ADVANCED DRIVER ASSISTANCE SYSTEM

Mangaiyarkarasi V[1], Nivas J [2], Raghavan M[3], Rishi Vaishnava N[4], Sai Ganesh M[5].

[1]Assitant Professor, Dept of Electronics and Instrumentation, SRM Valliammai Engineering College, Kattankulathur,Tamil Nadu, India
[2,3,4,5] Student, Dept of Electronics and Instrumentation, SRM Valliammai Engineering College, Kattankulathur,Tamil Nadu, India

ABSTRACT

Artificial Intelligence is currently a steadily growing field. It starts to represent a necessity for various technological processes such as the automation of operations in various factors, where certain AI systems can make decisions without human intervention. The proposed system is a new approach for assisting vehicle drivers to drive and apply the brakes on their own. The main principle of Advanced Driver Assistance System is to provide anti-collision automatic control system and signal detection. Ultrasonic sensors are used in the vehicle to activate the emergency braking in case any obstacle is detected. In our prototype, the detecting range of the ultrasonic sensors is 28 cm from the obstacle. If there is any obstacle within the range of 11cm to the ultrasonic sensor, the emergency braking system is activated and the vehicle is pushed to halt. The pi cam is used to view the sign boards and traffic signals. The system controls the speed of the vehicle using sign board on the road side. The AI uses a Raspberry Pi as a "brain", with the Python 2 programming environment to implement these algorithms so as to solve our problem.

KEYWORDS: Artificial Intelligence, Automation, Human intervention, left hand rule, dead end filling, Raspberry pi3.

I. INTRODUCTION

ADAS begins with an overview of the road accident statistics worldwide that dictate the need for further predictive action towards safer vehicles, moving on to a demonstration of state-of-the-art systems that are already commercially available. Then, an overview of vision-based systems already implemented by vehicle manufacturers and after-market vendors is presented, followed by a presentation of vision-based ADAS still in research stage.

II. METHODOLOGY

More than half of the world population lives in the urban areas so the cities have reached its full occupancy. As a result number of vehicles in the cities is also increased. Due to this most of the people spend their valuable time on the roads travelling fro one place to another. It becomes difficult for the people to have a check on the speed limits when the roads are free to move which may cause in accidents. Work proposed in this paper is an attempt to solve above mentioned problem. The system developed here is an Advanced Driver Assistance System which is integrated with the python program so as to act according to the commands. Here the pi cams are used to detect the sign boards and traffic signals. When the traffic signal goes red the system is trained in such a way that it comes to halt automatically. The pi cams also detect the sign boards in which the speed limits are specified. It compares the speed of the vehicle with the sign board and reduces the speed of the car if the speed of the car is higher than the sign board. The ultra-sonic sensors are used as the emergency system unit. It brings the car to the halt as soon as it detects any obstacle is within the range of the ultrasonic sensor.

a)Motivation of the project

During the past few decades, road accidents have proven to be one of the most common causes for the loss of human lives. According to a study by the World Health Organization issued in 2004 [1], road accidents were estimated as the cause for 1.2 million people killed and as many as 50 million people injured worldwide. The seriousness of the situation can be reflected by the fact that in 2000, road accidents were the main cause of death inflicting injuries, resulting to approximately 23% of worldwide injury related deaths, while in 2004 they were the second overall cause of death for people of ages 5-14 and the first cause of death for ages 15- 29 years

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b)Existing system

In the existing driving systems for different vehicle are provided with feature of automatic gear changing in order to provide comfort to drivers and better efficiency. But for every vehicle there must be a driver to drive the car. The driver will get tired by controlling the vehicle via steering. We are making use of wireless Bluetooth technology for controlling of the vehicle via a Touch screen based Mobile phone. The system will consists of a Microcontroller section with Motors. It will be called as Vehicle robot. Bluetooth module will be interface with microcontroller via max232. To move the vehicle in particular direction a person needs to send few commands.

Disadvantages

- Partial Automation
- Mobile control instead of vehicle control

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a) Proposed system

- The major aim is to design an autonomous robot to drive over the real world.
- The AI will find the abstract and stop before crash using ultrasonic sensor.
- It will operate automatically using the sign signal over the road side automatically.
- Including of this it will scan and find the shortest path and will turn left or right based on the information.

