K. S. GROUP OF INSTITUTIONS

K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BENGALURU-109

SOCIALLY RELATED PROJECTS- ELECTRONICS AND COMMUNNICATION ENGINEERING

Implementation of a Computer Vision Based Obstacle Avoidance and Self-Steering System for Autonomous Vehicle

A self-driving car, also known as an Autonomous Vehicle (AV), driverless car, or robo-car is a vehicle that is capable of sensing its environment and moving safely with little or no human input. The human error is one of the main reasons for road fatalities and accidents to overcome this problem.The self-driving car upon filling the obstacles in the path has to find a way to overcome them. The above action is performed by initially detecting the obstacle through pi-cam and based on the data received from pi-cam the necessary action has to be performed. The necessary action to be performed is commanded by Raspberry pi to Arduino. The Arduino signals the motor driver to perform its operation. The distance of 40cm is maintained between the model and obstacle. The distance parameter is accurately calculated by model through the aid of pi-cam.

The self-driving car on road has to identify the markings on the lane or identify the road surface to navigate or steer seamlessly through its path. The above actions are performed by the image processing technique where various processes and parameters are utilized to identify the lane markings. Also, certain pointers are used to calibrate the exact position to be maintained on the road surface, based on the above methods the model can steer along the path seamlessly.

Figure: Self-Driving Cars

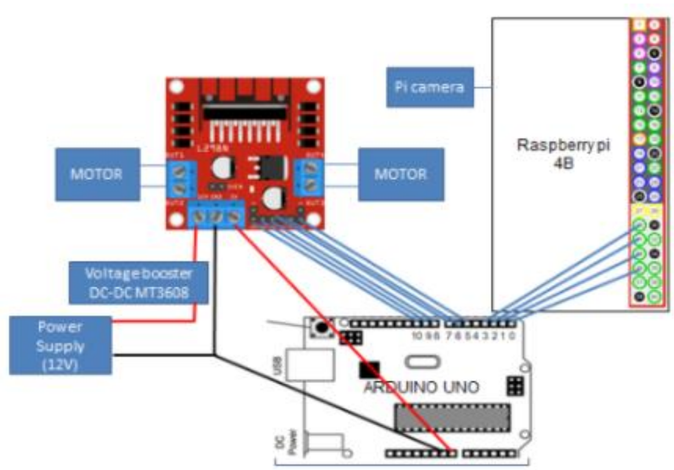

Figure: Circuit diagram of the project

Autonomous cars will consist of up to 75% of the cars on the roads. Tens of millions of people have lost their lives or have become disabled worldwide in the last 10 years as a consequence of traffic accidents, the purpose of this project is to create a safe self-driving car that could help millions of people each year.

An autonomous car is a vehicle capable of sensing its environment and operating without human involvement. A human passenger is not required to take control of the vehicle at any time, nor is a human passenger required to be present in the vehicle at all. An autonomous car can go anywhere a traditional car goes and do everything that an experienced human driver does. Autonomous cars rely on sensors, actuators, complex algorithms, machine learning systems, and powerful processors to execute software. Autonomous cars create and maintain a map of their surroundings based on a variety of sensors situated in different parts of the vehicle. Radar sensors monitor the position of nearby vehicles. Video cameras detect traffic lights, read road signs, track other vehicles, and look for pedestrians. Lidar (light detection and ranging) sensors bounce pulses of light off the car's surroundings to measure distances, detect road edges, and identify lane markings. Ultrasonic sensors in the wheels detect curbs and other vehicles when parking.

Sophisticated software then processes all this sensory input, plots a path, and sends instructions to the car's actuators, which control acceleration, braking, and steering. Hard-coded rules, obstacle avoidance algorithms, predictive modeling, and object recognition help the software follow traffic rules and navigate obstacles.

