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Vision Based Self Driving Robotic Car that Lane Tracking, Driverless Parking, Theft Prevention and Traffic Signal Recognition through Bluetooth Connectivity

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ABSTRACT

Human driver errors cause a variety of accidents for reasons together with distracted driving. The most of the issue behind all this is often that the human reaction period is limited and therefore these incidents square measure innately inescapable. Our answer is to construct a totally self-driving robotic automobile that's capable of sensing its surroundings victimization and sophisticated vision sensor and navigates itself showing intelligence and autonomously. Several image processing and sensor fusion techniques are used to do this. In this propose system describes the vision based self driving robotic car used to detect the lane tracking, driverless parking, theft prevention, and traffic signal recognition.

Keywords: Lane Tracking, Driverless Parking, Theft Prevention, Self Driving and Robotic.

I. INTRODUCTION

At present automobile maker's square measure arising with partly machine-driven cars like ADAS to help the human drivers. Automatic recognition of civil infrastructure objects employing a Andre Mark off random field modelling mobile mapping pictures and autonomous driving victimization visual memory and image based visual servo is through an experiment evaluated[1-2]. As such, a totally autonomous automobile remains a distance away. However the trade is currently advanced to such extent that each camera detector technologies and superior process technologies square measure getting down to exceed the necessities that square measure required creating totally primarily based autonomous cars. Later sensing primarily based road-boundary detection and track period of time vision for intelligent vehicles. Associate degree unsupervised image segmentation derived from non-symmetric mixture model [3-5].

The project uses a sophisticated camera detector, inaudible and motion sensors and a cortex-m4 microcontroller. A downward measuring system detector primarily based increased road boundary and obstacle detection [6]. The microcontroller unit handles multiple tasks like reading the image from the camera, doing vision process and detector fusion, human activity with a Smartphone and dominant the robotic automobile [7].

II. PROPOSED SYSTEM

The robotic vehicle is capable of doing the following list of tasks on its own.

1) Lane tracking

2) Obstacle detection

3) Traffic signal recognition

4) Driverless parking

5) Reverse pedestrian detection

6) Theft prevention alert

A set of common vision processing algorithms such as colour recognition, edge detection and image comparison are used to extract information from the captured camera images.

OV2640 camera image sensor is used as the primary vision sensor in this project. It can output images at resolutions ranging from QVGA up to SVGA. The system should be capable of processing at least 5 frames per second to achieve a good performance on a moving vehicle. Here, low resolution images will be used to achieve the fast vision processing needs in this project. Figure 1 shows that the hardware module.

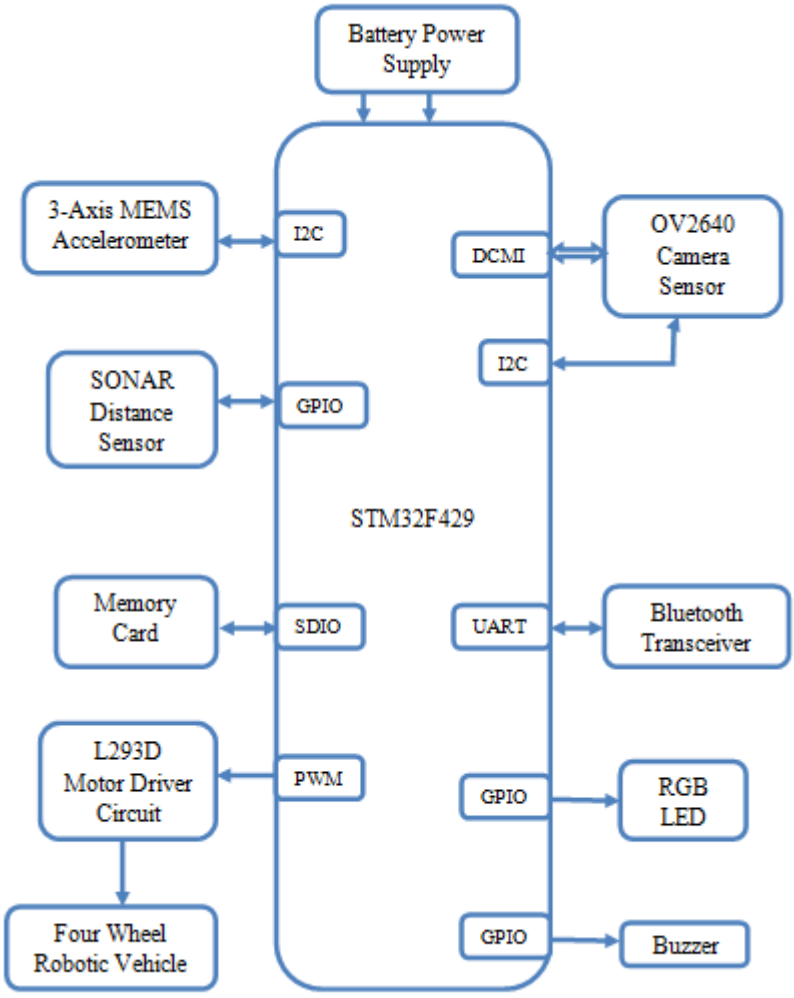

Figure 1: Hardware Module

Onboard MEMS accelerometer sensor is used to identify a vehicle theft scene. It also has support for storing camera images on a memory card in such a case. A SONAR distance sensor

assists obstacle detection and driverless parking feature. An RGB led will be used as a traffic light, to demonstrate the traffic signal recognition capability of the vehicle. A four wheeled robotic vehicle is used to show the demo. Each wheel is controlled by a DC motor using h-bridge motor driver chips.

