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FitBit Watch Along with a Monitoring Body Temperature Application

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Abstract: Commercially on hand wearable endeavor trackers have grown hastily in recognition since their introduction just over a decade ago. They goal to supply the user with real-time remarks on several components of everyday activities, such as number of steps taken, time spent asleep, and time spent in distinctive degrees of activity. This study will be conducted to overcome the lack of motivation to carry out exercise and stay fit all the time. Other than that, this study is also conducted to monitor the person's body temperature and blood pressure from time to time to avoid consequences later on. This study will present the result on the Fitbit watch according to the person's body temperature. Nowadays people depend so much on Fitbit watch to track their daily calories burnt. This device is a gadget to overcome the lack of motivation to carry out exercise and stay fit all the time. The proposed prototype is an implementation from the information derived all through the preceding studies. This machine is able to let humans tune their day-by-day temperature, heartbeat and track their calories. In this study, the watch is built using an ESP8266 Wi-Fi module which will be attached to Arduino to send the data. There will also be a database to store all the information in it. From this device people can track their daily calories, total steps taken, total distance covered, body temperature and also heartrate.

Keywords: Fitbit, Calories, Steps taken, Body temperature, Heartrate

1. Introduction

The term Fitbit refers to exercise tracker gadgets manufactured and bought by Fitbit Incorporated. Designed to help customers take manage of their health and fitness, Fitbit units track data such as step counts, energy burned, body temperature, amongst other functions. The purpose of this project is to develop a Fitbit watch that can be used to keep track the amount of calories burnt and distance covered by walking and also to monitor the patient's body temperature from time to time via an application through the mobile. By implementing this system, it is believed that there would be healthier people and also people who are alert with their body temperature. A Fitbit is a fitness and fitness tracker that a person wears whilst they go about their day by day activities. The Fitbit syncs to their clever telephone

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through Bluetooth, and computer with the aid of USB dongle [1]. As we all know, wireless communication does not require physical wired connection between sender and receiver, but rather the system is associated by radio waves as well as microwaves to maintain the communications. Wireless communication link can be associated by using Wi-Fi and Bluetooth. Fitbit is actually very useful for people out there. It is a gadget to overcome the lack of motivation to carry out exercise and to stay fit all the time. They can find out how much of progress have been made in a session. This gadget is to promote the importance to keep fit and also to keep track the amount of calories burned in an individual along with a monitoring application to monitor the person's body temperature from time to time. This would result in people to monitor their body system and lead their lives to a healthy lifestyle. Moreover, these days are very important to monitor the body temperature as a disease called Covid-19 is speculating almost everywhere. With this, people would be able to monitor their body temperature from time to time for prevention. This device promotes importance of working out to individuals. Furthermore, this device truly keeps tracks on the amount of calories burnt by a person everyday by connecting their device via the application.

2. Materials and Methods

2.1 Materials

The materials needed and used can be purchased locally. The whole application for this Fitbit watch is made using the MIT App Inventor which is Kodular. There are three buttons in the watch. One is a reset button and the two is to navigate up and down between the four screens. The displayed screens are time (phone will send the time when it is connected for the first time so the time doesn't have to be set manually), second screen will be temperature (from temperature sensor LM35), third screen will be heart rate (from heartbeat sensor MAX30102) and the fourth screen will be steps (from accelerometer MPU6050).

Table 1: List of Materials

Software	- **Arduino IDE** - **MIT APP Inventor** - **Kodular**
Sensors	- **Temperature Sensor (LM35)** - **Heart Rate Sensor (MAX30100)** - **Optical Sensor**
Electrical Components	- **Gyro & Accelerometer (MPU6050)** - **Microntroller (TTGO-T Display ESP 32)** - **3.7V Battery**

2.2 Methods

Project setup for testing

After the watch is switched on, there will be a display on the watch. There will be a message on the watch to connect to Bluetooth to use the application. Once the Bluetooth is connected to the watch, the application is connected. The device will then activate the date and time to be displayed on the watch. Once the application is logged on, the details such as gender, age, height, and weight should be filled. After filling in the details, the device would be worn as the people convenient. The device will be synced to the body movement. The device would be able to track the daily calories, the daily steps taken, heartbeat, distance covered and body temperature. The device sends the reading to the application every

minute. In the end daily measurements from the application from the day started wearing the watch until the very end can be tracked via the application.

