PROJECTS- IN DETAIL

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The Spiderbot
The Spiderbot is a robotic spider that functionally moves around in all directions, rotates about its axis and hinges upwards and downwards (to immitate spider looking upward and downward movement).

The final model of the bot locomotes on 8 legs using the creep gait and immitates the exact motion and behaviour of a spider, more precisely the inspiration is the 'tarantula spider'.
The project evolution is divided in three parts-
1.Making a quadruped bot that follows a spider like gait.
It locomotes using servo motors . And uses the basic Arduino Uno for control. The design is inspired from the natural look of a spider, a rectangular body with singly jointed legs.And conducts the following motions- forward, backwards, leftwards and rightwards locomotion, spin about its axis, upward and downward hinge.

2.Making a octopod, the only addition here to step 1 is that the bot will not move on eight legs rather than 4. Thus conrolling power supply to all the servos and managing the gittering is a difficult task.

3.Microbot – The final stage is creation of a micro spiderbot of the size exactly that of a tarantula. The bot would have photo and audio sensors on it and would be used for surveillance purposes.
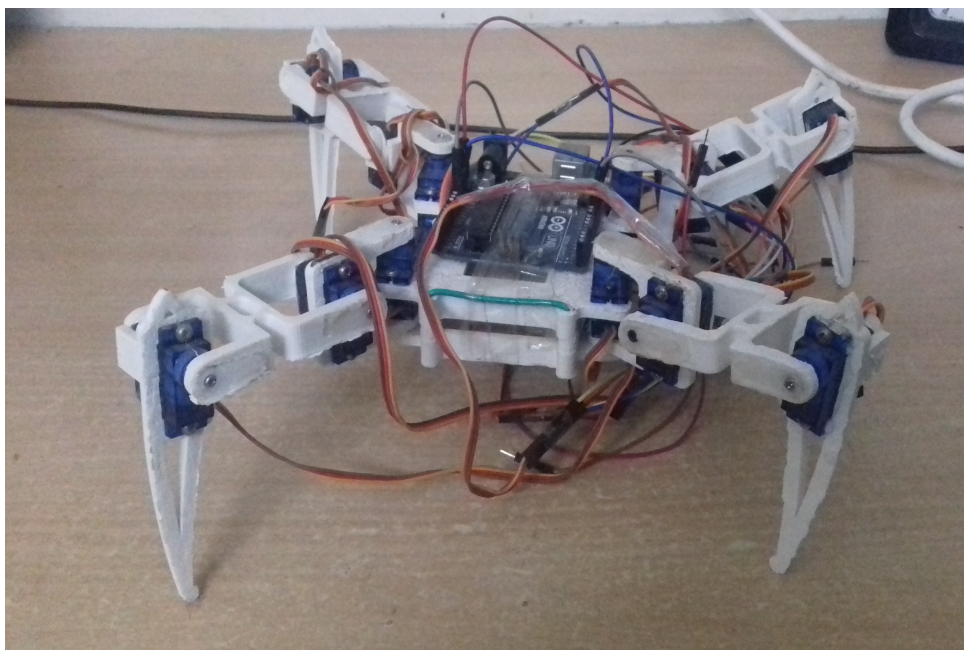
2.Smart vision analysis

This project is related to neuroscience. It aims to analyse the reception of images and colors to the brain to Improve comuter vision techniques. The project consists of a few steps
1.Using a Geodesic sensor net headset, we record data depicting the behaviour of brain nodes when shown different pictures and colors. Then we create an ML algoritm that tries the same sensory techniques used by the brain to detect the colors.
2. The ML algorithm is modified to now also analyse various objects in images.
3.This final ML algorithm that imitates the brain's behaviour while analysing objects is compared to other computer vision softwares.

Part one report-

The experiment

Aim: Analyse the brainwave data observed of various subjects when showed different colors for a period of time, and develop a machine learning model to detect the color that was perceived by the subject.

Equipment required:

Mobile application: We created a mobile application which shows the RGB spectrum , one color at a time. The color would be shown for five seconds, followed by a dark screen for the next five second and then the next color and so on.

Virtual Reality Headset: Any virtual reality headset to show the color displayed on the mobile screen to the subject, the purpose of using the headset is to ensure that the entire scope of vision of the subject is filled with the color we want to be perceived and the subject is not distracted by any external stimuli.

Geodesic sensor net: The headset that is used to measure the brainwave data of the subject.
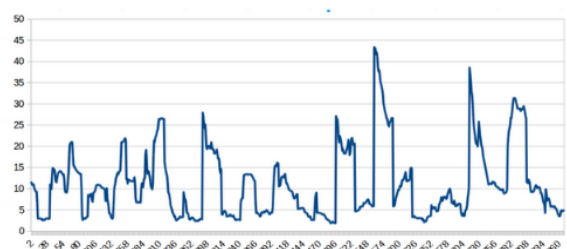
Monitor: A montor will be used to display the data and record it.
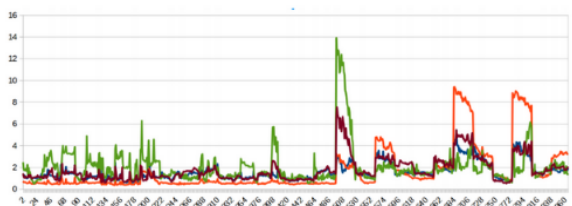
Observation:

Data Graphs:

G1:

Single Y axis data type value graph (a sample for observation)

G2:

