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Review Paper on Anti-Theft Autonomous Delivery Robot for Food and E-Commerce

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Abstract: ***The ongoing development of artificial intelligence and machine learning is enabling robots to become more observant. This advancement allows robots to be utilized in situations where humans may not have control. One example is the use of delivery robots for "last mile" delivery services. These robots can be remotely controlled by an operator in cases where they encounter obstacles. Delivery robots have various applications such as room service, package delivery, food delivery, and hospital deliveries. A research study focused on developing an algorithm that enables autonomous path generation using a GPS-based coordinate system. The algorithm allows the robot to create its own path between its current position and the destination using GPS co-ordinates.***

I. INTRODUCTION

In today's world, every sector is evolving very rapidly be it financially or on ground strength. Automation has become a necessity to carry out various types of jobs and furthermore reduce the amount of manual labour being put into the work. The increased efficiency by using robots instead of humans results in greater advancements in profits as well as technology. Autonomous robot delivery offers potential solutions to the challenges faced in last-mile delivery, primarily due to its environmental benefits and autonomous technology. One significant advantage is the reduction in carbon emissions. Delivery robots are highly efficient and sustainable, making them a viable option for addressing last-mile delivery challenges.

The concept of autonomous robots is not a new one instead many related works have already been published and a deep analysis have been done by us to provide a comprehensive and sustainable solution to a growing need and volume of deliveries all around the world

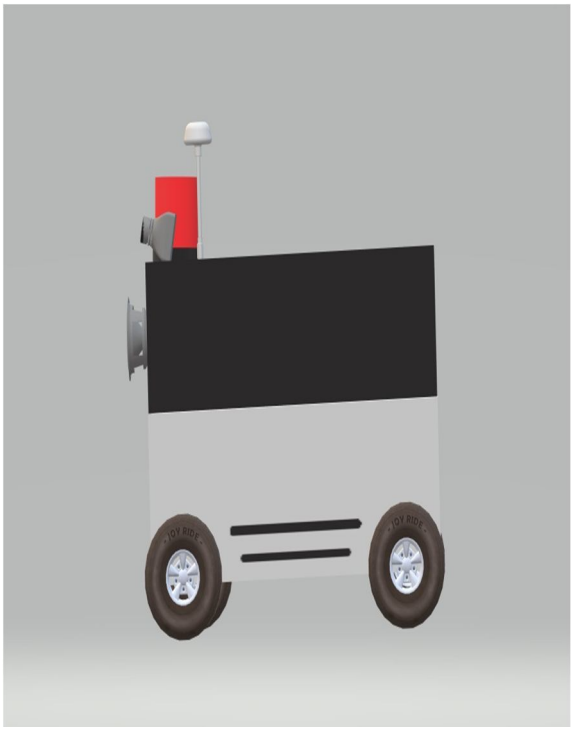


Fig 1: GPS guided autonomous robot

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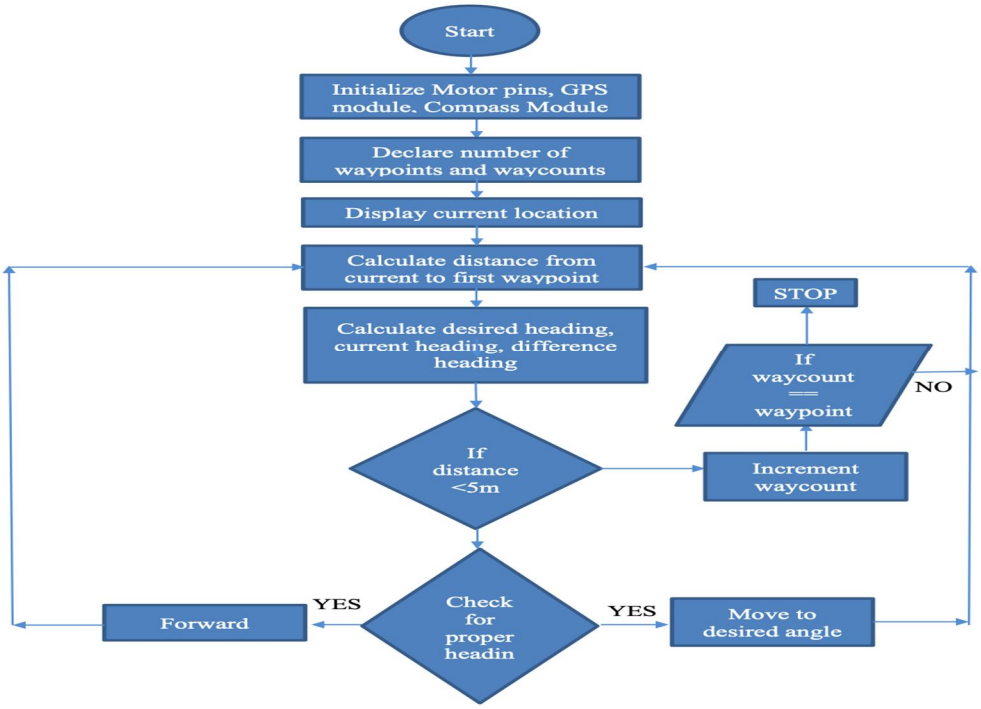


