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Car Parking Automation and Premises Security System

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***Abstract:** India is a developing nation. With progress at such a rate, there are cars today at every corner, and parking these cars is a significant issue in the country. Car parking automation is important in today's world for several reasons. Effective use of space, With the growth of urban areas and the increase in the number of vehicles, efficient use of parking spaces has become essential. Also, the demand for personal vehicles is on its high. Automated car parking systems provide convenience to drivers by eliminating the need to search for a parking spot. Drivers can simply drop off their cars at the entrance and the system will take care of the rest. Overall, car parking automation is a must in today's world because it provides an efficient, convenient, and safe parking solution that can help improve the quality of life in urban areas while reducing the environmental impact of driving. To overcome this issue numerous parking systems are available. But the problem with these parking systems is they require more space and are expensive. So, our project is dedicated to developing a fully automatic parking system. The other major problem we are facing today is Inefficient Premises Security Systems. A poor Security System can lead to several problems. If your security system is ineffective, it may be easier for burglars or other criminals to enter your home or business and steal your valuables. This can result in significant financial loss and may also put you and your family or employees at risk. Our Premises Security System keeps your home and your surroundings safe, deters crime and is quite helpful in an emergency. We automated it to make it much more secure and safe which will help us in maintaining the safety of the residences.*

I. INTRODUCTION

The question that arises while working on this project was why only the Vertically Automated Rotary Parking System, not any other parking system? Vertically Automated Rotary Parking System is a type of rotary parking system. Car parking automation is the use of technology to automate the process of parking vehicles. A Vertically Automated System needs very less human interaction, it is a semi-automated system that requires a driver to park the car in a designated area, and after that, the system takes control. The traditional parking system required car drivers to search for spots of parking spaces that were available, navigate through tight spaces, and park their cars themselves. Seeing the current scenario our system gives many advantages like Redundancy structure, the less initial cost compared to other systems, malleable operation without the needs of any operator, it is easy to assemble and dismantle, 100% security assured, no issue of damage, and hence more suitable than the typical Vehicle parking systems. In contrast, Automated Car parking systems use sensors, cameras, and computer algorithms to park and retrieve vehicles. In this parking system, cars are parked in parallel spaces of three cars. This system is used to increase the number of car parking efficiently. The benefits of car parking automation include efficient use of space, convenience for drivers, improved safety, reduced environmental impact, and potential cost savings. These systems can be found in various settings, such as residential buildings, commercial structures, and public parking garages. While car parking automation is still a relatively new technology, it is gaining popularity around the world as cities seek to improve the efficiency and sustainability of their transportation systems.

Premises security systems refer to technology and procedures used to protect a physical location, such as a building, office, or residence, from unauthorized access and potential security threats. Other Premises security systems have many problems in it. These systems typically include a combination of physical security measures, such as locks, barriers, and access control devices. In our project, at the entrance of the premises we have placed number plate scanners, and they perform number plate recognition. Once the plate is recognized, only then the car can enter the society premises. At the entrance of the lobby, the person must give his fingerprint, and the CCTV cameras installed in the lobby will perform face recognition of that person, if the person is a stranger, it will store his facial data, if the person is a member it will go through the database and verify. It will track him through the lobby space. The goal of a premises security system is to create a safe and secure environment for occupants and to deter potential intruders or criminals. The security required for a particular location may change depending on factors such as the value of the assets being protected, the level of risk associated with the location, and the regulatory requirements governing the operation of the premises. Overall, premises security systems are an essential component of any comprehensive security strategy and can help protect individuals, organizations, and communities from a range of potential threats.

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II. LITERATURE SURVEY

A. *"Rotary Parking System Design and Simulation" by Mohamed El-Sayed, published in the International Journal of Engineering and Technology. May 2017, India.*

This paper provides an overview of the design and simulation of rotary parking systems, including the system's components, control algorithms, and safety features.

B. *"Design and Analysis of the Rotary Parking System for Urban Parking Space Optimization" by Arvind Kumar and Ravi Shankar, published in the International Journal of Emerging Technology and Advanced Engineering.*

This paper discusses the design and analysis of a rotary parking system, including its features and potential benefits for urban parking optimization.

C. *"Parking Space Optimization Using Rotary Parking System" by R. J. Bhosale and M. S. Rane, published in the International Journal of Research in Engineering and Technology.*

This paper presents an analysis of rotary parking systems and their potential for optimizing parking space in urban areas.

D. *"Safety and Design of Rotary Parking Systems" by S. P. Chowdhury and H. P. Wong, published in the Journal of Transportation Technologies.*

This paper examines the safety features and design considerations of rotary parking systems, including the system's control, sensor, and emergency stop systems.

E. *"Design and Analysis of a Rotary Parking System with Wireless Control" by X. Liu, L. Wei, and X. Zheng, published in the Journal of Traffic and Transportation Engineering.*

This paper discusses the feasibility of rotary parking systems for parking optimization in urban areas, including potential challenges and solutions.

