Performing Arts and IOT

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1 Introduction

Dance is an art. It is the form of expressing ones feelings symbolically using mental and physical aspects.Technically portraying an art like Dance is the recent ideas which has evolved out to be a challenging tasks from the past decade. On the other hand, technologies like IOT(Internet of Things) is in a huge demand, wherein the world is looking to integrate IOT with everything. The bridge between Art and technology is IOT. The Dance IOT is a project where the dance arm movements are analysed and mapped onto several functional platforms(may be control of the auditorium's lighting system,volume system etc..), so that the performance is enhanced and makes the audiences awestruck. This is more constrained to bring up new era in the performing arts like dance,theatre plays,magic shows and circus as well. The whole idea is the please the audiences with the innovative technologies that lead to great performances.

2 Project Analysis

2.1 Initiation

This project is a collaboration of art and technology. The main motto lies in using IOT as the combining tool.There would be possibly four main domains in this project,categorised on the basis of modular functionality in achieving it.The following are the functionaries:

1. Pattern Acquisition
2. Pattern Analysis
3. Functional Mapping
4. Performance analysis

Figuring all the possible ways, the main goal of this project would be to find out a mathematical mapping relation between the sensed data and the assigned specific task .The process of designing such a system requires the perfect understanding of the components and their outcomes. For better understanding and also to uphold the terms of modularity, I have divided the project into three phases,they are:

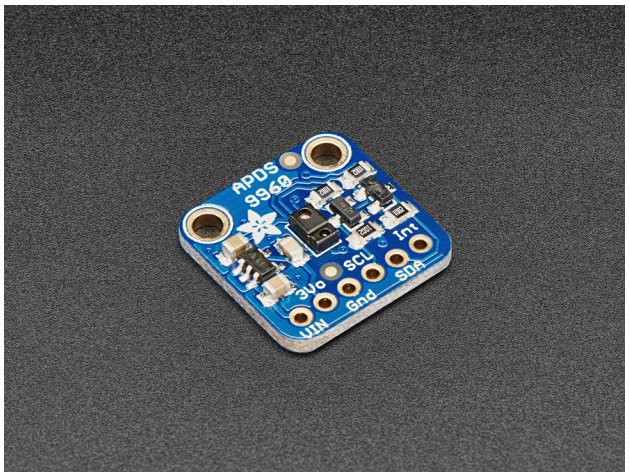
1. Phase 1 - Pattern Acquisition, Pattern Analysis
2. Phase 2 - Functional Mapping
3. Phase 3 - Performance Analysis

3 Modules and Tools

3.1 Sensors

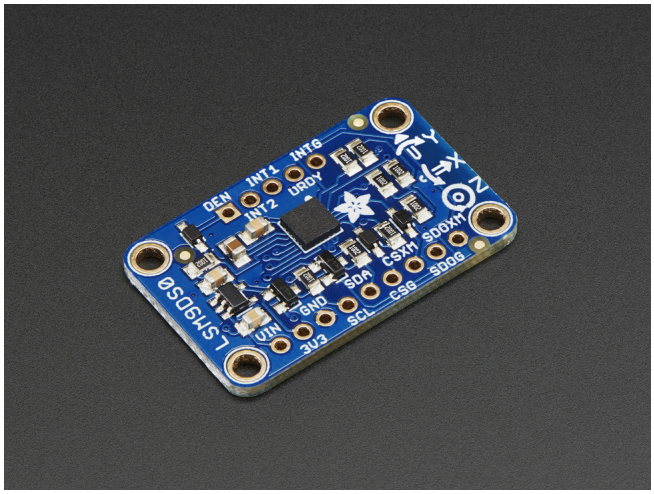
Generally , there are sensors which can sense motion and detect its path of movement as well.Out from various available sensors we are using APDS9960 and LMS9DS1. They are the two most common sensing devices used in motion detection.

