

SDC: Self-Driving Car based on Raspberry Pi

Mr. M.A. Hawre¹ Yash Sudhir Shirke² Udayraj Sambaji Gawade³ Karan Kamlakar Jadhav⁴
^{1,2,3,4}JSPM J.S. Polytechnic Hadapsar, Pune, India

Abstract— Within the era, the vehicles square measure centered to be machine-driven to offer human driver relaxed driving. within the field of automobile numerous facet has been thought-about that makes vehicle machine-driven. during this paper, considering the various options and the price, on a tiny low scale a three-wheeled conveyance robotic epitome has been designed that may follow the lane and avoid obstacles. Autonomous cars square measure a developing technology which can encourage be consecutive massive evolution in personal transportation. This report begins by describing the landscape and key players within the self-driving automobile market. Current capabilities, as well as limitation and opportunities of key enabling technologies, square measure reviewed, together with a discussion on the impact of such advances on society and also the atmosphere. Most impact, together with reduced traffic and parking congestion, freelance quality for poor people, redoubled safety, and energy conservation and pollution reductions can solely be important once autonomous vehicles become common and cheap to folk. Raspberry Pi is that the hardware of our Autonomous automobile. Numerous pictures are captured by the camera module, on this pictures numerous Image process techniques square measure won't to succeed computing.

Keywords: self-driving car, Raspberry pi

I. INTRODUCTION

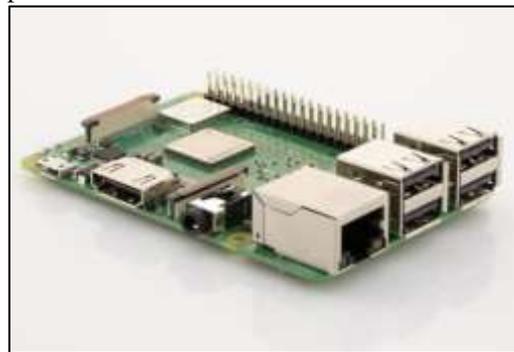
With the growing desires of convenience, technology currently tries to hunt automation in each facet attainable. Also, with the expansion within the variety of accident within the recent years thanks to enlarged variety of vehicles and a few quantity of carelessness of the drivers, it currently appears necessary to hunt automation in vehicles yet. thus to realize the benefit higher than mentioned issues, we tend to gift associate degree autonomously drive automotive which might eradicate human intervention within the field of driving. The automotive would drive itself from one place to the opposite on its own it might possess integrated options like lane-detection, obstacle-detection and traffic sign detection. This options would facilitate the automotive drive itself to the mentioned destination on the track properly, avoid collisions, offer live streaming of the read before of it with the assistance of camera mounted over the automotive and discover traffic signs and adjust them consequently thus on avoid accidents caused thanks to disobeying the traffic rules. this could guarantee safer, easier, updated and additional convenient quality, thus providing dead set be a revolutionary step within the field towards automation and quality.

II. HARDWARE REQUIREMENT

A. Raspberry pi b 3 +:

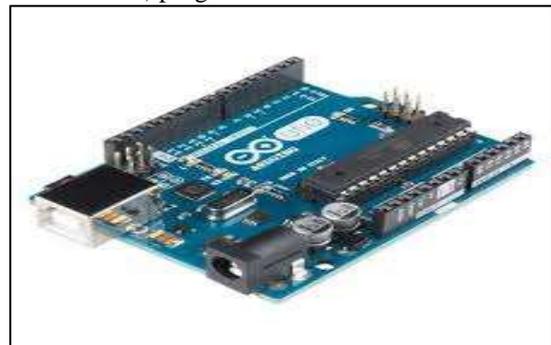
- The Raspberry Pi three Model B+ is that the most well liked Raspberry Pi laptop created, and therefore the Pi Foundation. Faster processor, 5 GHz WiFi, and updated LAN chip with Edgar Allen Poe capability.

