Smart Devices for Athletes to Monitor Running Speed in Marathon Race with IoT

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ABSTRACT:

Physical health is a state of fitness and well being and, extra specifically the ability to perform elements of sports activities. If the athlete is not fit then the person may concerns with knee injuries, controlling blood pressure etc., To overcome this fitness issues in marathons giving proper physical training and knowing the blood pressure of the athlete. A system based on the acceleration, gyroscopic sensors and the parts-dependent heart rate adjustment approach was suggested. The goal is to track the operating pace during the human activity in real time, informing users that they need to correct the pace when coaching. The coaches and the doctor transmit the wireless data at the same time. The experimental result shows that athletes are running at speed. This leads to a safe running habits and encourages urban life and balanced activity for the growth of athletes. The main objective of this project is to reduce the injuries while giving training and monitoring the data of the athlete and also observing the heart rate of the athletes.

Keywords:Acceleration Sensor, Gyroscopic Sensor, Marathon, Heart rate

1. INTRODUCTION:

Marathon sports pay attention to uniform speed, they can have better pay to their strengths in a uniform state. Many runners pay attention to controlling speed. They figured out their marathon scores ten thousand meter results multiplied by marathon endurance coefficient, And then the marathon scores correspond to the speed , trying to run in the same pace throughout the same pace. Grasp the pace can be based on the sense of speed, Watch your time when you are running at ordinary times, connect the actual speed to pace. You can also use a mobile phone or watch sports software movement while training and competition, these watches or software are with GPS positioning function, according to the GPS data average speed for the athletes can be calculated the to adjust their running speed.

Through Marathon sports, they exert their strength more efficiently in a specific setting, taking account of uniform speeds in marathon sport. Most drivers are responsible for speed control. The running process is always unsatisfactory and not complete due to its insufficient speed. The sport accidents involved are caused in spite of the runner's excessive speed. A sensor-based approach is applied.The goal is to track run speed in real time, while WLAN provides data on user acceleration and the heart rate of athletes that can effectively improve athletes' running pace, accelerate spectator trains and also control cardiac pace of Physi.

2. LITERATURE REVIEW

ZhangoBo ,GuoJinBao&XuDanDan (2018), author proposed a system for monitoring and implementing the runge-kutta algorithm of the running sprrd and for generating power with piezoelectric material.

Emma M. Kidman ,Mattwe JA D' Souza & Surya P.N. Singh(2016),author proposed system that is a wearable device with inertial motion tracking and vibro-tactile feedback the system consists of wearable sensor module and a smart phone application for coach , the wearable sensor module receives the control command and acts accordingly.

Dhruv R Seshadri, Colin Drummon& John Craker(2017), author proposed paper gives a brief overview of new technologies which helps athletes to understand new technologies in real time. Wearable devices have been documented to be able to identify and monitor the effects of interactions in the research and development phase. The incidence of congestion of sportsmen would probably be one of small wearable goods.

sachinMenon and dhanammajagli (2016), author proposed report "IOT implementations in the sport environment" explains how iot is used in sports.iot in a broad scale, but is carried out in small-scale sports due to certain limitations and studies. The application explains how iot technology is linked with sportsmen.

Li Jiayi, Liu Dongxu, Zhu Jianjum& Liu Tao(2019), authors proposed system gives in assessing the state of motion using wearable devices.This program is strongly anti-interference capable, contains time information and guidelines for the assessment of cardiopulmonary performance.

KENNETH LI MINN ANG & JASMINE KAH PHOOL SENG(2019), author presented paper the emergent field of the device specific Internet of Things summarized the emerging field and provided fundamental taxonomy for further research into interoperability, energeticalperformance, edge / fog learning models and security / privacy challenges for the Internet of Things specifically for application.

In KittichaiTharawadeepinuk&YodchananWongsawat(2014), author presented paper they observe the brain activity of Asian athletes before the match and also they studied the anxiety symptom showing on the brain via QEEG maps.

In GuoHao(2010),author presented paper they studied about the positively correlated between the groups compatible index and the team's performance and also they observed the factors like ability, personality, etc.,

In Jonathon G. Neville, David D. Rawlands, James B. Lee & Daniel A. James(2016), author presented paper demonstrates a method in which accelerometer data gathered from competition and training data was used to determine over ground running speed on an individual athlete basis for use during elite competitive sport.

PROPOSED METHOD:-

This section provides the method used for this mission. IoT powered wise system for sportsmen" is the solution. This is a technique based entirely upon Particle Argon which uses sensors to monitor athletes' moments.