DESIGN AND IMPLEMENTATION

This project adapted the shape-based approach and used Haar feature-based cascade classifiers for object avoidance. Since each obstacle requires its own classifier, we use only one obstacle to demonstrate the operation obstacle avoidance. We use the detector that is provided by OpenCV library. Positive samples (contains target obstacle) are collected using raspicam and were cropped so that only required obstacle is visible. Negative samples were also collected using raspicam, which contains some random images.

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SOCIALLY RELATED PROJECTS- ELECTRONICS AND COMMUNNICATION ENGINEERING

"IMPLEMENTATION OF A TREMOR DETECTION SYSTEM TO MONITOR THE EFFECTIVENESS OF PARKINSON'S MEDICATION"

Auscultation is an important method in medicine to detect and monitor various defects in the human body. Many auscultation devices were invented and implemented amongst which Stethoscope plays an important role in listening to auscultatory sounds. Due to the decline in the Auscultation skill and expensiveness of the high quality present traditional stethoscopes, there is a drawback for efficient Auscultation. To overcome these drawbacks, it was decided to design and implement a low cost, efficient and reliable Auscultation device which gives accurate monitoring of auscultatory data.

The present study focuses on implementing the basic operation of traditional stethoscope, along with the processing techniques for noise removal. The project mainly focuses on the extraction and efficient auscultation of the Heart Sounds. The Heart Sounds obtained can be visualized in LabVIEW. The Heart rate obtained is calculated by programming in LabVIEW using its VI's, which can also detect the Normal, Bradycardia or Tachycardia conditions of a patient. The result is an inexpensive and non-invasive method for efficient Auscultation and monitoring Heart rate. This can be a quick diagnostic tool in the hands of Physicians for routine checkups. Some major irregularities in heart sounds can be detected and visualized and the necessary medical intervention or actions can be adopted well ahead of time.

DESIGN AND IMPLEMENTAION

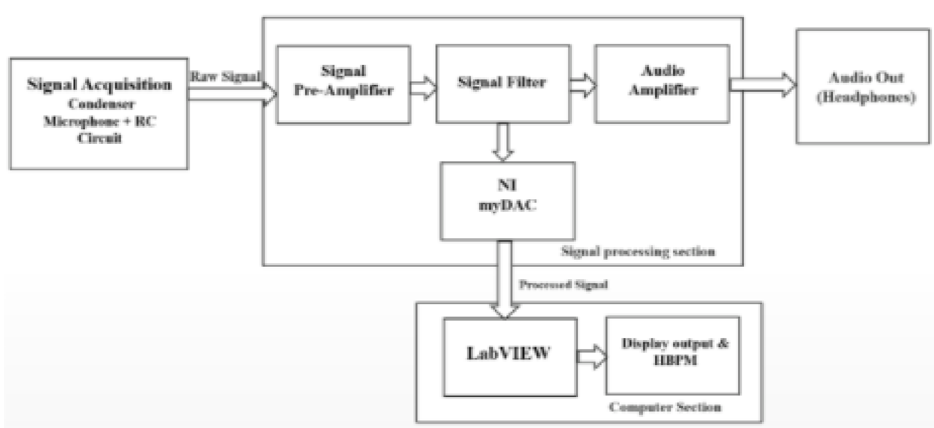


Figure: Block diagram of proposed system

Auscultation is termed as " The Art of listening to internal sounds of the body" like the heart, lungs, or other organs, typically with a stethoscope, as a part of medical diagnosis. It is an integral part of physical examination of a patient and is routinely used to provide strong evidence including different pathological conditions that are manifested clinically in the patient.

