Technology (RTEICT), May 1920, 2017, India. Work proposed in this system addresses the issue of parking in smart cities. The system is implemented using low-cost IR sensors, Raspberry pi model 3b for real-time data processing, E-parking mobile application, and Geared DC motor. The developed system provides real-time information on the availability of parking slots in parking areas and allows users to book parking slots from remote locations by using a mobile application and also provides user authentication. The developed system is tested for different cases such as single- user booking, multiple users booking, a user trying to book a reserved slot, and user authentication. The proposed system is designed for 3 parking slots each having a single IR sensor with an adjustable sensing range of up to 30cm. Proposed work not only reduces the traffic congestion, but it is also providing authentication of the user, costeffective, real-time, and helps in reducing carbon footprint.

- 5) *"Internet of Things based Smart Parking System"* Shelena Soosay Nathan, Aida Nabilah Mohd Khairudin, Muhammad Najmi Afiq Saiful Bahri, Muhammad Alifuddin Jaafar Multidisciplinary

Applied Research and Innovation 1 (1), 45-52, 2020 - This smart parking allows customers to optimize shopping time by helping them find a nearby parking spot, provide real-time information on parking space and provide smart payment services. This study aimed at developing an Auto Gate Smart Parking System which applies the concept of the Internet of Things. The methodology used in the development is the Input Process Output model in steps which include analysis requirement, design and testing, and evaluation. This system uses an Auto Number Plate Recognizer (ANPR) through Raspberry Pi to detect the vehicle's plate number and with the help of an ultrasonic sensor, Raspberry Pi camera, database, and an Arduino board. Testing was conducted by registering the vehicle plate numbers into the database through Google Form and the system was tested with the registered plate number vehicle. It has shown that the system had effectively recognized the vehicle's plate numbers which makes it easy for parking for small organizations to control their parking area.

The system provides convenience to users as no direct interaction is needed for access. Given the current situation in facing Covid19, it is very important to have contactless systems. Therefore, this Auto Gate Smart Parking will be a great tool to be used in an authorized parking area

III. PROBLEM STATEMENT

To implement IOT BASED SMART TRAFFIC MANAGEMENT SYSTEM USING NODEMCU ESP8266 With the increase in the population, the number of vehicles increases and due to unmanaged parking, it leads to many problems. In center cities, people face difficulties as increasing number of vehicles creates congestion, wastage of space, time, traffic problems, carnapping, car vandalism, and many other difficulties.

IV. OBJECTIVE

- 1) The main objective of this project is reducing the risk of finding parking slots in any area.traffic
- 2) It eliminates the unnecessary traveling of vehicles across the filled parking slots in a city.
- 3) Using the IoT-based parking system you can easily access the parking slot availability over the internet.
- 4) This project helps the drivers of the cars to park their vehicles with minimum wastage of time with accurate information of the availability of the space.
- 5) Enhance the security by simplifying the parking system.
- 6) Smart system that parks several vehicles with the least space possible.