Multiple Y axis data type value Graph

3.Project Holter Monitor-

Project Holter monitor is to make a cost efficient heart rate monitor which can be simply worn on the body and helps measure heart rate anytime at a regular basis. The key feature of this project is its cost efficiency compared to industrial products. The cost of a holter monitor that we make would be around 3500 any holter monitor in the market which has all the features as ours at the moment costs atleast 30,000.
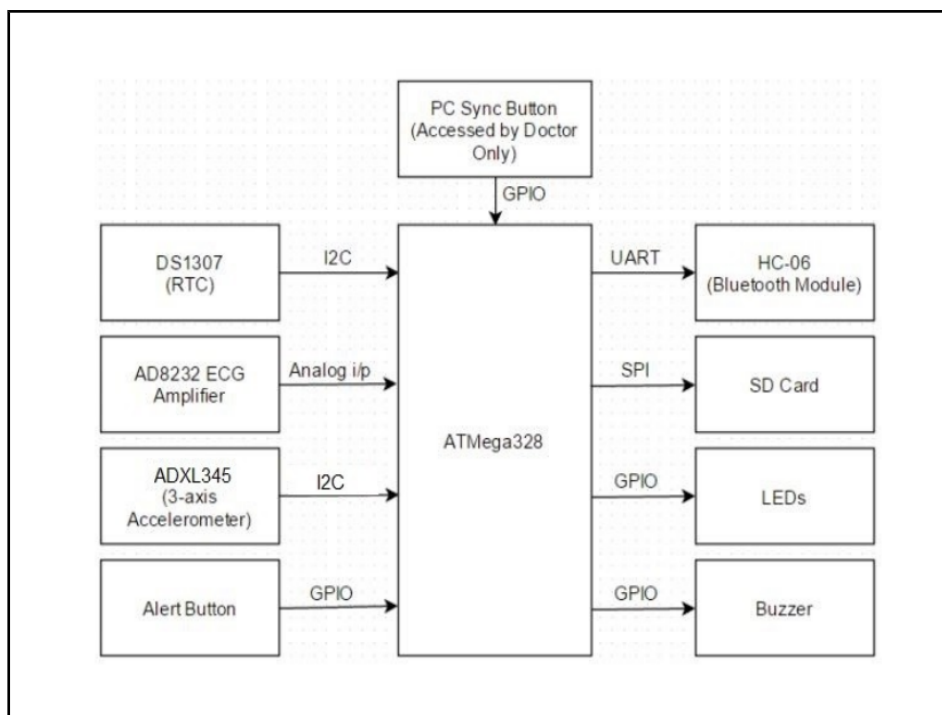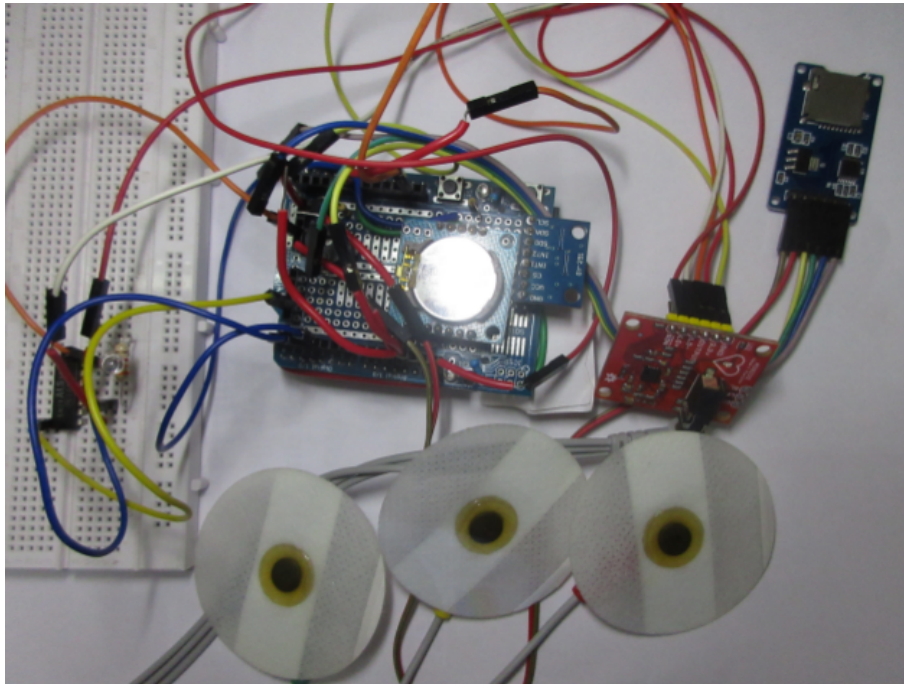
4.Human Machine Teaming-
This project is in collaboration with DRDO and is used for Army missions. We aim to make swarm drones that collaborate with each other and humans to make Indian defence system more efficient.

5.F1 Racecar motion planning on a complicated track using Python
I wrote a python code to simulate the motion of a car
simulation video and code here-
https://github.com/bs2603/UniBotics

RELEVANT COURSES COMPLETED/ MISCELLANEOUS-

1. Practice school
I did a college organised summer internship at grasim industried nagda where I got the following LOR

2.Boeing Aeromodelling Competition -Techfest IIT Bombay
I participated In the Boeing Aeromodelling Competition at Techfest IIT Bombay. We designed and built an RC model Plane which and flew it to cross various challenge levels of the competition.

3.Worked on the following as a member of the aerodynamics club Bits Goa
-Worked on build and fly of various RC airplane designs
-worked on build and fly of a quadcopter
-worked on build of an RC air-cushion vehicle (ACV)
-Worked on aerofoil design and simulation on XFLR5