Particle Argon:

Particle Argón is the main part of a network which is fitted with Nordic nRF5240 and Espressif ESP32 processors and is compatible with the Bluetooth mesh platform. The Argon features an integrated charging circuit, which enables the contact and communication of a Li-P0 battery with sensors, drives and other electronic devices.

MPU6050 SENSOR:

The MPU6050 module is complete with a 6-axis motion tracking device. It combines in a small package all 3-axis gyroscope, 3-axis accelerometer and digital motion processor. It has I2C auxiliary bus to communicate with other sensors such as pressure sensors etc. With Micro Electro Mechanical System (MEMS) technology, the 3-axis gyroscope detects rotational velocity along the X, Y, Z-axis and provides a full-scale output of + /-250, + /-500,+/-1000,+/-2000. The 3-axis Accelerometer is with Micro Electro Mechanical System(MEMS) Technology which used to detect angle of tilt or inclination along X,Y and Z-axes and give the output in the scale range of acceleration are +/-2g ,+/-4g,+/-8g,+/-16g where it measured in g(gravity force) unit.

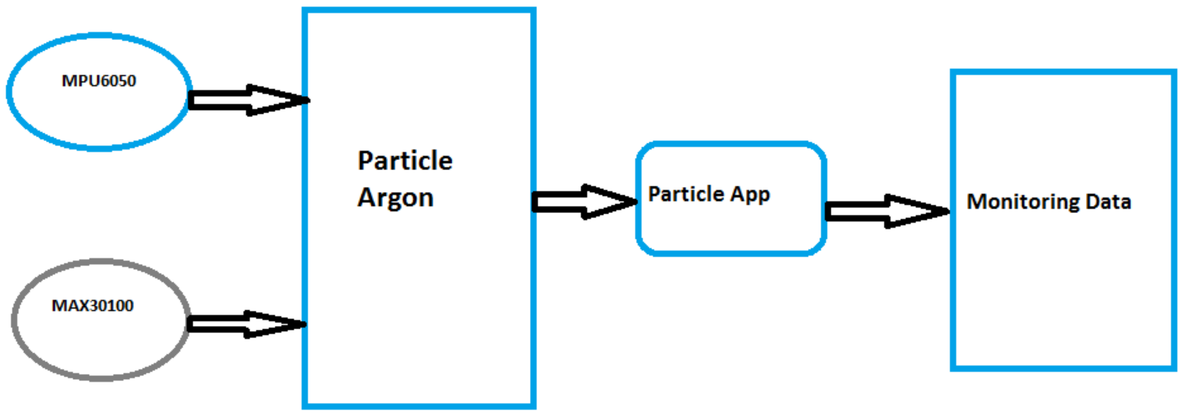
MAX30100 SENSOR:

The MAX30100 is an integrated heart rate and pulse oximetry monitor system which operates from 1.8v and 3.5v power supplies and can be used mainly in medical monitoring systems with low-standby software.

Bluetooth HC-05 Module:

The HC-05 is a Bluetooth SPP module, designed for the transparent installation of a wi-fi serial connection. The frequency band uses 2.45 GHz. The relationship may be factor-to-factor or multiple, with 10 meters being the largest variation. The price is 1Mbps for statistical move. It also offers a shifting mode between grasp and slave, so it can neither obtain nor pass on information.

METHODOLOGY:-



The proposed system consists of particle argon and other parameters including the 3-axis gyroscope, the 3-axis accelerometer and the heart rate are the main control factor. The system is controlled by the first sensors are connected according to the pin description to the particle argon board as a point. This contact is achieved by a software program, which is a Particle Web IDE or a VS workbench between hardware components. The first step is to connect the components to the Particle Argon. Power the Particle Argon and open the particle web IDE and login to that website and code should be run in this ide and then flash the code to the system. After flashing the code to the system, download the Particle App in the App store and login to the app and connect the system to the app and we can monitor the data of the athlete in the app.

ALGORITHM:-

Step1: The sensors are linked to the Particle Argon Network

Step2: Provide the device with the power supply.

Step3: Build a Particle Web IDE account.

Step4: Write the code to the Particle IDE and then flash the code to the device.

Step5: Download the Particle App to mobile device.

Step6: Build an account in the Particle App and log in to Particle Argon.

Step7: Once the system is set up, the data will be monitored in the Device.