V. SPECIFICATIONS

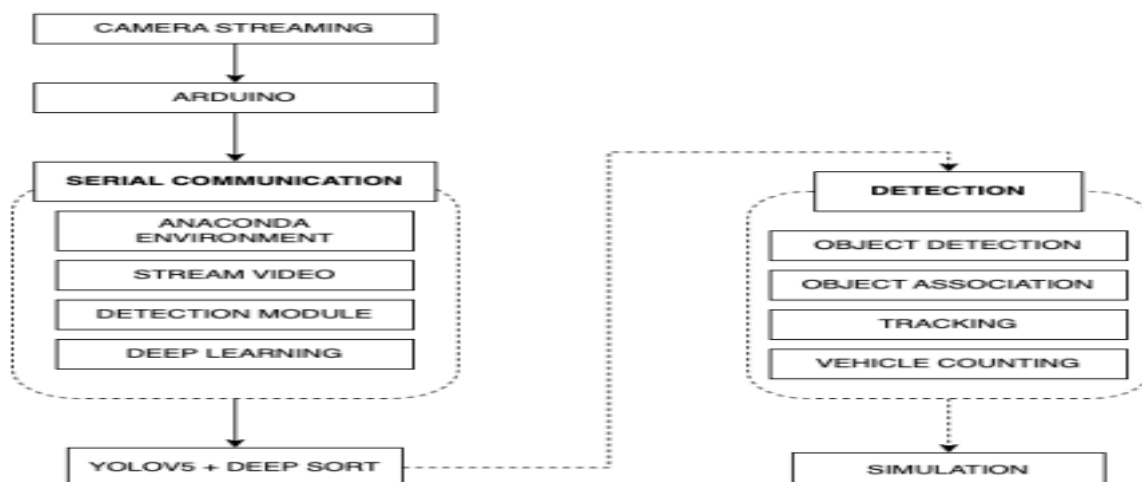
A. Hardware

- 1) ESP32 CAM
- 2) OLED DISPLAY
- 3) CV2640
- 4) Power Supply
- 5) COLOUR MONITOR

B. Software Requirement

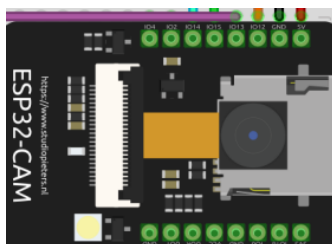
- 1) C++,PYTHON
- 2) ARDIUNO, VISUA STUDIO

VI. BLOCK DIAGRAM



VII. DISCRIPTION

A. ESP32



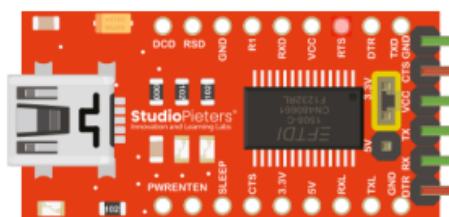
- 1) ESP32 is an open-source Lua-based firmware and development board specially targeted for IoT based applications.
- 2) It includes firmware that runs on the ESP8266 WiFi SoC from Expressif Systems and hardware which is based on the ESP-32 module, and like this, it can also be programmed using Arduino IDE and can act as both Wi-Fi Hotspot or can connect to one.
- 3) It has one Analog Input Pin, 16 Digital I/O pins along with the capability to connect with serial communication protocols like SPI, UART, and I2C.
- 4) ESP32CAM has 128 KB RAM and 4MB of Flash memory to store data and programs

B. CPLAY DISPLAY



- 1) Operating Voltage is +5V typically
- 2) Torque: 2.5kg/cm
- 3) Operating speed: 0.1s/60°
- 4) Gear Type: Plastic
- 5) Rotation: 0°-180°
- 6) Weight of motor: 9gm

C. USB



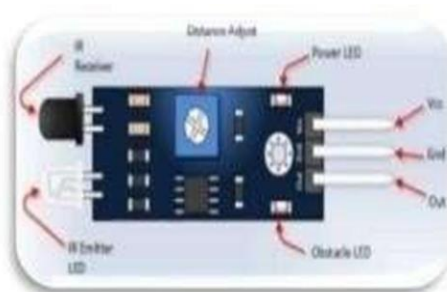
- 1) Standard 0.1" (2.54mm) spacing when placed next to each other
- 2) Length: 200mm (7.87")
- 3) Wire Colors: brown, red, orange, yellow, green, blue, purple, grey, white, black (Each cable includes 4 of each color)
- 4) Fits breadboard
- 5) Weight: 31g

D. Power Supply



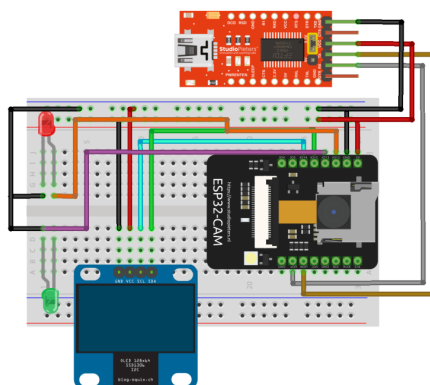
Power banks can be used as power supply. They are almost X. SOFTWARE IMPLEMENTATION universally rated in milliampere hours, abbreviated as “mAh”.

