Driverless Autonomous Bus

Niraj Kapase[1], Abhishek Lande[2], Apurva Patil[3], Akshay Thigale[4], Tejaswini Rajeshirke[5]

[1]Assistant Professor, Department of Electronics Engineering, DKTE'S Textile & Engineering Institute, Ichalkaranji, India

[2,3,4,5]Student, Dept. of Department of Electronics Engineering, DKTE'S Textile & Engineering Institute, Ichalkaranji, India

Abstract- **Autonomous vehicles represent a new, growing segment of transportation research. Therefore, objective of this paper is to provide a review of the latest research on fully autonomous buses to summarize finding and identify gaps needing future research. The five main themes were identified, which are (1) technology deployment (2) user acceptance (3) safety (4) social and economic aspects and (5) regulations, legal issues and policies. In this paper, considering the different features and the cost, on a small scale a three-wheel vehicular robotic prototype has been designed that will follow the lane and avoid obstacles. Driverless Future and Autonomous Bus are a developing technology which may prove to be the next big evolution in personal transportation. This report begins by describing the landscape and key players in the future autonomous market.**

Index terms- **raspberry pi, IR sensor, servo motor, Ultrasonic sensor, Pi-camera, Arduino UNO, RFID tag, motor**

I.INTRODUCTION

An autonomous vehicle is defined as a vehicle that can drive without any human intervention by sensing the local environment, detecting objects, classifying them. When you begin to take the question what exactly is allowing their bus to behave autonomously you begin to realize that under the advanced algorithms exist conceptually simple components to make such a thing possible. In the project mainly focuses on the basis to implement the object detection and tracking based on its colour, which is a visual based project i.e., the input will be the video/image data which is continuously captured with the help of a camera interfaced to the Raspberry Pi.

II. PROPOSED MODEL

The mechanism is designed with the help of the some technologically advanced and error free components such as Raspberry Pi 0W, Servo motors, IR sensor, Ultrasonic sensor, Pi-camera, Arduino UNO, RFID tag, motor.

Machine learning

Machine learning is a type of artificial intelligence (AI) that provides computers with the ability to learn without being explicitly programmed. Machine learning focuses on the development of computer programs that can change when exposed to new data. The process of machine learning is similar to that of data mining. Both systems search through data to look for patterns. However, instead of extracting data for human comprehension -- as is the case in data mining applications -- machine learning uses that data to detect patterns in data and adjust program actions accordingly.
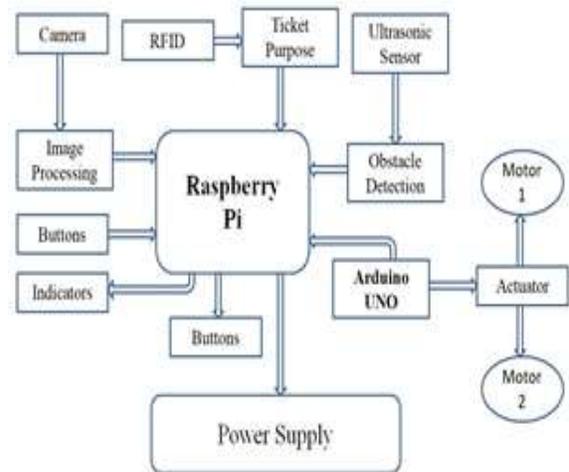

Fig. 1. Block Diagram

A Raspberry Pi board (model B+), attached with a pi camera module and an HC-SR04 ultrasonic sensor is used to collect input data. Two client programs run on Raspberry Pi for streaming color video and ultrasonic sensor data to the computer via local Wi-Fi connection. In order to achieve low latency video streaming, video is scaled down to QVGA (320×240) resolution.

III.COMPONENTS
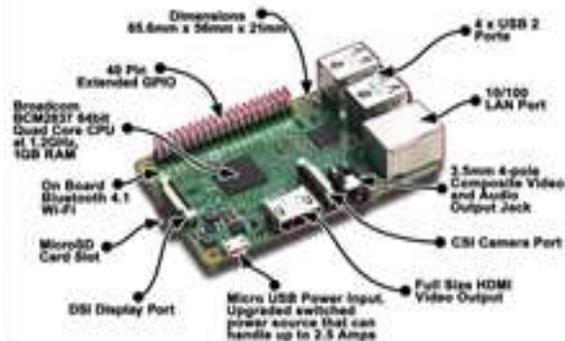
A. Raspberry Pi

Fig. 2. Raspberry Pi 0w

The Raspberry Pi is a credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python. It's capable of doing everything you'd expect a desktop computer to do, from browsing the internet and playing high-definition video, to making spreadsheets, word-processing. it keeps its operating system, documents and programs. If your raspberry pi did not come with an SD card, then the min size you should get is 4GB.Advantages of the raspberry pi is, it is small in size, and it works as a normal computer at low cost server to handle web traffic.