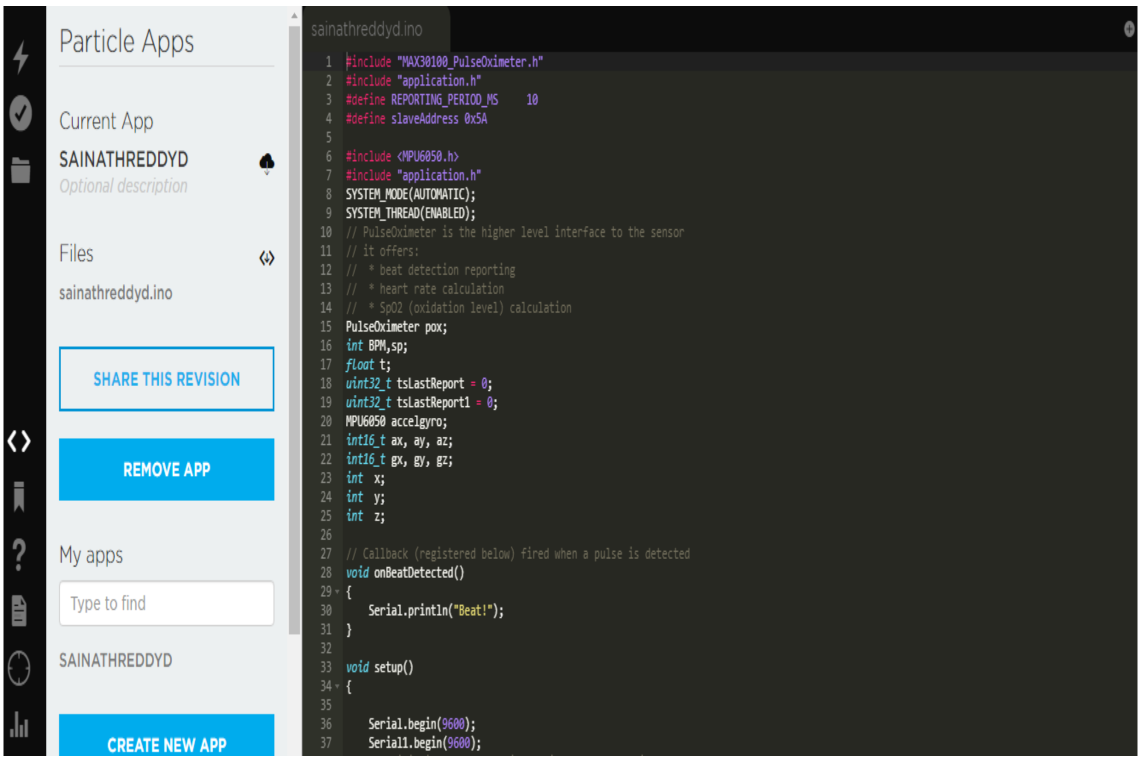
Step8: The Bluetooth module is attached to the network that provides the data to be controlled on the Arduino Serial board.

Step9: All values are shown in the Particle App and in the Serial Monitor.

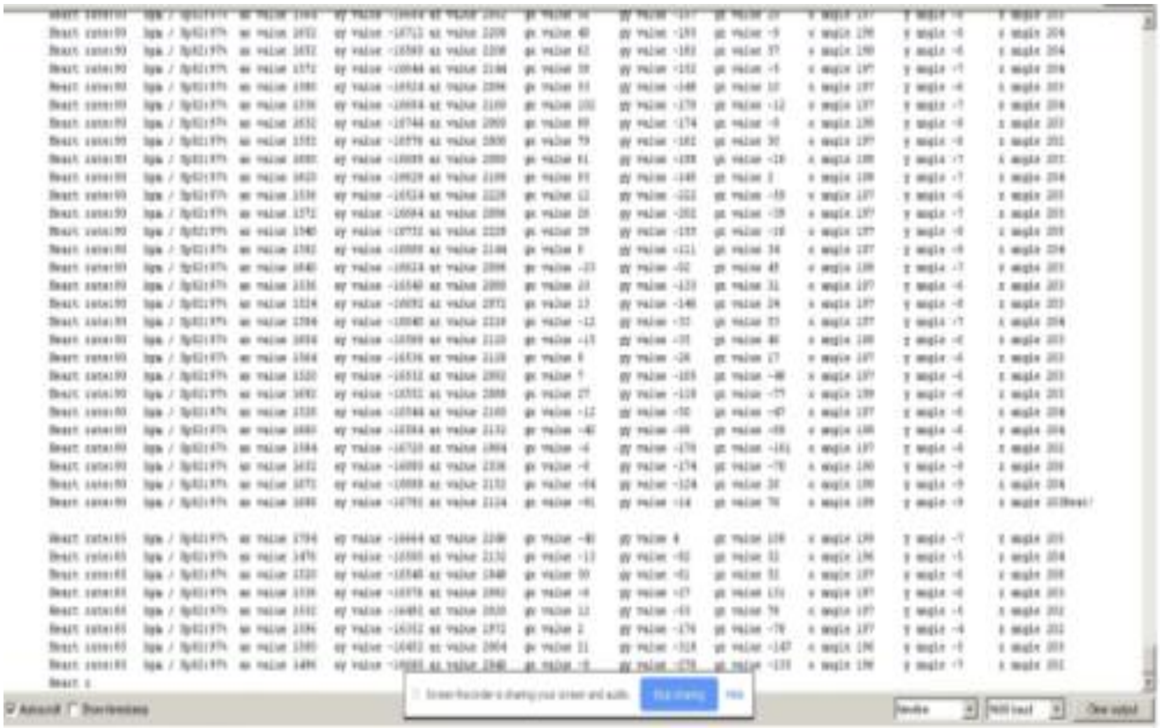
Result:

