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SMARTf ROBOTIC CAR WITH GPS & GSM

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ABSTRACT

In this paper we develop and test a Smart car Model that comprises ARDUINO-UNO, sensors, GPS, GSM, LCD. Which is based on preventing vehicle from any hinderance and avoiding contact by automatically stopping the vehicle. If in case of collision from any side it will generate an alert to vehicle owner Via SMS. It also regularly displays the distance readings in LCD installed at the vehicle instance itself.

Keywords: - Smart car Model that comprises ARDUINO-UNO, sensors, GPS, GSM, LCD

I. INTRODUCTION

The Smart car comes with Rear parking sensors alert drivers about the distance of obstacle behind the car, and keep them safe from accidents or any kind of damage. It also stops the car if it is to near to any obstacle and it will notify the owner about car accident. This will led to utmost safety and precautions while driving and parking too. The central theme revolves around making a precautionary product that can handle a set of given circumstances stably and provide the desired result if any format of warning is matched [1-2].

The vehicle will be guided entire safety by modules loaded and programmed in its central idea and will notify at best case to avoid hassle. The overall functionality is thus monitored and allows the user to have a global idea of all happenings at all stages of travel by the vehicle [3-4].

Moreover, the vehicle is a complete package towards automobile safety and can be used for better development in future aspects. More efficient and automated products can ne build upon it in a useful manner towards advancement and quality delivery of product.

Needs for Project:

It maintains vehicle major safety and allocates features for device location and readings for distance calculating measures at body of vehicle. Overall, it contributes towards prevention and measurement of motor vehicles thus protecting mankind scientifically.

It also features quick assistance to user and at utmost safety level by message as a means of communicating media to track and locate the vehicle coordinates. It ensures accurate location and apart from user it can send location to nearby hospitals and ambulance too by feeding the same domain that can serve humans a lot at safety and root level [5-6].

At global basis also the creation can serve more models by providing a database to meet training data results and to make accurate working and dependable models that are autonomous and able to cope with related issue by taking the basic set as inventory. The purpose is to serve as an entity for realistic development and allowing ease at development and better Future performances [7].

II. PROPOSED METHODOLOGY

The Smart car works on advance prediction technique that provides safety to warn before collision. Using such feature in device. Usually if driver is drunken or slept such systems provides advance warning to prevent the vehicle and stops it automatically before physical contact with obstacles [8]. The modern used ARDUINO monitors the device mind by micro-controlling and avoids the contact. The applied other parts like sensors, locators also play a vital role in adhering to safety protocols for performing the desired tasks at all places [9-10]. This method is applicable at all places and can be installed at any vehicle to perform the specified tasks. Hence the need is must for such entities [11].

The method uses pulse and echo technique as whenever at any place any collision or disturbing pulse is sensed the vehicle ceases and allots the required information to the cautionary or the user panel for obvious help and quick resolution [12]. The design is also such that accurate prediction and calculations are made to meet the need at its best cause. The idea also provides accurate and effective tools for a safety guide and driven mechanism for the motor device allocated [13-14].

A. Component Required

Key Components that are incorporated in the model:

- GPS for location traceability.
- GSM for instant message service.
- DC motors for tyre synchronization.
- ARDUINO-UNO microcontroller as brain.

- Ultrasonic sensor for distance evaluation.
- IR sensor for peripheral object detection.
- LCD for displaying obstacle distance.
- Accelerometer for vibration detection.

B. Practical Applications

With Modern day vehicle scenario there are a lot of challenges that needs to be managed. This smart car is one such application that uses concept of safety and sensor-based device to secure vehicle from any accidental hazard. This device when installed avoids collision by sending messages and location if such case occurs and also warns the driver as vehicle approaches towards any obstacle via production of buzzer sound and thus avoids issues while driving. Such devices are needed at very large scale to provide general safety and awareness among drivers. The location and buzzer feature allows easy approach and accessibility that helps at level of protection and safety. Thus, more and more devices need to be used for better road safety and avoiding collisions to best possible case among people [15].

Along with the installed devices it can be loaded with more features like device synchronization and tracking that enables the user to have exact pin, location connected via internet and data is fetched at host device that monitors the entire vehicle management system [16].

C. Objective

The automatic robotic smart car deals with driver and vehicle safety as its key and utmost purpose for humanity. It also has a key idea to provide best technique for safety assurance and quality delivery of product to be there at all stages of vehicle delivery.

The vehicle is designed in such a way that the whole network is able to perform efficiently and the safety signal and protocol also works perfectly along with features that provide utmost quality assurance by the produced system.