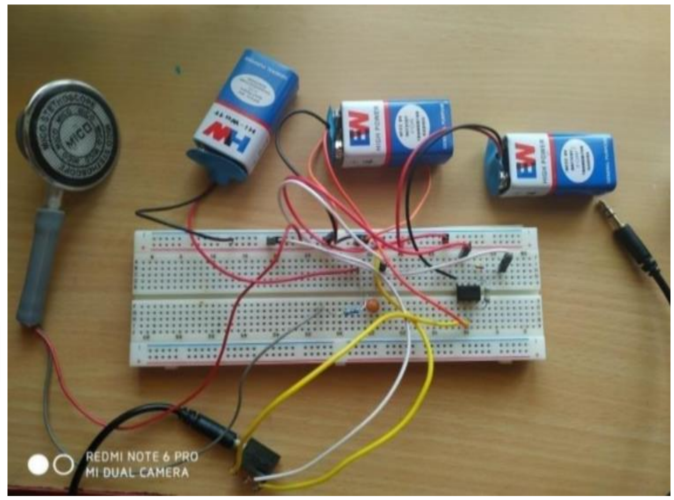


Figure: NI my DAQ

Figure: Setup of the acquisition circuit with amplifier

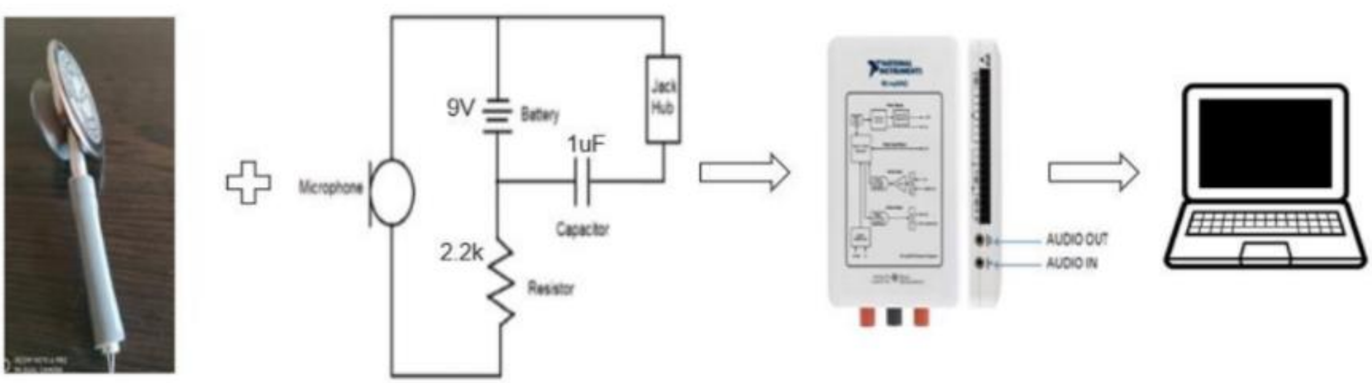


Figure: Setup for extraction of Raw Signal

From the results of software and hardware implementation of the filter it is seen that the Primary Heart Sounds seems to look more neat with most of the noise eliminated. Whereas in case of Hardware implementation, due to its roll-off, most of the noise is completely not eliminated. Hence, Software implementation seems to give better results.

