SMART SHOE

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Overview

- "Smart Shoe" is a simple, cost-effective solution to keep people healthy.
- Nofies the percentage of calories burnt daily using set of LED lights.
- Shoe is embedded with a tiny computer, which calculates the footsteps using accelerometer located under the shoe.
- Calculates the weight and height of the person and use that data to calculate BMI of the user and set the daily targets accordingly.

Problem & Solution

- Non-infectious diseases/condions` like heart-a. acks, cholesterol, etc. frequently occur due to lack of physical exercises.
- With technology development, people have become more health-conscious.
- Busy schedules and hecc lifestyles don't allow me to manage health.
- This is where the *Smart Shoe* comes in, it is a standalone product to monitor acvies and keep us on a healthy lifestyle.
- The *Smart Shoe* monitors daily walking or running acvies and help maintain a healthy BMI.

Background Information

- There are plenty of methods invented to monitor whether we are living a healthy life style or not.
- For example: Nike's NIKE+ SPORTBRAND, Garmin Foot Pod, Life source Acvity monit or, etc...
- All these products need to connect to a smart-watch/phone to connect and send data. Our *Smart Shoe* is independent product no need of a smart watch or smart phone.
- Smart health assistant applicaons (Apple's Health app, Samsung's S-health app, Runkeeper app etc...) need a smart phone or a computer to work with them (To Calculate using sensors feeds). The smart shoe do all these by itself.

Implementaon`

- Components used : Arduino Nano, Gyroscope, Accelerometer, Weight Sensor, LED panel
- Design :
  - All the components are placed inside the shoe, expect the LED panel which is at the right side to indicate the amount of calories burnt. Once all LEDs are lit, daily calorie burning requirement is met (based on the user's BMI).
  - Weight sensor inside the shoe is used to calculate the weight of the person
  - 3-Axis-Accelerometer will sense walking/running patterns, and calculate number of steps and step length by using filters and advanced calculaons
  - Above informaon is used to esma te the height of the person by advanced mathemac al algorithms
  - Esma te the BMI according to calculated values.

FEATURES

- Easily recognize the foot steps using simple processing of raw data of accelerometer, the result is simply seen as lighng the LED as s teps taken.
- Accuracy for detecng s teps is much higher compared to modern smart phone or smart watch apps. Accuracy for step detecon w as above 90%.
- Calibrated Weight sensor values are also directly taken to the microcontroller as input
- Step length was calculated from Accelerometer and Gyroscope values and then the result is BMI(Body Mass Index) of the person, Which is recorded in microcontroller(EEPROM).

Conclusion & Further Works

- Standalone smart shoe concept is a new idea and calculang height using few sensors located inside the shoe needs hard work, but possible.
- The product can benefit by using of higher accuracy sensors.
- When analyzing and calibrang the pr oduct for several persons we found out most users have unique walking rhythms; so we could use this to idenf y a person for many other applicaons such as,
  - To open a door by recognizing who he/she is (as an IoT device)
  - In security system for home can use above technology to have more accurate results (to idenf y house owner more accurately)