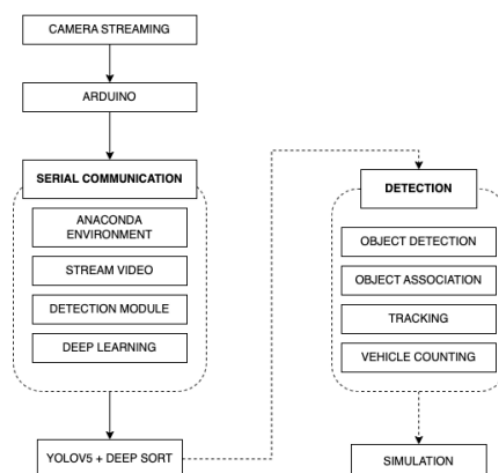
E. IR Proximity Sensor



- 1) IR transmitter
- 2) Pin easy interface connectors
- 3) Indicator LED & Power LED
- 4) Distance 2cm to 30cm
- 5) Active Low on object detection
- 6) 3.3 to 5V operation

VIII. CIRCUIT DIAGRAM



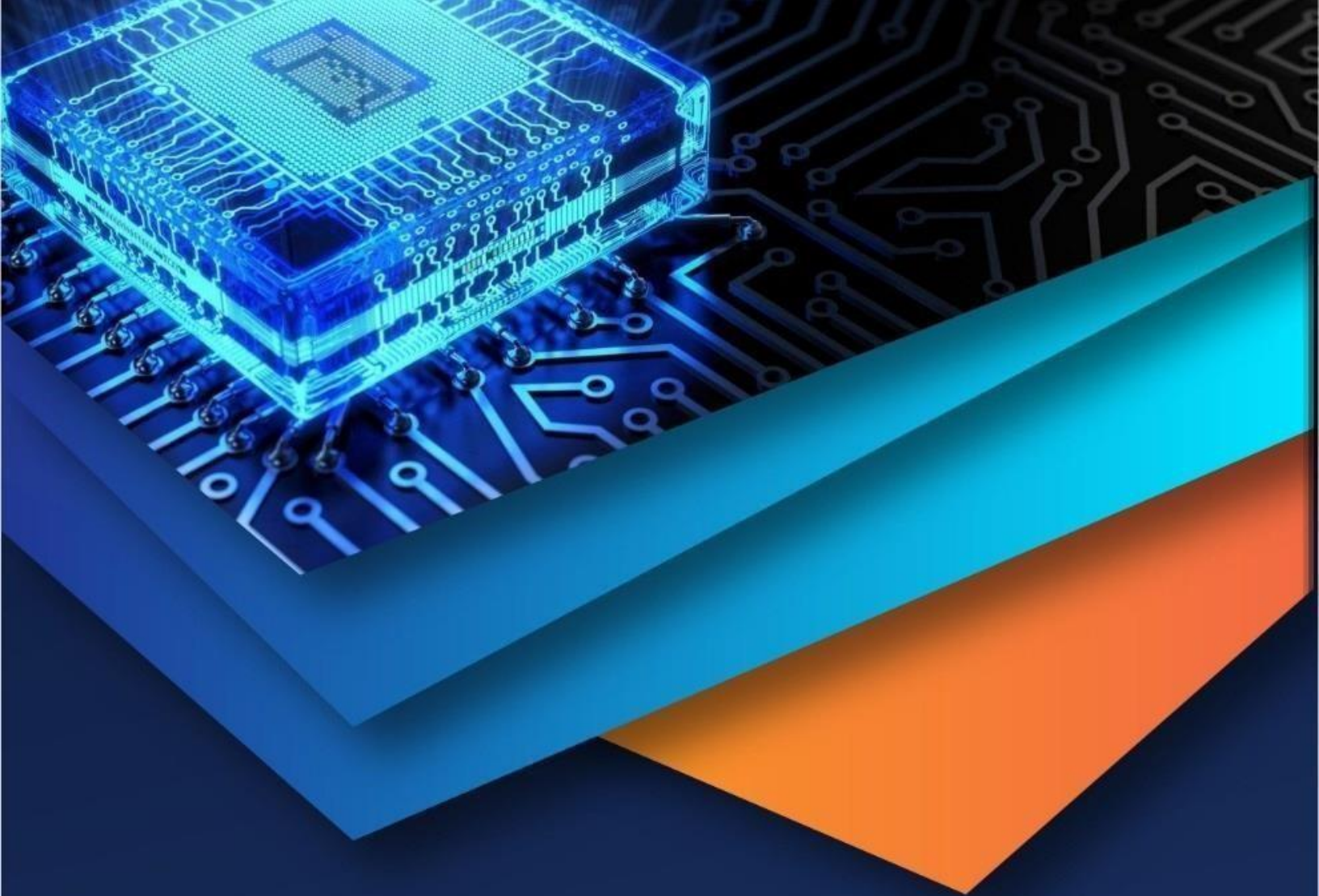


IX. FUTURE SCOPE

- 1) *Development And Deployment:* The idea is that having cars that self-park will help improve traffic congestion considerably as riders could be dropped off in front of their destination and the car would park itself and minimize the time spent taking up space on the road.
- 2) *Automated Parking:* An automated parking system is capable of moving cars
- 3) *Parking Counter:* A system capable of detecting vehicles entering and leaving a parking facility. This connected counting system will successfully provide motorists with a count of available parking slots in real-time.
- 4) *AI, ML:* AI-based smart parking solutions include special IoT tools that can count the number of parked vehicles and empty parking spaces in a parking lot. It detects if there is a car presence in a parking space and sends the information to the management platform. The best part is that this AIbased solution collects and formats the information in real-time.

REFERENCES

- [1] Denis Ashok, Akshat Tiwari, and Vipul Girje, "Smart Parking System using IoT Technology", IEEE, 27 April 2020.
- [2] Vinay Raj Tripathi, "Smart Vehicle Parking System Using IoT", IEEE, 23 June 2020.
