FitGroup: Network of Hexiwear Fitness Watches for Group of Friends/Family

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Idea

- To connect all the smartwatches in the family, tracking the entire group's fitness data
- To create a Networked Embedded System using BLE and WiFi so that each one can keep track of their buddy/ family member's activity
- To motivate others to remain fit for the rest of their lives :)

Features

- Heart-rate
- Specially configured buttons to read buddies data
- Azure based cloud storage
- Azure based analytics
- Two way communication between Pi and Hexiwear
- Pedometer to calculate everyday steps based on the accelerometer data

Hardware/ Software Requirements

Hardware

- Hexiwear
- Raspberry Pi

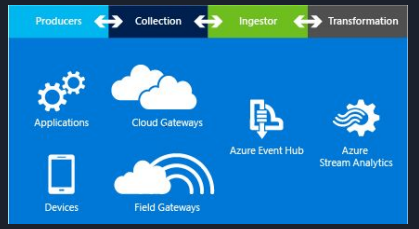
Software

- Mbed Online Compiler
- Microsoft Azure
- Microsoft Azure ML

Hexiwear-Pedometer and Heart-Rate

- Leveraging the inbuilt accelerometer data to count the number of steps taken by the person throughout the day
- Filtering the accelerometer data by taking the average of array of samples to reduce the noise
- Using the MAXIM 30101 built-in heart rate sensor to obtain raw heart rate data and computing beats/minute with Fast Fourier Transform
- Pedometer processed on the hexiwear and heart rate on the Raspberry Pi

Communication Network architecture



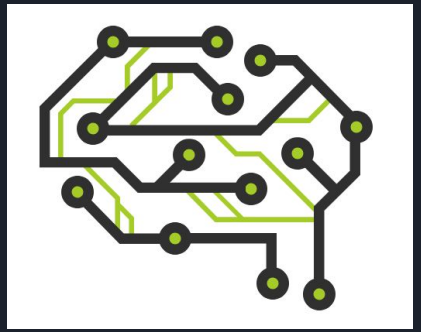
Microsoft Azure

Hexiwear to Azure

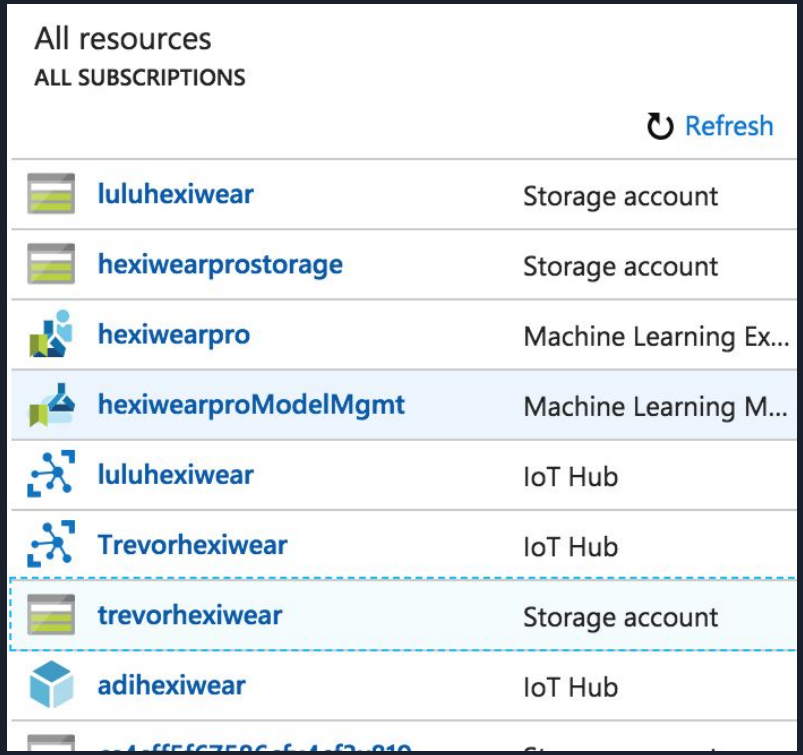
- First level of communication in the network
- After BLE connection is established, Fitness data is transferred periodically from Hexiwear to Raspberry Pi
- Data is stored in a txt file in the Raspberry Pi
- Then the file is pushed to Azure via Wi-Fi
- Azure cloud has blob storage that can store data in any form