Advantages

- Fully Automated
- Accuracy more compare to conventional methods
- Driving assistance
- Reduce accident

b) Hardware requirements

- Raspberry pi 3
- Power supply
- Driver IC
- DC Motor
- Camera
- Ultrasonic sensor

c) Software requirements

- Raspbian OS
- IP scanning software.
- VNC Viewer

III. BLOCK DIAGRAM

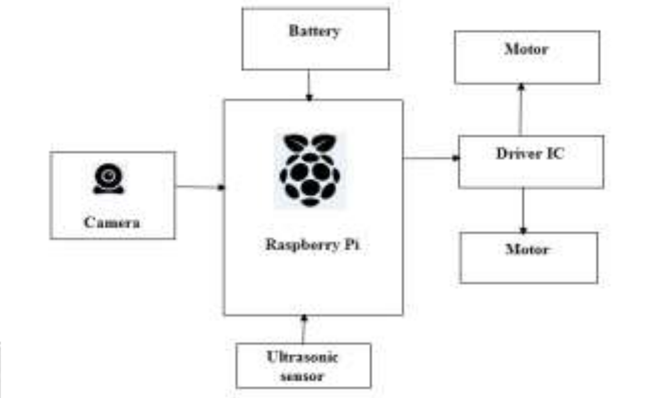

Figure:1 Block diagram for hardware.

Block diagram description

The battery is the main supply of power to the raspberry pi and camera. The camera detects the speed signs and the traffic signals. These images are sent into the raspberry pi where the programs are installed through a memory card as a storage device. The raspberry pi detects the images and activates the driver IC. The driver IC is connected to the motor in the vehicle which helps in slowing down the vehicle. The ultrasonic sensors are used in the emergency braking system. In case of sudden detection of any other vehicle or human by the sensor, the emergency braking system is activated and the vehicle comes to halt.

IV. SPECIFICATION OF COMPONENTS

a)RaspberryPi

The Raspberry Pi hardware has evolved through several versions that feature variations in memory capacity and peripheral-device support. This block diagram depicts Models A, B, A+, and B+. Model A, A+, and the Pi Zero lack the Ethernet and USB hub components. The Ethernet adapter is internally connected to an additional USB port. In Model A, A+, and the Pi Zero, the USB port is connected directly to the system on a chip (SoC). On the Pi 1 Model B+ and later models the USB/Ethernet chip contains a five-point USB hub, of which four ports are available, while the Pi 1 Model B only provides two. On the Pi Zero, the USB port is also connected directly to the SoC, but it uses a micro USB (OTG) port.

Processor

The Raspberry Pi 2B uses a 32-bit 900 MHz quad-core ARM Cortex-A7 processor. The Broadcom BCM2835 SoC used in the first generation Raspberry Pi is somewhat equivalent to the chip used in first modern generation smartphones (its CPU is an older ARMv6 architecture), which includes a 700 MHz ARM1176JZF-S processor, Video Core IV graphics processing unit (GPU), and RAM. It has a level 1 (L1) cache of 16 KB and a level 2 (L2) cache of 128 KB. The level 2 cache is used primarily by the GPU. The SoC is stacked underneath the RAM chip, so only its edge is visible. The earlier V1.1 model of the Raspberry Pi 2 used a Broadcom BCM2836 SoC with a 900 MHz 32-bit quad-core ARM Cortex-A7 processor, with 256 KB shared L2 cache. The Raspberry Pi 2 V1.2 was upgraded to a Broadcom BCM2837 SoC with a 1.2 GHz 64-bit quad-core ARM Cortex-A53 processor, the same SoC which is used on the Raspberry Pi 3, but underclocked (by default) to the same 900 MHz CPU clock speed as the V1.1. The BCM2836 SoC is no longer in production (as of late 2016).The Raspberry Pi 3+ uses a Broadcom BCM2837B0 SoC with a 1.4 GHz 64-bit quad-core ARM Cortex-A53 processor, with 512 KB shared L2 cache.

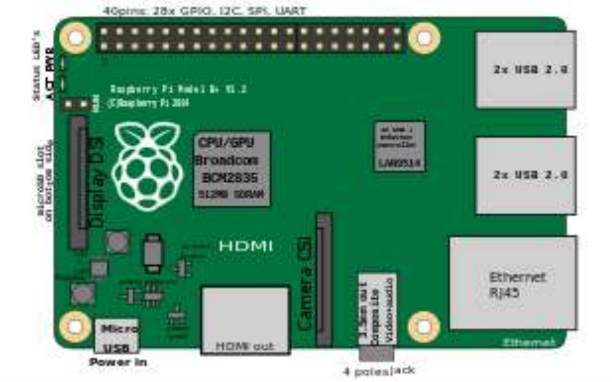

Figure:2 Raspberry pi B+

b)Webcam

A webcam is a video camera which feeds its images in real time to a computer or computer network, often via USB, Ethernet or Wi-Fi. Their most popular use is the establishment of video links, permitting computers to act as videophones or video conference stations. This common use as a video camera for the World Wide Web gave the webcam its name. This face recognition system more than security provide for net banking concept or personal social media account. This project can provide two type of security method first user can normal login then face recognition for user this user and account user image match then start net banking process and online process.

c)Raspberry pi Camera Board v1.3(5mp,1080)