Fig2: Flowchart of the robot

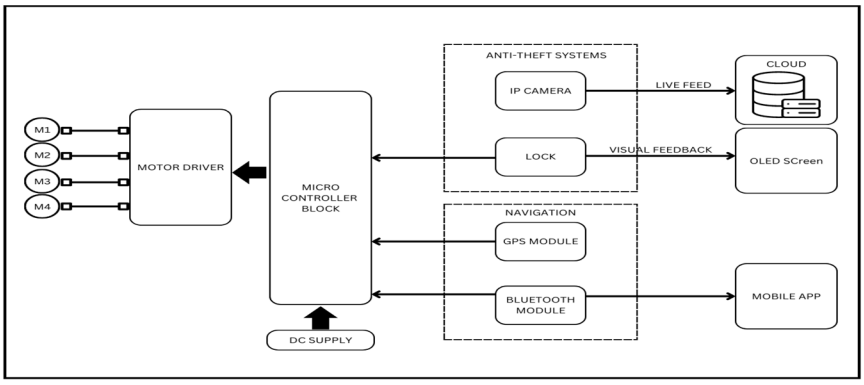


Fig3: Block Diagram of the robot

II. RELATED WORKS

D. Deenadayalan et.al. [1] This research paper deals with the design and development of self piloted ground vehicle which employs a GPS receiver module to capture the GPS signal and determine the precise current location of the vehicle.

Ms. S. Kalaimagal et.al. [2] This research paper briefs a system that can identify its present positional data from the satellitethrough the GPS modem where the target location is fed as input.

Anupama1 et.al. [3] This research paper deals with a cost effective autonomous ground vehicle which would carry out surveillance and tracking missions .

Pınar Savaştür et.al. [4] In this paper the demand for increased security is catered by providing improvements in the security of the video data transmitted in real time.

Dr.P.D. Selvam et.al. [5] This research paper discusses on the theme of intelligent visual surveillance systems and sheds light on the importance of real time monitoring using ESP-32 cam module.

Annmary Vadakkan et.al. [6] This research paper explains the design and implementation of a door locking system using a keyboard and arduino board along with a servo motor.

Aman Sharma et. al. [7] In this paper, we get a detailed description of the role of arduino uno in the implementation of a solenoid lock with two high security passwords.

III. PROPOSED DESIGN

The anti-theft delivery robot operates by integrating various components and systems to ensure secure and reliable operation. The robot's working involves the following key steps: Upon initialization, the GPS module establishes a connection and tracks the robot's location in real-time. Geo-fencing techniques are implemented to define authorized areas, and any movement outside these areas triggers an alert. The live feed system captures video footage, which is processed in real-time using image processing algorithms to detect suspicious activities or potential theft incidents. If a theft event is detected, an immediate alert is generated. The keypad lock system provides secure access control to the cargo area, allowing authorized personnel to unlock it using a passcode. During delivery operations, the robot follows its designated route, with the GPS module continuously updating the location and the live feed system providing remote visibility. In the event of a theft attempt, alerts are communicated to the operator or control center, enabling appropriate actions to be taken, such as coordination with law enforcement. Regular maintenance and system checks ensure proper functioning, and operators receive training to effectively utilize the anti-theft system and respond to theft incidents. Overall, the integration of these components and systems enhances the security of the delivery robot and protects valuable cargo during transportation.

IV. CONCLUSION

In conclusion, the development and integration of anti-theft mechanisms, including GPS tracking, live feed functionality, and keypad lock systems, have shown significant potential in enhancing the security of delivery robots. By combining these technologies, a multi-layered defense system can be established, addressing various aspects of theft prevention, detection, and access control.

The proposed design presents a conceptual framework for implementing these mechanisms, taking into account considerations such as module selection, system integration, and operational challenges. The integration of GPS tracking enables real-time monitoring and geofencing, preventing unauthorized movement and triggering immediate alerts. The live feed functionality enhances remote monitoring capabilities, allowing for theft detection and timely response. The keypad lock system provides secure access control, ensuring that only authorized personnel can interact with the cargo.