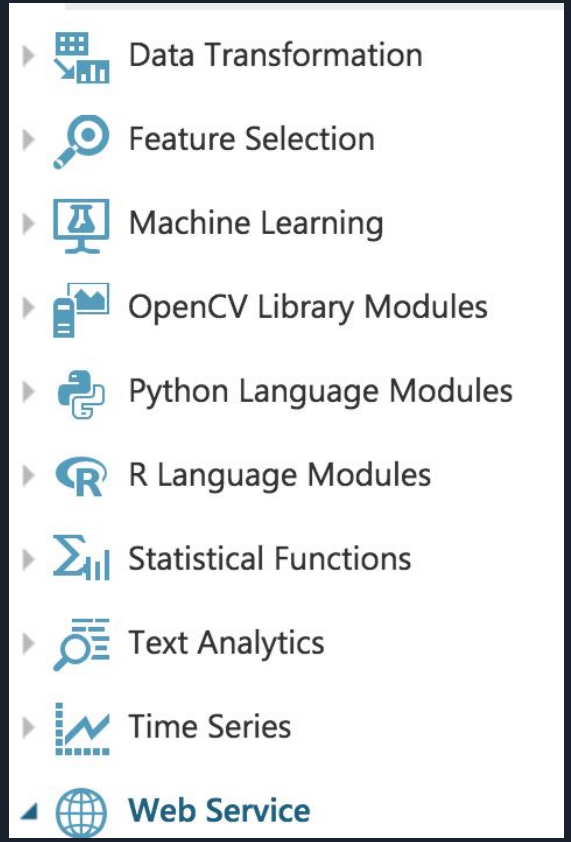
Azure Cloud

- Azure IoT Hub: real time update
- Azure blob storage: Massively scalable object storage for unstructured data
- Azure Machine Learning Studio



Microsoft Azure

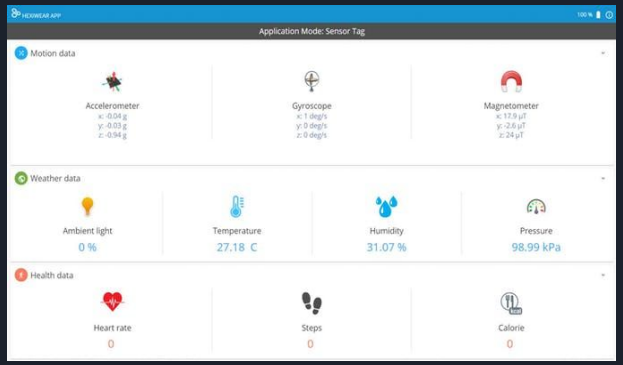




Local Analytics

- Maintain a step count
- Information is easily passed through Pi to the cloud and then to other users.
- Compute meaningful heart rate data for information about activity And fitness

Azure to Hexiwear



- Second connection back to Hexiwear
- The Hexiwears are connected in a tree network
- Pi performs analytics using Python to get some standard data out of the one sent to it
- The processed data which when requested through a configured Haptic Button for the users in each Hexiwear is received and printed on the OLED of the Hexiwear

Future Work and Extension

- Incorporate Machine Learning Algorithms to improve activity detection
- Improve the pedometer by incorporating the values of gyroscope
- Verify the analytics and the storage of other cloud services
- Incorporate gym analytics using Hexiwear if the group is into weight lifting
- Include long-term goals and fitness accomplishments for the group to manage health as a unit

References

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