D. Observations

The Smart car is tested successfully in automated environment to test its functionalities and has been working up to the mark as expected. The distance readings were correct too and the functionality were approved and recorded too.

Moreover, alongside the data entries at various locations are fetched and managed manually to retrieve and access the points or the coordinates at display screen to fetch the places.

E. About Hardware & Software

For the proposed model the components required are broadly classified into two types:

HARDWARE: Smart car comprises of hardware components like: The Arduino Uno is a widely available ranged microcontroller board dependable on the Microchip named ATmega328 microcontroller and evolved by Arduino.cc. It consists of a board with log pins for input and output and a board that may be clubbed with other boards and circuits to avoids external interference [17]. The other ones include LCD (16*2), several Sensors, GSM module, GPS modules and other body devices that works for automated synchronous working of the smart car.

SOFTWARE: Smart car has ARDUINO-UNO as its brain with software embedded in it. The **Arduino Integrated Development Environment (IDE)** is a cross-platform application (for Windows, macOS, Linux) that is written in functions from C and C++. It is used to write and deploy programs to Arduino supportable boards [18].

The used network is also integrated and processed with languages for effective communication and allotted slots for performance effectiveness.

III. RESULTS & ANALYSIS

The bumpers and the alloy included are nicely chromed but a scratch or dent can destroy it. It might happen due to careless activities like bad parking style sleepy driving or reversing when there is already an obstacle. The reverse parking sensor are therefore installed to provide accurate judgement to avoid mistakes.

The rear parking sensors are also installed to avoid back collision. Other safety measures are also included like safety buzzer and distance reader to provide maximum safety distance. The vehicle is automated in such a way that it can handle all nearby blockages and guide the vehicle accordingly as per the surroundings it is used.

Overall, the entire body and internal parts are arranged and integrated in such a way that it can work coherently and accurately as promised. The device is synchronized with chips at proper position to work independently at all stages of the cycle that is asked to be delivered.

The figure 1 shows the proposed model. Using this Model, we can easily test and train more vehicles that work on further advance concepts to build more safer and autonomous vehicles.

Figure 1: Proposed smart robotic car

IV. CONCLUSION

The major findings involved data and function specific research in Designed Model. The entire model was found working perfectly and trial and testing was done prior to its deployment. The readings were analysed and found to have good percentage of accuracy and precision at various places for testing.

The whole integrated vehicle is deployed and tested at various places and tracks and the overall performance is remarkable and the state of working is perfect along with its applicative tasks for full safety and allotted way of working.

A. Future Scope

The Working Model focuses on following pros to develop and boost safety scientifically:

- Producing a handy product to deal with maintenance and avoiding issues related to robots' work.
- Usage of automatic car parking with advance sensors that allows the driver to perfectly judge the obstacle distance and drive safely in all directions.
- Effective implementation on IAPS (Intelligent Parking Assist System), also known as the Advanced Parking Guidance System (APGS).
- Providing boost to automobile sector via modern techniques for vehicle guard.
- Use it in Safe Drive Vehicle (ADAS -Advanced driver-assistance systems)
- Supporting Technological sources via open Contribution.

Minimizing probability of error and producing optimal results. Moreover, allowing the management of vehicle at effective bases for providing optimal and accurate observations that are quick to obtain and easier to understand and resolve [19].

Modern day has various tools that are incorporated in Vehicle design, including procedures based on accuracy and protection along with research factors, device building search and mechanical optimizations and achievement [20]. The device semantics are drawn on prevention, maths, computer science, tool management, machine control management and other relatable fundamentals that can be proven to be useful at later stages in automobile arena for smart models.

REFERENCES

[1] Iswaramoorthy, U. "A Smart Wheelchair Robotic System with Health Monitoring & Communication Aid for Paralyzed Person." Turkish Journal of Computer and Mathematics Education (TURCOMAT) 12, no. 13, 2021.

[2] Ravi Khandelwal, Manish Kumar Mukhija, Satish Kumar Alaria, "Numerical Simulation and Performance Assessment of Improved Particle Swarm Optimization Based Request Scheduling in Edge Computing for IOT Applications", New Arch-International Journal Of Contemporary Architecture, vol-8, issue-2, pp. 155-169, 2021.

[3] Telkar, A. K., & Gadgay, B. "IoT Based Smart Multi Application Surveillance Robot", In 2020 Second International Conference on Inventive Research in Computing Applications (ICIRCA), pp. 931-935, IEEE, July 2020.