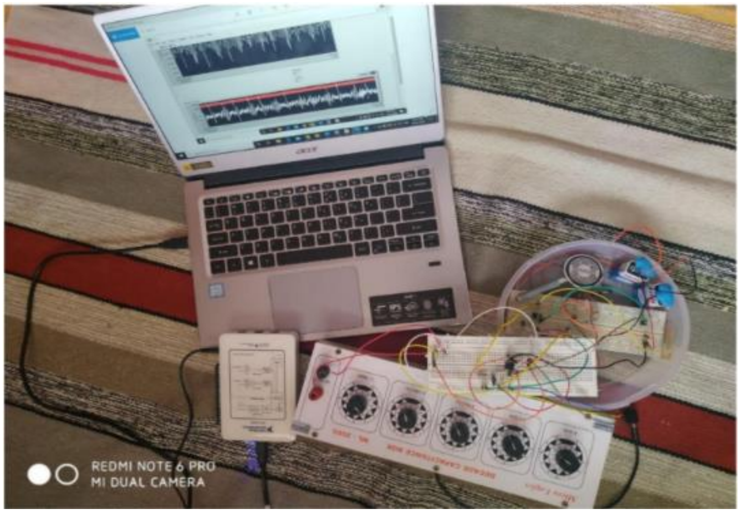
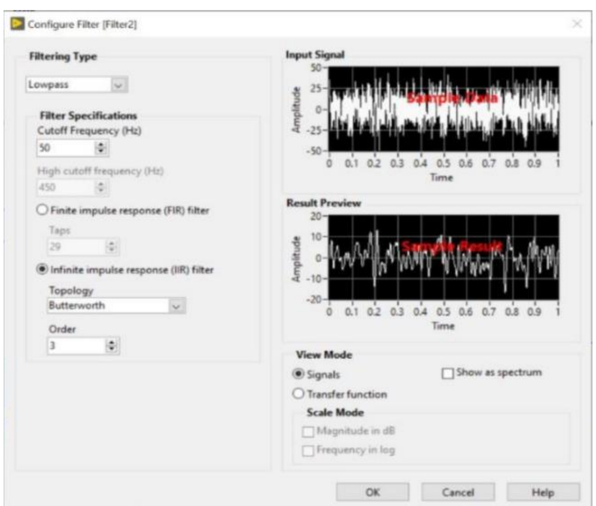


Figure: shows the Hardware implementation of the Filter along with the Acquisition and Pre-Amplification section

The HBPM for the obtained filtered primary heart sounds is calculated using the program in LabVIEW using the particular VI's. Fig.6.12 shows the front panel of the LabVIEW showing the primary heart sound peaks with heart rate calculated. The integrated system was tested on people at different instances such as the resting Heart rate.



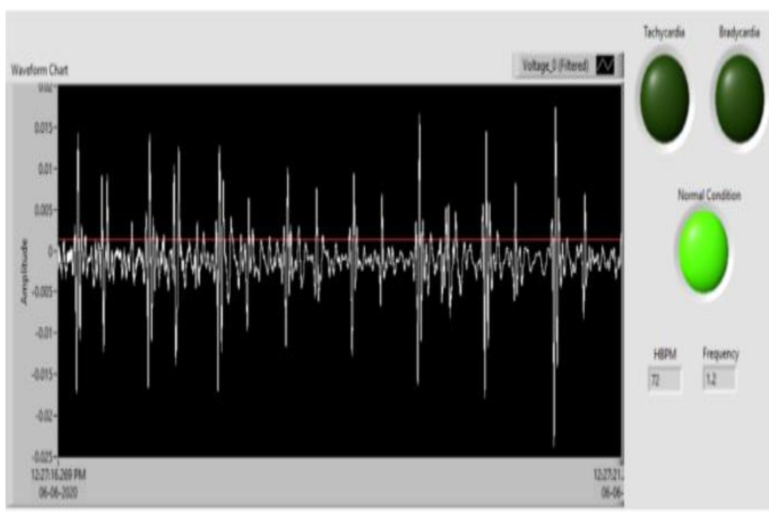


Figure: Filter configuration

Figure: Front panel showing S1 and S2 peaks along with HBPM

Our aim was to design and implement an Auscultation device to monitor heart sound and heart rate, and hence a system was designed implementing efficient acquisition and processing techniques. It is a low cost and non-invasive device built using the traditional acquisition method. Existing Auscultation signal extraction methods and sensors to be used was studied.

It was seen that the condenser microphone was successful in extracting the raw signal containing heart sound. The raw heart sounds are observed in LabVIEW and could be typically seen below 50Hz. This project uses amplifier and filters circuits which were designed for the required value and tested for its correctness with the theoretical value. An algorithm was developed in LabVIEW, to calculate the BPM and to show the Normal, Tachycardiac and Bradycardiac conditions. The algorithm was tested on various people of different age groups. The proposed system for the detection of Heart Sounds is not a tool for final diagnosis but, it is a simple tool which enables us to detect the normal and abnormal conditions of the heart rate, after which further appropriate treatment can be taken.