- The Raspberry Pi three Model B+ is the most recent product within the Raspberry Pi three vary, jactitation Associate in Nursing updated 64-bit quad core processor running at 1.4GHz with built-in metal heatsink, dual-band two.4GHz and 5GHz wireless LAN, quicker (300 mbps) LAN, and Edgar Allen Poe capability via a separate PoE HAT.



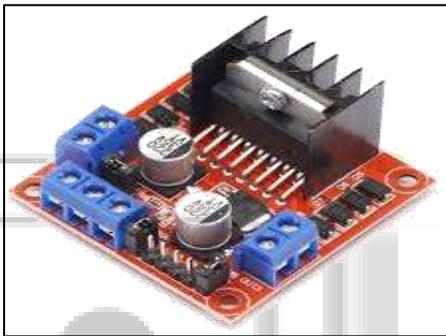
B. Arduino uno R3:

- Arduino may be a single-board microcontroller meant to form the applying a lot of accessible that area unit interactive objects and its surroundings. The hardware options with Associate in Nursing ASCII text file hardware board designed around Associate in Nursing 8-bit Atmel AVR microcontroller or a 32-bit Atmel ARM. Current models consists a USB interface, half-dozen analog input pins and fourteen digital I/O pins that enables the user to connect varied extension boards.
- The Arduino Uno board is a microcontroller based on the ATmega328. it's fourteen digital input/output pins during which half-dozen are often used as PWM outputs, a sixteen MHz ceramic resonator, Associate in Nursing ICSP header, a USB affiliation, half-dozen analog inputs, an influence jack and a button. This contains all the specified support required for microcontroller. so as to urge started, they're merely connected to a laptop with a USB cable or with a AC-to-DC adapter or battery. Arduino Uno Board varies from all different boards and that they won't use the FTDI USB-to-serial driver give them. it's featured by the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial convertor.



C. Motor Driver (H Bridge):

The L298N may be a twin H-Bridge motor driver that permits speed and direction management of 2 DC motors at an equivalent time. The module will drive DC motors that have voltages between five and 35V, with a peak current up to 2A. The module has 2 screw terminal blocks for the motor A and B, and another screw terminal block for the bottom pin, the VCC for motor Associate in Nursing a 5V pin which might either be an input or output. this relies on the voltage used at the motors VCC. The module have Associate in Nursing on board 5V regulator that is either enabled or disabled employing a jumper. If the motor offer voltage is up to 12V we are able to modify the 5V regulator and therefore the 5V pin are often used as output, as an example for powering our Arduino board. however if the motor voltage is larger than 12V we have a tendency to should disconnect the jumper as a result of those voltages can cause injury to the on board 5V regulator. during this case the 5V pin are used as input as we'd like connect it to a 5V power offer so as the IC to figure properly.



D. Pi Camera:

- The Raspberry Pi Camera v2 is that the new official camera board free by the Raspberry Pi Foundation.
- The Raspberry Pi Camera Module v2 may be a top quality eight-megapixel Sony IMX219 image sensor bespoke add-on board for Raspberry Pi, that includes a hard and fast focus lens.
- The Raspberry Pi Zero currently comes complete with a camera port! mistreatment the new Raspberry Pi Zero Camera Adapter, you'll be able to currently use a Raspberry Pi camera to your Zero
- It's capable of 3280 x 2464 pel static pictures, and conjointly supports 1080p30, 720p60 and 640x480p90 video.



E. Ultra sonic sensor:-

An unhear able device may be a device that may live the gap to Associate in Nursing object by mistreatment sound waves. It measures distance by causing out a acoustic wave at a

particular frequency and listening for that acoustic wave to get well. By recording the period between the acoustic wave being generated and therefore the acoustic wave bouncing back, it's doable to calculate the gap between the measuring instrument device and therefore the object.