While the proposed design lays the foundation for robust anti-theft measures in delivery robots, further research and development are needed to optimize their performance, address implementation challenges, and explore potential advancements. Considerations such as power management, computational resources, and system scalability need to be addressed to ensure practical implementation.

By improving the security of delivery robots, businesses and logistics providers can mitigate the risks associated with theft incidents, safeguard valuable cargo, and enhance customer satisfaction. Moreover, the integration of anti-theft mechanisms contributes to the growth and adoption of efficient last-mile delivery solutions in various industries.

The continuous advancement of anti-theft technologies, coupled with ongoing research efforts, holds promise for the future of secure delivery robot operations. With further refinement and innovation, these mechanisms can enhance the overall reliability, safety, and trustworthiness of delivery robots, enabling their seamless integration into the logistics ecosystem.

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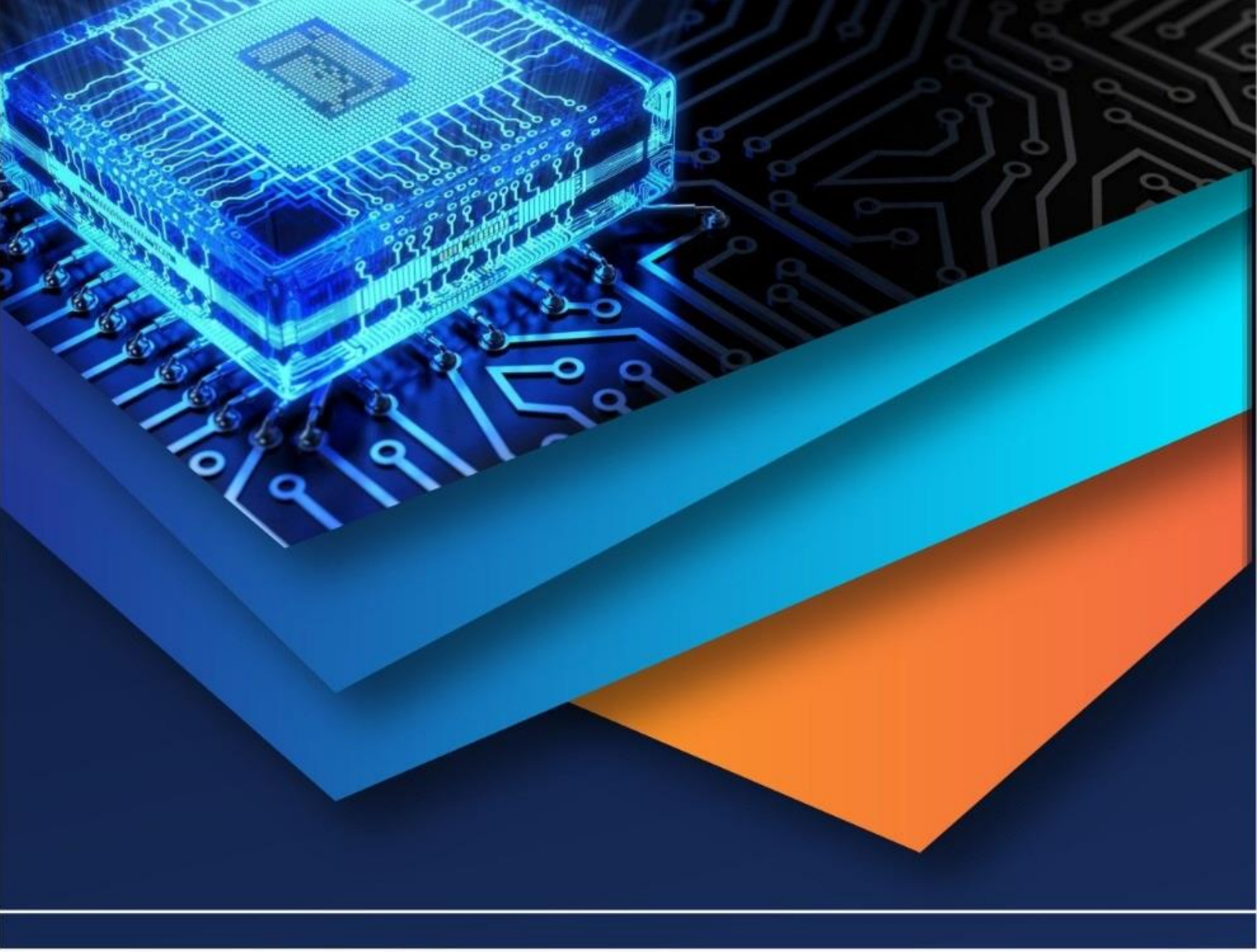
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