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Smart Shoe

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Abstract: This abstract briefs about a development of inexpensive device called smart shoe which is designed to assist user in knowing how much distance they havecovered and how much calories they have burnt while walking or running. Proposed project is implementable for finding distance covered and total amount of calories burnt by using force sensitivity resistor. Advantages of such shoes include extensibility and low maintenance. The idea was to develop shoes that anyone can wear .The shoes will be designed in such a way that anyone who does running or walking by wearing these uniquely designed shoe they will get to know how much amount of calories they have burnt and how much distance they have covered through a mobile application. The idea being if you are looking for how much distance you have covered, open the app and click on distance. And if user is looking for how much calories burnt, open the app and click on calories. The mobile application will continuously receive the information from FSR sensor over the internet. In the past few decades, an unprecedented demand for wireless technologies has been seen. Mobiles and laptops are becoming part of everyday life of a growing number of devices that communicate wirelessly. Internet of things is becoming more popular everyday and it is being preferred due to its inherent advantages like security, effective communication.

Keywords: FSR sensor, IOT

I.INTRODUCTION

Internet of Things represents a general concept for the ability of network devices which sense and collects data from the world around us, and then share that data across the Internet where it can be processed and utilized for various interesting purposes.The intermediate which we are using for sensing data and sending it to internet is Arduino board with arduino wifi module.

Force sensitivity resistor consists of conductive polymer whose resistance changes when force or pressure is applied.Using this property we can measure how much pressure has been applied by the user while running. The sensor will sense the data and will send it to the mobile application as its already programmed using arduino board. The program will be written in such a way that it will take force as an input and covert it to the calories burnt. And this same data will be sent to the mobile application.

The idea is to develop a shoe that anyone can wear.The shoes will be designed in such a way that anyone who does running or walking by wearing these uniquely designed shoe they will get to know how much amount of calories they have burnt and how much distance they have covered through a mobile application. The idea being if you are looking for how much distance you have covered, open the app and click on distance. And if user is looking for how much calories burnt, open the app and click on calories.The FSR sensor will be continuously sending data to mobile application using arduino board. In the past few decades, an unprecedented demand for wireless technologies has been seen. Mobiles and laptops are becoming part of everyday life of a growing number of devices that communicate wirelessly. Because of this reason we are using IOT for our proposed project.

II.MOTIVATION

Cell phone has became a part of our everyday life. And internet of things is becoming more popular everyday and it is being preferred due to its inherent advantages like ease of access, security, effective short distance communication. So we are using this technology in our project.

After running or walking for some time “How much distance do I have covered?” or “How much calories do I have burnt?” is a question that we must have asked ourselves many times in our life! How often you might have ran for some time but you might be not knowing about how much distance you have covered. Another issue was with people who are suffering from obesity and weight problem. They might have got advice from doctors to burn some specific amount of calorie everyday to reduce their weight. Even though these people

are doing some exercises like running and walking. They won't be knowing how much exact amount of calories they are burning. This may cause health issues for such people.
Well, our group decided to develop a device that would end this problem!

III.PROBLEM DEFINITION

"Development of inexpensive device called 'Smart Shoe' which is designed to assist users to show much calories they have burnt while running or walking."

IV.APPLICATIONS

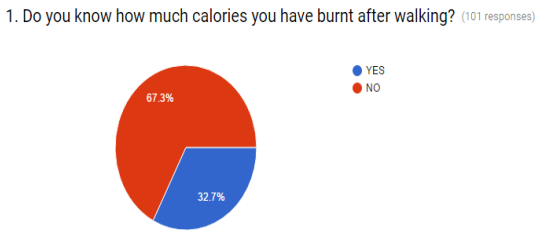
Some applications of Smart shoe are:

1. Online healthcare
2. Body fitness
3. Diabetic patients

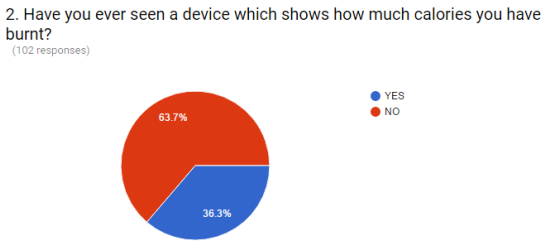
V.ONLINE SURVEY

We conducted a survey online. The results are as shown below:

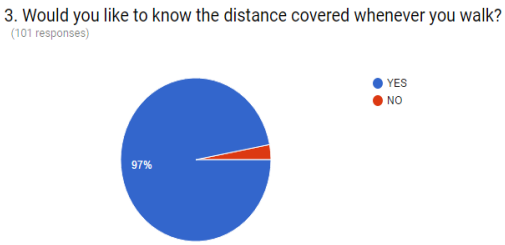
a) 67.3% of the responses indicated that they want to know the amount of calories burnt.



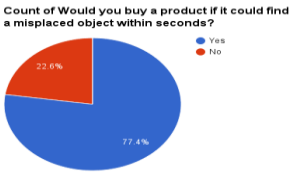
b) From the responses, 63.7%of the people have not seen the device that measures the calorie



c) Nearly 75% of the users want to know the distance they have walked.



e) Nearly 80% of the users are in favor of buying the designed product.