III. SOFTWARE EQUIPMENTS

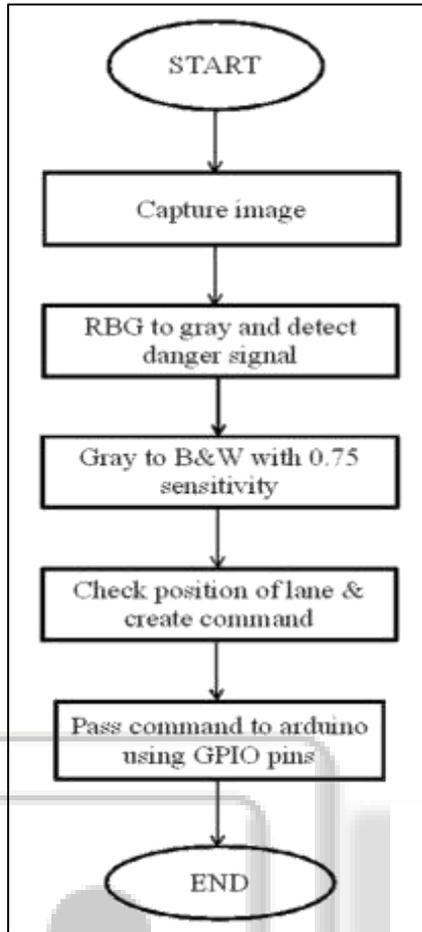
A. Python 3 IDE:

- Python is one amongst those rare languages which might claim to be each easy and powerful. you'll end up pleasantly stunned to envision however straightforward it's to consider the answer to the matter instead of the syntax and structure of the language you're programming in.
- The official introduction to Python is Python is a straightforward to find out, powerful programing language. it's economical high-level knowledge structures and an easy however effective approach to object-oriented programming. Python's elegant syntax and dynamic writing, alongside its taken nature, create it a perfect language for scripting and speedy application development in several areas on most platforms.

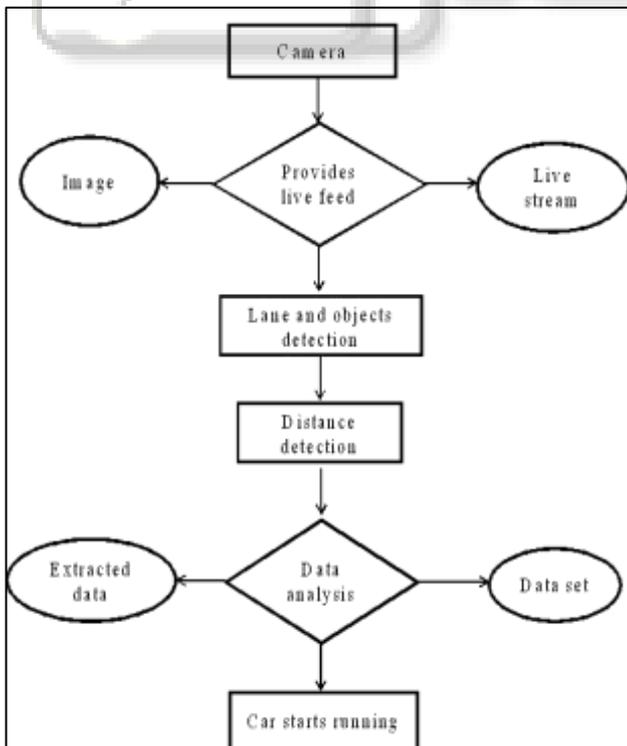
B. Arduino IDE:

- The Arduino integrated development atmosphere (IDE) is a cross-platform application (for Windows, macOS, Linux) that's written within the programming language Java. it's accustomed write and transfer programs to Arduino compatible boards, but also, with the assistance of third party cores, different vender development boards.
- The ASCII text file for the IDE is free below the GNU General Public License, version 2. The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE provides a software library from the Wiring project that provides several common input and output procedures. User-written code solely needs 2 basic functions, for beginning the sketch and therefore the main program loop, that area unit compiled Associate in Nursingd connected with a program stub main() into an executable cyclic executive program with the GNU toolchain, conjointly enclosed with the IDE distribution. The Arduino IDE employs the program argued to convert the possible code into a document in positional notation cryptography that's loaded into the Arduino board by a loader program within the board's computer code.