Features: -
- 1GHz, single-core CPU
- 512 MB RAM
- Mini-HDMI port
- Micro-USB On-The-Go port
- Micro-USB power
- Hat-compatible 40-pin header
- Composite video and reset headers
- CSI camera connector
- 802.11n Wireless LAN
- Bluetooth 4.0

B. Servo Motor

Fig. 3. Servo Motor

The MG995 is an excellent choice for a high torque, digital metal geared servo. It comes in a standard size and its metal gears mean when the is in a jam. The gears are likely to strip. This medium servo will rotate up to 6o degrees. This servo with its metal gears comes in at 55g and is a good choice for medium-large size projects. Each servo comes with three arms and screws and with pre-soldered female wires.

Features: -
- Weight - 55g
- Dimensions - 40.7*19.7*42.9 mm
- Stall Torque - 9.4 kg/cm (4.8v); 11 kg/cm (6v)
- Operating Speed - 0.20 sec/60 degree (4.8v); 0.16 sec/60 degree (6.0v)
- Operating Voltage - 4.8 ~ 6.6 v
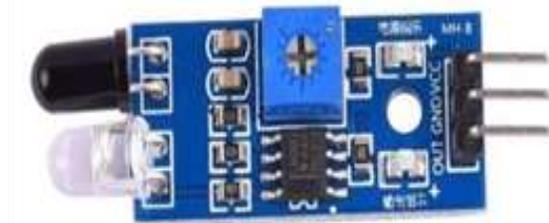- Gear Type - Metal Gear

C. IR Sensor

Fig. 4. IR Sensor

The 5v dc supply is given to the VCC pin and the supply negative is connected to GND terminal of the module. When no fabric is detected within the range of IR receiver the module gives the output zero and LED remains OFF. When fabric is detected within the range of IR receiver the module gives output ONE and LED remains ON.
- Working voltage: 3 - 5V DC
- Detection distance: 2 ~ 30cm
- Output type: Digital Output
- Board size: 3.2 x 1.4cm

IV. WORKING

Here is simple block diagram of prototype of autonomous car which describe the actual structure of project and command flow between the various sub-systems. As shown in figure, there are two sub-systems. That is Image processing sub-system and obstacle detection sub- system. Camera attached to image processing sub-system which capture the image and provide system. System extracts the data from the image and generates the command about turn. Mainly image processing is used here to detect the road lane. Generated commands are forward to obstacle detection subsystem. Obstacle detection sub-system is detecting the obstacle in front of bus and also calculates the distance between the obstacle and the bus. And if suf333ficient distance is available to move car forward the command from Raspberry pi is forwarded to motor driver else this command are rejected.
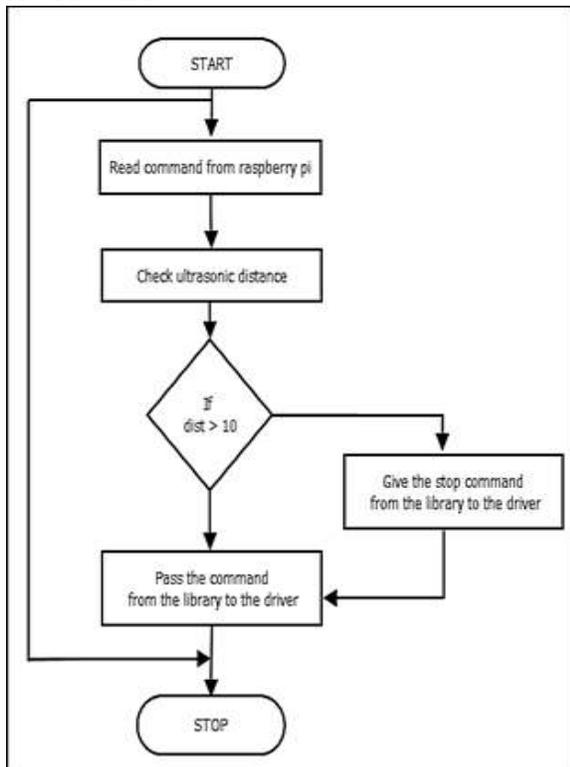
A. Flowchart

Fig. 5. Flowchart

V. ADVANTAGES

1 In industry
2 School bus
3 Airport
4 National park
5 Public and private transport

VI. RESULT

This section presents the results of the literature aims at the review on fully autonomous buses, and it has been divided to summarize findings for each of the five key themes. For each theme, a summary table was created to synthesize five dimensions for each created to synthesize five dimensions for each study pertaining to that theme: (1) authors; (2) type of publication; (3) study location; (4) method(s); and (5) key findings.

VII. CONCLUSION

Driverless Future and Autonomous Bus revolution which aims at the development of autonomous buses for easy transportation without a driver. For the economy, society and individual business this autonomous technology has brought many broad implications. In this paper, a method is determined for marked road edges are explained in detail relying upon OpenCV.

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