Getting live data through Bluetooth:-

The system is first connected to the Particle web IDE and there login to the IDE and necessary code should be done and verify the code and then flash the code to the system. And check the port connections in the Arduino to monitor the live data in your PC.

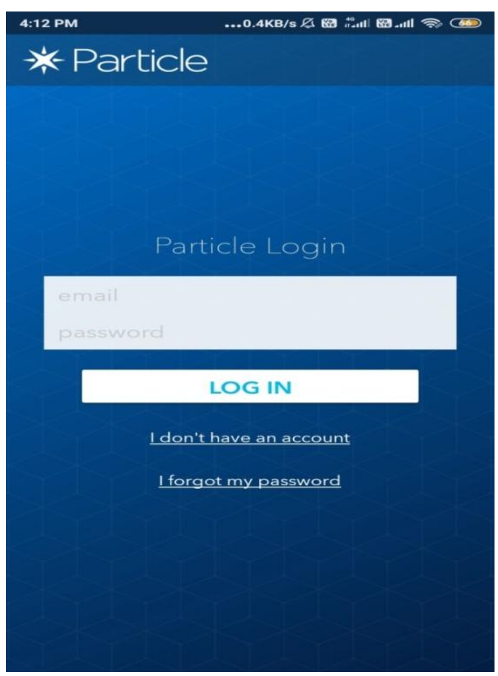


After connecting the system with the Wi-Fi router that is our connection status is shown in the Particle web IDE will show online. Now open the Arduino IDE in your PC and connect the Bluetooth HC-05 to your PC. After checking the Bluetooth Com PORT Number and change the port to that port . Now open the Serial port where you can see the live sensor data of the athlete.

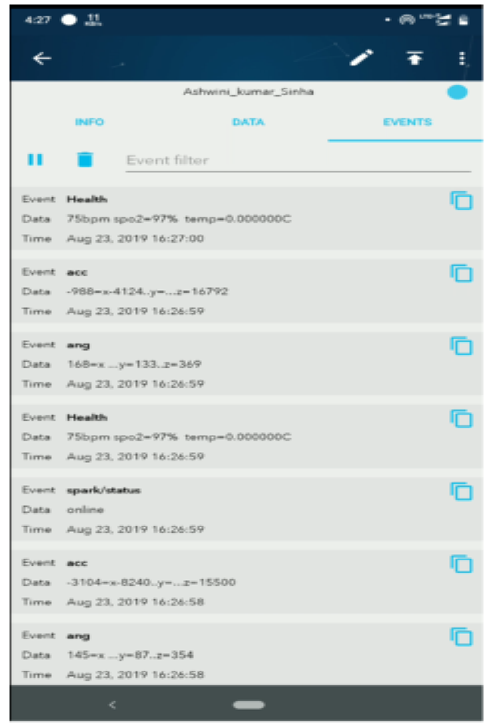


Getting data through device cloud:

Firstly login toto the particle app, if you did not have the account just create an account by just clicking on the sign up.



After login to the App, connect the system to the App by scanning the QR code on the system to connect to the particular system and give the event name to the system and also password to the system



To get the data from the device cloud Open the console and copy the URL and paste it in any browser then it will show data with event name. This data can be accessed from anywhere over internet no matter how far you are from the device and the live data of the sensors can also be accessed from Particle App.

CONCLUSION:-

The IOT framework the objective of the proposed system is to track the data of athletes during training and competition. The data obtained will help the coaches practice better and will also allow us to know the heart rate of the athlete. In future various sensors can be used such as the athlete's glucose level, and also add piezoelectric material that can produce electrical energy, and the same energy can be used to power the device.

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