IV. FLOW CHART



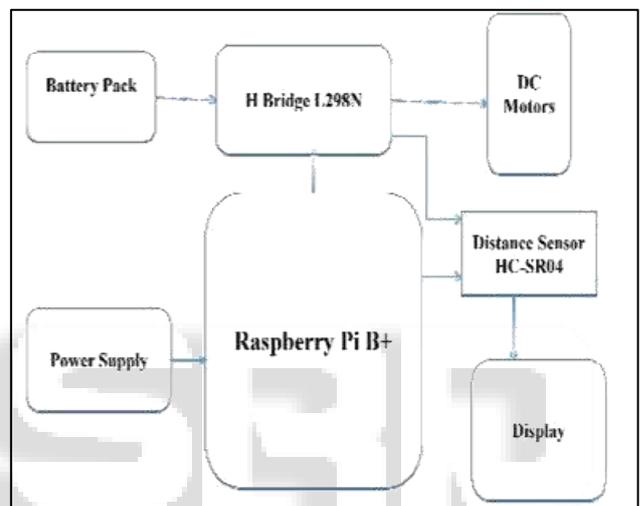
V. ER DIAGRAM



VI. WORKING

- The self-driving car is a road-based machine which is used for driving the car automatically.
- The self-driving car works on a simple small board processor raspberry pi 3b+.
- When the SDC gets start the pi camera captures the live streaming of the field and sends the information to the raspberry pi.
- Raspberry pi converts the colour video into the gray scale video.
- Then raspberry pi processes the video, and sends the command to the Arduino using GPIO pins.
- Then the Arduino process the command and send the command to the motor drivers.

VII. BLOCK DIAGRAM



VIII. CONCLUSION

- The autonomous car would surely prove out to be a boon in the automation industry and would be preferred over many traditional techniques.
- They could be used for patrolling and capturing the images of the offender. As they won't require any drivers, the accidents caused by the carelessness of the goods carrier vehicles would be reduced and would ensure better logistic flow.
- Hence, due to greater autonomous nature and efficiency, an autonomous car of this nature can be practical and is highly beneficial for better regulation in the goods and people mover's section
- The driver less car's technologies improves vehicle's stability helps to loss of control. Driver less cars are designed to minimize accidents by addressing the main cause of collisions: driving error, distraction and drowsiness.

REFERENCES

- [1] IEEE, 2014. www.ieee.org. [Online] Available at: http://www.ieee.org/about/news/2014/14_july_2014.html [Zugriff am 29 April 2015].
- [2] Broggi, A. et al., 2013. Extensive Tests of Autonomous Driving Technologies. IEEE TRANSACTIONS ON

INTELLIGENT TRANSPORTATION SYSTEMS,
14(3).

- [3] J.M.A. Alvarez, A.M. Lopez & R. Baldrich, Illuminant Invariant Model-Based Road Segmentation. *Intelligent Transportation Systems*, IEEE Transactions on, 12, 2008, pp 184–193. Bar Hillel, R. Lerner, D. Levi, & G. Raz. Recent progress in road and lane detection: a survey. *Machine Vision and Applications*, Feb. 2012, pp. 727–745
- [4] Shahzeb Ali Department of Electronic Engineering, Mehran University of Engineering & Technology, Jamshoro, 2016 IEEE.
- [5] K. R. Memon, S. Memon, B. Memon, A. R. Memon, and M. Z. A. S. Syed, “Real time Implementation of Path planning Algorithm with Obstacle Avoidance for Autonomous Vehicle,” in 3rd 2016 International Conference on Computing for Sustainable Global Development”, New Delhi, India, 2016.