F. *"Evaluation of Space Utilization in a Rotary Parking System" by H. Kim, H. Baek, and J. Yoon, published in the Journal of Traffic and Transportation Engineering.*

This paper presents a wireless-controlled rotary parking system design and analyzes its functionality and benefits.

G. *Jinu Celine and Sheeja Agustin A. Department of CSE, Marian Engineering College, Trivandrum India. "Face Recognition in CCTV Systems".*

We learnt through this research paper, how to use multiple CCTV's cameras connected in parallel to different monitoring Systems. The in-detail process of facial Recognition. In first part the CCTV's does evidence testing where it where it uses the combination techniques and information gets stored in databases by using different distances and angles between the subject with the parameters of the camera.

H. *Hoshiyar Sing Kanyal, Mukulit Goel, Amit Singh Tomar, Harshit Kumar Yadav, Koshinder Singh "Object Recognition and Security Improvement by enhancing features of CCTV".*

In this research paper, the researchers focused on the enhancement of the CCTV's by adding a User Authentication and Firewall system which detects the intrusion attacks and activates the alarm system.

III. RELATED WORK

The architecture of a rotary parking system with weight measurement using Arduino is comprised of multiple layers of hardware and software components that work together to create a smart parking solution. At the hardware level, the system includes load cells, sensors, an Arduino microcontroller, a servo motor, a power supply, and an enclosure. Load cells are placed beneath each parking slot to detect the presence of cars and measure their weight, while sensors provide additional information about the location and status of the cars. The Arduino microcontroller receives signals from the load cells and sensors, processes this data, and controls the servo motor to rotate the parking platform.

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Fig. 1 Vertically Rotary Parking System.

For our Premises Security system, we are using a servo motor for the gate, and a camera to detect and store the car number plate. Then at the entrance of the lobby space, we used a Fingerprint scanner and cameras to perform fingerprint recognition and face recognition respectively.

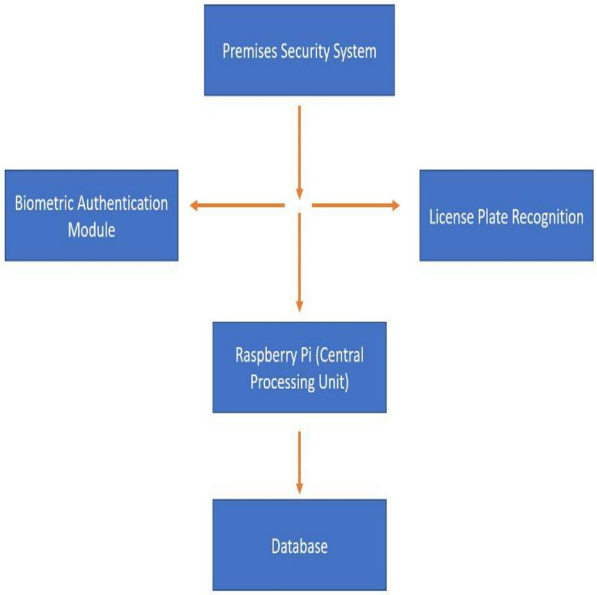


Fig. 2. Block diagram Premises Security System.

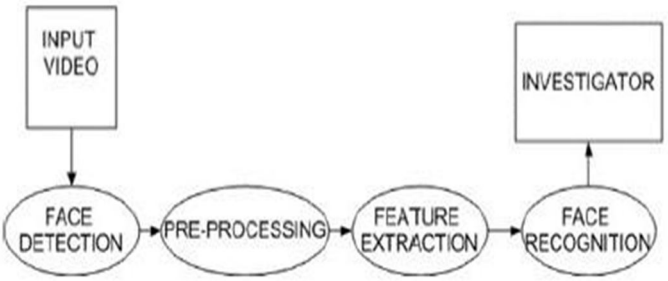


Fig. 3. CCTV Recognition Process.

The Components we used are Arduino for the Automated Parking System. And for Premises Security System we used Raspberry Pi, which performs face recognition and fingerprint recognition and stores the data in the database, and even cross-checks the new data with the old data. Arduino consists of both a physical programmable circuit board) that runs on your computer, used to write and upload computer code to the physical board. Raspberry Pi is popularly used for real time Image/Video Processing, IoT based applications and Robotics applications. The raspberry pi board comprises a program memory (RAM), processor and graphics chip, CPU, GPU, Ethernet port, GPIO pins, Xbee socket, UART, power source connector. And various interfaces for other external devices.

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IV. RESULT

Our Vertically Automated Car Parking system which is much more efficient and can store more cars in less space and solves many problems.



And through the Premises Security Systems that can track and detect live objects and perform Face recognition, which will indirectly secure the Premises area.





We also built a System which gathers all user information data, stores it, and performs Face recognition and Number plate recognition.