VI.PRELIMINARY DESIGN AND DETAILED DESIGN

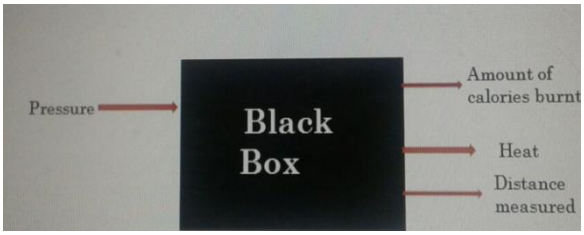


Figure 1: Preliminary Design

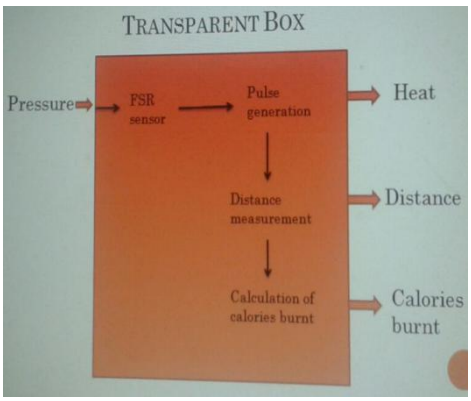


Figure 2: Detailed Design

VII.COMPONENTS REQUIRED

- Shoe
- Force sensitive resistor
- Arduino board
- Arduino Wi-Fi module
- Cell phone

VIII. FSR SENSOR

A force-sensing resistor is a material whose resistance changes when a force or pressure is applied. They are also known as "force-sensitive resistor" and are sometimes referred as "FSR"sensor.

Some important uses of Force-sensing resistors are commonly used to create pressure-sensing "buttons" and have applications in many fields, including musical instruments, car occupancy sensors, artificial limbs and portable electronics.

IX. BASIC METHODOLOGY

We use force sensitive resistor to calculate how much pressure or force is applied by the person. Force sensitive sensor will be placed right under the feet inside shoe pads. When user wears this shoe his weight will be acting as a force on force sensitive resistor. Force sensitive resistor consists of conductive polymer which changes its resistance as per force applied on it. Applying a force to the surface of the sensing film causes particles to touch the conducting electrodes, changing the resistance of the film.

Figure 3: Force sensitive resistor

We also use arduino board which acts as a serial communication for our project. Arduino board will receive continuous inputs as sensed by FSR sensor.The Uno is a microcontroller board based on ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

Figure 4: Arduino board

This is another important component of our project. This will help us to connect our arduino board to Wi-Fi network. The ESP8266 Wi-Fi Module is having integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware. The ESP8266 module is an extremely cost effective board.

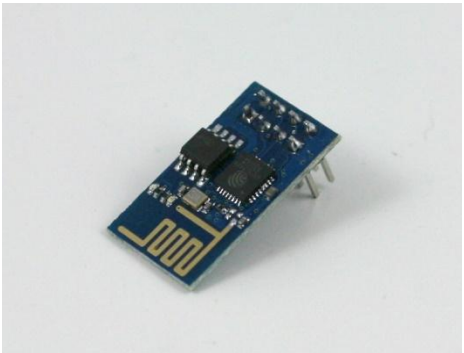


Figure 5: Arduino Wi-Fi module

X. DESIGN ALTERNATIVES

1) Another way of building a device to perform the same objective along with person's weight. Also we can show howmany steps he has taken to reach the distance. Along with that we can even display maximum speed and minimum speed while the user is running.
2) Another aspect is we can keep a GPS module inside the shoes. Which will keep track of user.

XI.SELECTION OF THE APPROPRIATE APPROACH:

1) Why arduino over raspberry pi?
Another way of building a device to perform the same objective would be using raspberry pi over arduino. We have to interface FSR sensor with raspberry pi. Even though raspberry pi provides more features than Arduino, cost of raspberry pi is comparatively high. So we had drop raspberry pi. And finally we choose arduino.

XII.BREADBOARD IMPLEMENTATION

We first implemented the circuit, FSR sensor. The implemented circuit was to check the output of FSR sensor when force is applied. The circuit was implemented on a breadboard to get the force applied as shown in the figure below and got the output.

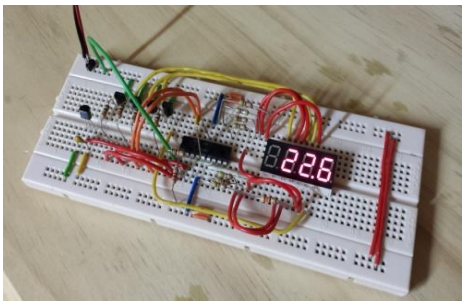


Figure 6: Breadboard implementation

XIV.CONCLUSION

We were successful in designing the prototype of the above mentioned idea. We successfully received the force applied while walking and running. And by some simple mathematical calculations we got the calories burnt by covering some noted distance. And hence we were successful in showing the calories burnt.

XV. References

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