The Raspberry Pi Camera Board plugs directly into the CSI connector on the Raspberry Pi. It's able to deliver a crystal clear 5MP resolution image, or 1080p HD video recording at 30fps! Latest Version 1.3! Custom designed and manufactured by the Raspberry Pi Foundation in the UK, the Raspberry Pi Camera Board features a 5MP (2592:1944 pixels) Omnivision 5647 sensor in a fixed focus module. The module attaches to Raspberry Pi, by way of a 15 Pin Ribbon Cable, to the dedicated 15-pin MIPI Camera Serial Interface (CSI), which was designed especially for interfacing to cameras. The CSI bus is capable of extremely high data rates, and it exclusively carries pixel data to the BCM2835 processor. The board itself is tiny, at around 25mm x 20mm x 9mm, and weighs just over 3g, making it perfect for mobile or other applications where size and weight are important. The sensor itself has a native resolution of 5 megapixel, and has a fixed focus lens onboard. In terms of still images, the camera is capable of 2592 x 1944 pixel static images, and also supports 1080p @ 30fps, 720p @ 60fps and 640x480p 60/90 video recording. The camera is supported in the latest version of Raspbian, the Raspberry Pi's preferred operating system.

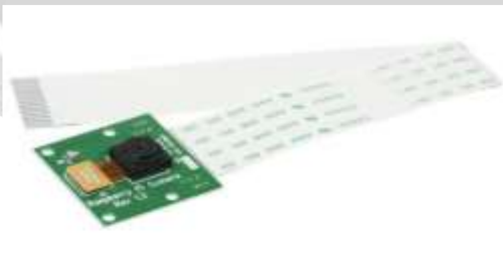

Figure.3 Pi camera

d)Ultrasonic sensor

An Ultrasonic sensor is a device that can measure the distance to an object by using sound waves. It measures distance by sending out a sound wave at a specific frequency and listening for that sound wave to bounce back. By recording the elapsed time between the sound wave being generated and the sound wave bouncing back, it is possible to calculate the distance between the sonar sensor and the object.

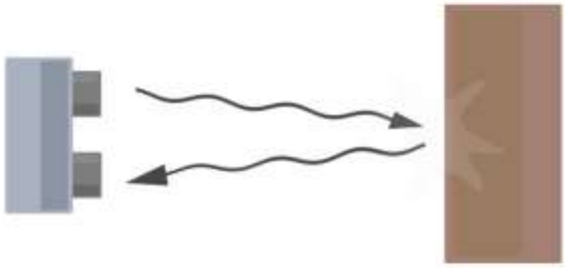

Figure.4 Ultra sonic sensor

e)Driver IC

L298N

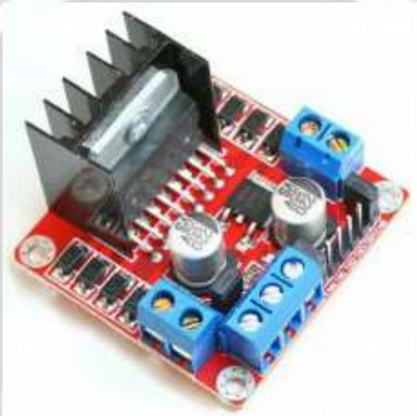

Figure.5 Driver IC

This L298 Based Motor Driver Module is a high power motor driver perfect for driving DC Motors and Stepper Motors. It uses the popular L298 motor driver IC and has the onboard 5V regulator which it can supply to an external circuit. It can control up to 4 DC motors, or 2 DC motors with directional and speed control

This motor driver is perfect for robotics and mechatronics projects and perfect for controlling motors from microcontrollers, switches, relays, etc. Perfect for driving DC and Stepper motors for micro mouse, line following robots, robot arms, etc.

An H-Bridge is a circuit that can drive a current in either polarity and be controlled by Pulse Width Modulation (PWM).

Pulse Width Modulation is a means of controlling the duration of an electronic pulse. In motors try to imagine the brush as a water wheel and electrons as the flowing droplets of water. The voltage would be the water flowing over the wheel at a constant rate, the more water flowing the higher the voltage. Motors are rated at certain voltages and can be damaged if the voltage is applied to heavily or if it is dropped quickly to slow the motor down. Thus PWM. Take the water wheel analogy and think of the water hitting it in pulses but at a constant flow. The longer the pulses the faster the wheel will turn, the shorter the pulses, the slower the water wheel will turn. Motors will last much longer and be more reliable if controlled through PWM.

V. HARDWARE RESULTS

VI. CONCLUSION

From the data we conclude the safety measures of the car is better than before to yield a better result in the car safety systems. Advanced Driver Assistance Systems (ADAS) will help to improve the driver safety and will make driving safer. It is different than the passive safety systems and other traditional safety features like Anti-lock Braking System (ABS) and Electronic Stability Control. The acceptance of this system will vary from user to user. Further research in this field are led towards autonomous driving vehicles.

VII. REFERENCES

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