- [3] Tharun Bhupathi, Abhilash Chittala, Durga Prasad Alakunta, "INTELLI Parking System using Internet of Things", Reliability Infocom Technologies and Optimization (Trends and Future Directions) (ICRITO) 2021 9th International Conference on, pp. 1-6, 2021.
- [4] Wael Alsafery, Badraddin Alturki, Stephan ReiffMargarinec, and Kamal Jambi, "Smart Car Parking System Solution for the Internet of Things in Smart Cities", IEEE, 23 August 2018.
- [5] Adil H., Abderrahim M. And Larbi H., "Designing And Managing A Smart Parking System Using Wireless Sensor Networks", Journal Of Sensor And Actuator Networks, 2020.
- [6] Alam M., D. Moroni, G. Pieri, M. Tampucci, M. Gomes, J. Fonseca, J. Ferreira, and G. R. Leone, "Real-time Smart Parking Systems Integration In Distributed ITS For Smart Cities", Hindawi Journal Of Advanced Transportation, 2018.
- [7] Alsafery W., B. Alturki, K Jambi and S. Reiffmargarinec, "Smart Car 32 Parking System Solution For The Internet Of Things In Smart Cities", International Conference On Computer Applications & Information Security, 2018.
- [8] Pradyumna G., Omkar B. And Sagar B., "Introduction To IoT", International Advanced Research Journal In Science, Engineering And Technology, 2019.
- [9] Hettiarachchi L. H. A. D. U. S. And Sagara Sumathipala, "Smart Vehicle Parking Lots and Automated Lighting System For Parking Lot", Systems Engineering Technologies, 2019.



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