1. APDS9960 :



APDS9960 (for specifications: https://cdn-learn.adafruit.com/downloads/pdf/adafruit-apds9960-breakout.pdf) is a multi-functional sensor that mainly senses proximity,RGB, light and gesture of an object. It is the most popular sensor used in gesture detection.It is to be connected to a micro-controller for the action and control process of it.It generally returns the gesture detected(right,left,up,down) and even complex gestures such as zigzag,near,far,etc.. It also returns the values in Red, Green, Blue attributes of the object that it detects.When coming to the terms of proximity it returns the distance of the object detected with up to 8 bit resolution. As mentioned above it is a multi-functional sensor. It has six pins where VIN is for the input voltage, 3Vo is to power up the sensor, Gnd to ground the sensor so as the unwanted voltages are grounded, SCL is the serial clock, SDA is serial Data and, INT is the interrupt.

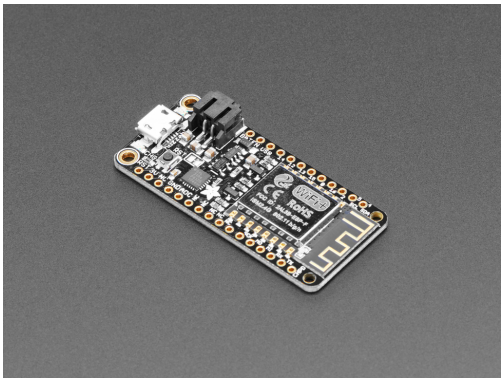
2. LMS9DS1:



LMS9DS1 (for details: https://www.adafruit.com/product/2021) is a motion sensing sensor. It is a combination of accelerometer, gyroscope and magnetometer.In depth it has a 3-axes accelerometer, 3-axes gyroscope and 3-axes magnetometer.So collectively its good for all the possible 9 degrees of freedom(DOF). It supports both I2C and SPI. It measures angular velocity, acceleration and magnetic heading and returns them to the micro-controller.It measure the above mentioned parameters in a three dimensional field resulting in 9 outcomes i.e angular velocity in x,y,z, and acceleration in x,y,z, and magnetic heading in x,y,z. Thus, this sensor outcome is more reliable and best to analyse.

3.2 Micro-controller

A micro-controller is a user friendly electronic device which is generally used to perform a specific task. Here, task may be either one time or an infinite number of times, it is user controllable. User will have to code the required task in the form of an assembly language (or language with effective to the micro-controller, mostly a high level language). The micro-controller converts the code written into its understandable language and performs the task as per the code written by the user.



In our project we are using ESP8266 as a micro-controller. An ESP8266 s a versatile micro-controller, it has an on-chip wifi module which gives the option to the user to connect to a cloud or server based on his need. This is similar to an arduino micro-controller but has more performance stability and advanced features than an arduino has. This is the main reasons for the usage of it in complex projects. Projects filled with real time robotics, real time analysis prefer ESP8266 over other micro-controllers that are available in the market.

3.3 Sloeber Eclipse IDE

Sloeber Eclipse IDE is an open source user-interface, generally a tool that is used to code and manage the micro-controllers.Sloeber is used in our project to manage the code that is used to perform our project. It has code files that are in cpp format and as well as python format. It is multi-disciplinary tool,since

it can mange code of different formats. We also use sloeber to set a connection for the module and the server precisely speaking, setting a wifi connection.

4 Phase 1

4.1 Pattern Acquisition

Pattern acquisition is the process of collecting a large number of data sets relevant to the task to be performed. Pattern Acquisition is a result obtained by the sensors through control by the micro-controller. When the code is uploaded onto the module(combined micro-controller connected with the servers), the program runs and the results are obtained on successful compilation.The results are sent to a server using MQTT protocol. Once the server starts storing data, we can retrieve it back. This set of data received is called a pattern. Depending on the action or movement of the wearable module,the values change. so,in case of waving a hand, the action must be performed so that the server stores the action and the user can then successfully retrieve data. This action is one sample of a pattern. With varied acceleration and speed we need tor record as many as samples as required for a single pattern. The pattern is obtained in a JSON format.Java Script Object Notation popularly known as JSON is a flexible text format that can store data and communicate it with other devices. So, anything related to a cloud or server based data system a JSON format must be used and hence we are using it. Finally my Pattern is acquired in the form of JSON.

5 References

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