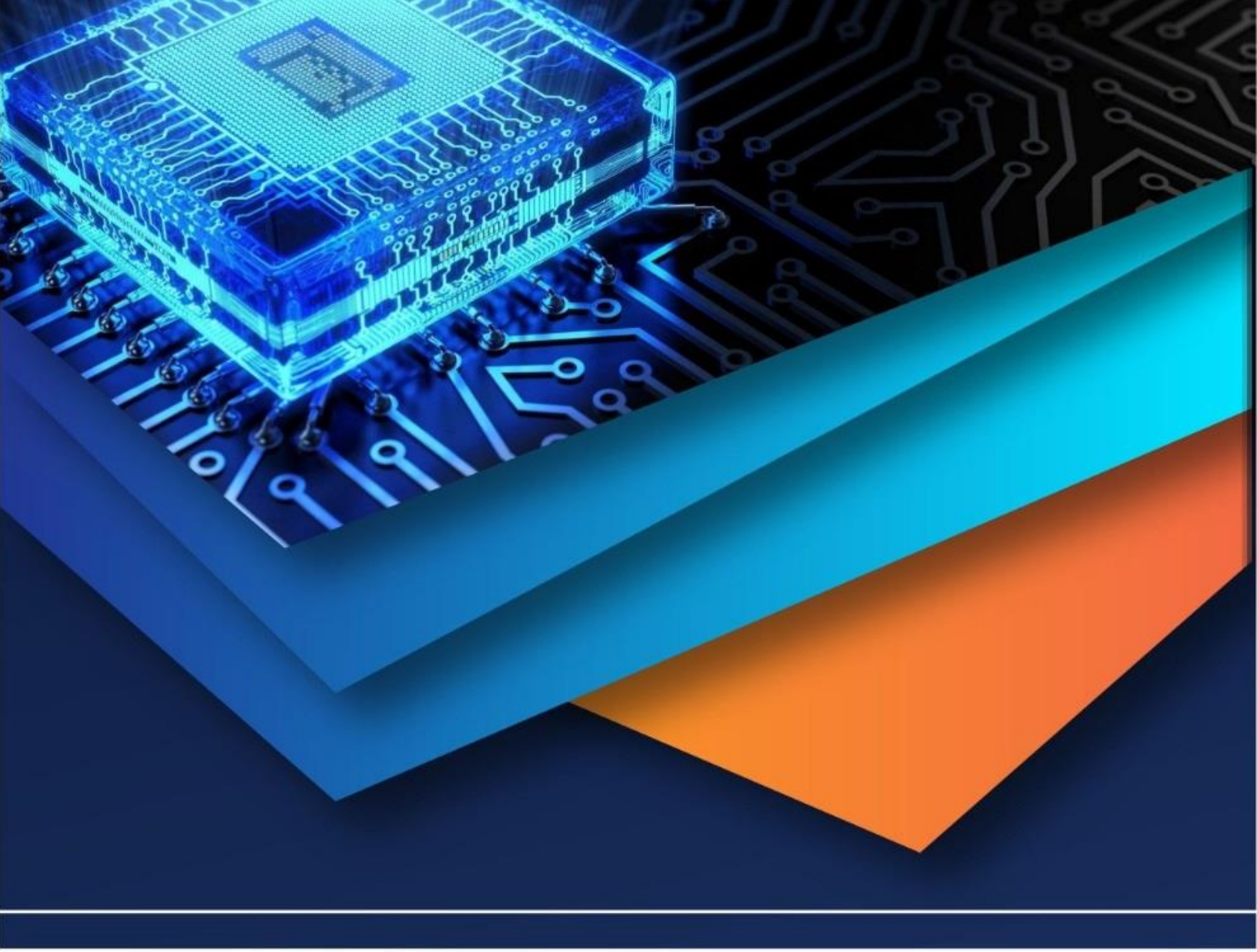
V. FUTURE SCOPE.

Our Project solved various problems such as live tracking and face recognition. The future scope of premises security systems is quite promising as new technologies are constantly being developed to enhance the security of buildings and properties. IoT devices can be used to create a network of sensors and cameras that can detect potential security threats and alert security personnel in real-time. Biometric technology can provide a more secure and reliable means of access control, using features such as fingerprints, retinal scans, and facial recognition.

The future scope of the system is vast, with potential applications in smart cities, airports, and other public areas. Further development and integration of advanced technologies, such as AI and IoT, can enhance the functionality and performance of the system. The Rotary Parking System can be integrated with smart city infrastructure to provide real-time data on available parking spots to drivers. This will enable drivers to locate available parking spots quickly, reduce traffic congestion, and improve road safety. The use of artificial intelligence can help the Rotary Parking System to learn from data and make more accurate predictions about parking patterns. This can be used to optimize the use of parking spaces, predict peak times and adjust pricing accordingly. The Rotary Parking System can be integrated with renewable energy sources such as solar panels and wind turbines to reduce the system's carbon footprint.

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