[4] G. Soni, V. Poddar, Y. Sahu and P. Suryawanshi, "Hand Gesture Recognition Based Wheel Chair Direction Control Using AVR Microcontroller", International Journal of Advanced Research in Computer and Communication Engineering, vol. 5, no. 3, pp. 344-348, 2016.

[5] Diksha Beniwal, Manish Mukhija, "A Survey on Fuzzy logic-based approaches for Edge Detection", International Journal of Innovative Science and Research Technology Vol.1, Issue 3, pp. 23-25, Article Digital No. IJISRT16JU07, June 2016.

[6] Raganna, A., K. Nithesh, B. Neha, Omchandra V. Shrivastav, and Praveen T. Musaguppi. "Iot Based Night Patrolling Robot for Women Safety." International Journal of Modern Agriculture 10, no. 2, 2021.

[7] Avram, Camelia, Mihai Modoranu, Dan Radu, and Adina Aştilean. "Smart Packages Tracking System." In International Conference Innovation in Engineering, pp. 141-153. Springer, Cham, 2021.

[8] Chitrakshi Jain, Manish Mukhija "Various Approaches for flower detection & Surveillance: A Performance Evaluation", International Journal of Innovative Science & Research Technology Vol. 5, Issue 3, pp. 20-22, Article Digital No. IJISRT16JU06, June 2016.

[9] A Gaurav Kumar Soni, Sonam Gour, Mr. Kshitiz Agarwal, Aakash Sharma, Chandraveer Singh Shekhawat, Braj kishore sharma, " IOT Based Smart Agriculture Monitoring System", Design Engineering, Issue-6, pp. 2243- 2253, 2021.

[10] Sourabh Banga, Akash Rawat, Riya Ahuja, Mohd. Zaid, Yamini Goyal, "A Brief Survey on Personal Cloud Storage using Raspberry-Pi", Design Engineering, pp. 6767- 6774, 2021.

[11] Alfiero Leoni, Riccardo Colella, Luca Catarinucci, and Vincenzo Stornelli. "IoT-Ready Energy-Autonomous Parking Sensor Device." IEEE Internet of Things Journal 8, no. 6 (2020): 4830-4840.

[12] Ikhlayel, Mohammed, Adre Johan Iswara, Arief Kurniawan, Ahmad Zaini, and Eko Mulyanto Yuniarno. "Traffic Sign Detection for Navigation of Autonomous Car Prototype using Convolutional Neural Network." In 2020 International Conference on Computer Engineering, Network, and Intelligent Multimedia, pp. 205-210. IEEE, 2020.

[13] Manish Kumar, Dr. Sunil Kumar, Dr. Harish Nagar, "Comparative Analysis of Different Steganography Technique for image or Data Security", International Journal of Advanced Science & Technology (IJAST), Vol.29, pp. 11246-11253, April 2020, ISSN: 2005-4238.

[14] Chowdhury, Abdullahi, Gour Karmakar, Joarder Kamruzzaman, Alireza Jolfaei, and Rajkumar Das, "Attacks on self-driving cars and their countermeasures: A survey" IEEE Access 8, pp. 207308-207342, 2020.

[15] Rajabli, Nijat, Francesco Flammini, Roberto Nardone, and Valeria Vittorini. "Software Verification and Validation of Safe Autonomous Cars: A Systematic Literature Review." IEEE, 2020.

[16] Sun, Xiaoqiang, F. Richard Yu, and Peng Zhang "A Survey on Cyber-Security of Connected and Autonomous Vehicles (CAVs)", IEEE Transactions on Intelligent Transportation Systems, 2021.

[17] Monika Mehra, Manish Kumar, Anjali Mourya, Charu Sharma, "MERN stack Web Development", Journal Annals of R.S.C.B., ISSN: 1583-6258, pp. 11756-11761, Vol. 25, Issue 6, 2021.
[18] Campbell, Sean, Niall O' Mahony, Lenka Krpalcova, Daniel Riordan, Joseph Walsh, Aidan Murphy, and Conor Ryan. "Sensor technology in autonomous vehicles: A review." In 2018 29th Irish Signals and Systems Conference (ISSC), pp. 1-4. IEEE, 2018.
[19] Vishal Pratap Singh, Manish Kumar, Himanshu Arora, "Enhanced image security technique with combination of ARNOLD transformation and RSA algorithm", International Journal of TEST engineering and management, Vol.83, pp. 30550-30560, May/June, 2020, ISSN: 0193-4120.
[20] Manish Mukhija, "A Resourceful Technique for virtual Machine Migration in Fog Computing", International Journal of Innovative Science and Research Technology, vol-6, issue-6, pp. 167-170, 2016.