The system is able to communicate with a Smartphone app via Bluetooth. This allows the user to send control commands from a handheld Smartphone and operate the robotic vehicle.

Embedded RTOS:

A period of time software is critical to handle the timely events and alternative multitasking necessities of the project. FreeRTOS is that the most generally used period of time software within the world.

III. RESULTS AND DISCUSSION

The Implementation of vision drive done victimization STM32F429 Microcontroller and Block Detection algorithmic rule in DIP – Digital Image Processing. Kit Demonstration is put on the STM32 board; it'll monitor and go the block ideological barrier road. Figure 4 shows that the hardware implementation. Figure 2 represents the driverless car.

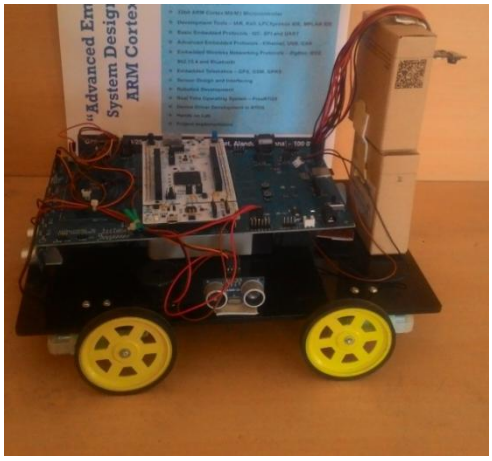

Figure 2: Hardware Implementation

Project Demonstration Procedure

1) During Start up, first switch on the Microcontroller Board.
2) Give 5v power supply.
3) The BT interface App should be installed in the ANDROID SMARTPHONE.
4) Connect Bluetooth (HC-05) with android mobile phone.
5) Open the App a BT interface free trial screen will be displayed and Bluetooth is automatically enabled.
6) In that BT interface free trial screen Press “Screen1” button a window is opened scroll down to the bottom and click the check box CR.
7) Come back to the Main Menu of the BT interface App choose “Discover” button.
8) The Smartphone will be searching to find enabled Bluetooth devices, after completing the Search, a select device dialog box appears.
9) In that dialog Box choose respective enabled device then password will be asked for pairing the two devices.
10) Enter the password as “0000” or “1234” two devices will be paired and Smartphone can communicate with vision drive unit.

11) After the two devices have paired the Led which is in the Bluetooth module glows steadily and Print "Connected "in smart phone app display.
12) Immediately a Screen "VISION DRIVE" commands Menu will be opened also few commands available for Parking the Car automatically.
    Drive
    Park
    Retrieve
    Alert
13) Before selecting the Drive Mode, we need to paste the Black tape for follow the Robotics car.
14) If you selecting the Drive mode, robot will track the Black tape line for driving purpose. After that any Traffic Signal is present means it will take care of it. Green signal means Drive and Red Signal means Stops the robot automatically. If obstacle is came in front of robotic vehicle it automatically stop the vehicle after showing green signal (green colour ball) only it will move, otherwise it won't go.
15) Place the Car in the Parking lot. Press the PARK button in the command Menu for parking the car in the Parking lot and it can Park Right side only. Bt app will say auto park completed.
16) After the Robot was parked press the Retrieve button in the command Menu. The Robot will come to the place where it was started to park.
17) After receiving that command the Robot starts to move forward for few seconds and If SONAR finds any obstacle while it is in retrieving mode intimate us with a command "OBSTACLE DETECTED" (heard in SMARTPHONE).
18) The car was parked in the parking lot if someone tries to break the car intimate to the owner by sending a SMS and also Robot raising the sound to alert while vision drive car in ALERT Mode. BT app will say auto retrieve completed in robotics voice.
19) We can also park the car using the REMOTE DRIVE command. For driving the Robot remotely using the navigation keys which are located right side of the command menu.
20) If we press the up button in that navigation keys Robot should move forward, press down button should move backward, press right side navigation button Robot turns right, press left side navigation button Robot turns left and press centre navigation button to stop the Robot.
21) We can also control the vision drive car remotely using this app.
    Come back to the Main Menu of the BT interface App. Press TERMINAL button a screen will be opened.

IV. CONCLUSION

In this proposed system based on driverless car is made to keep running among inside streets. In this propose framework the vision based self driving mechanical car used to identify the path following, driverless stopping, robbery anticipation, and traffic light recognition. This task is demonstrating framework the mechanical car is worked to keep running inside microcontroller and some other peripherals. There are huge attempts to be done to make this system to noticeably a final result that could keep running on a street in true conditions.

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