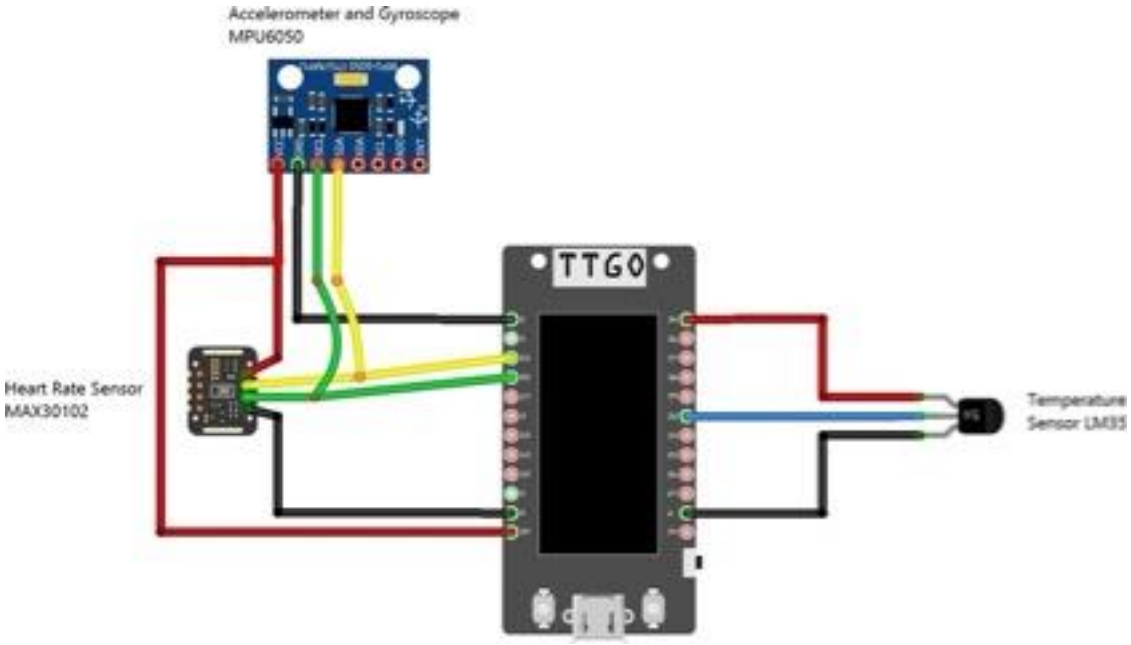

Figure 1: Schematic diagram for project setup

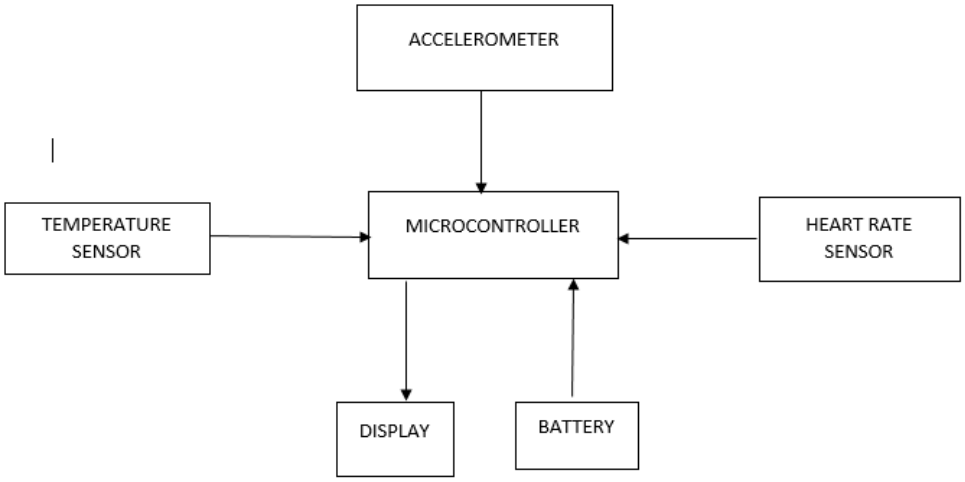

Figure 2: Block Diagram of prototype

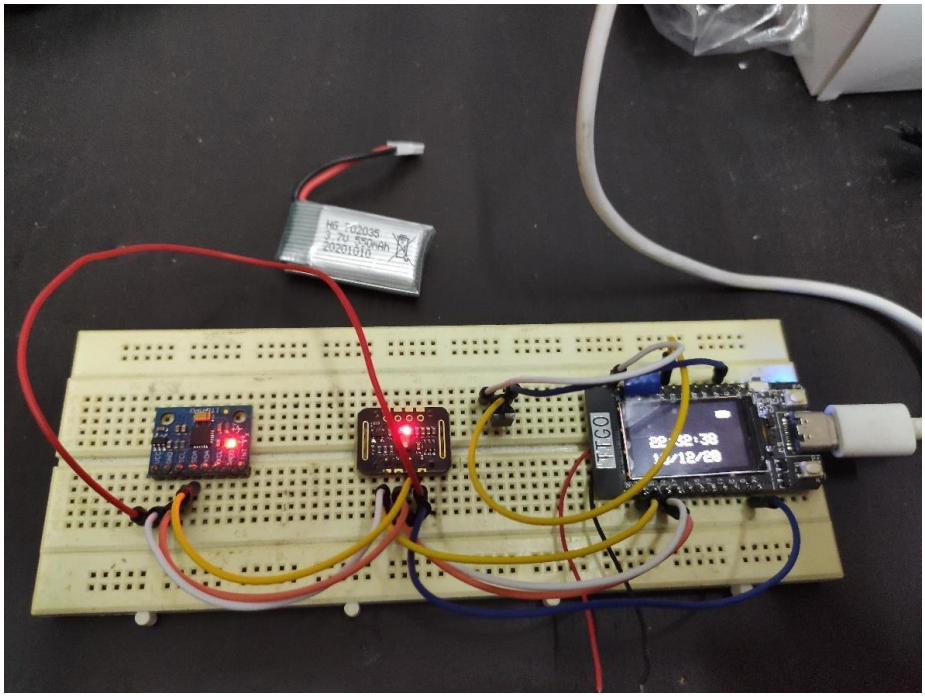

Figure 3: Circuit diagram for Fitbit watch

Figure 4: Prototype of Smartwatch

Figure 5: Prototype of Smartwatch

3. Results and Discussion

Fitbit watch which includes steps, calories and body temperature and heart rate. The developed prototype has been completed and its functionality has been fully tested which strives to achieve the objectives of this project. The device displays total steps taken in a day by that person. Once the device is connected to the application via Bluetooth, the accelerometer sensor works to calculate the steps of that person. Other than that, there is the temperature sensor which would sense the person's body temperature every minute. We know that normal body temperature is in the range of 36.5 – 37.5. The device will alert the person if the temperature goes beyond that range. As for the calories, it is calculated using the ACSM Walking Metabolic Equation. The person can have a goal on how much of calories would be burned in a day and observe it via the device after performing the daily activities. This equation would calculate the calories burned by calculating the steps taken and percentage of incline.

3.1 Results

From this Fitbit watch people can track their daily calories, total steps taken, total distance covered, body temperature and also heartrate. The purpose of this device is to develop a Fitbit watch that can be used to keep track the number of calories burnt and distance covered by walking and also to monitor the patient's body temperature from time to time via an application through the mobile. Once they have sync'd the watch to the application all data will be stored into the phone and displayed in the application. Due to lack of components and not being able to use the laboratory this device could not alert the user if the steps taken has reached the goal and if the temperature has arisen beyond the normal temperature. The calories burnt are calculated from the number of steps taken, height, weight and gender using the ACSM the walking metabolic equation. The data in the phone would not be erased if the application is not deleted. The figure below shows the results of the Fitbit watch which contains all the data required.

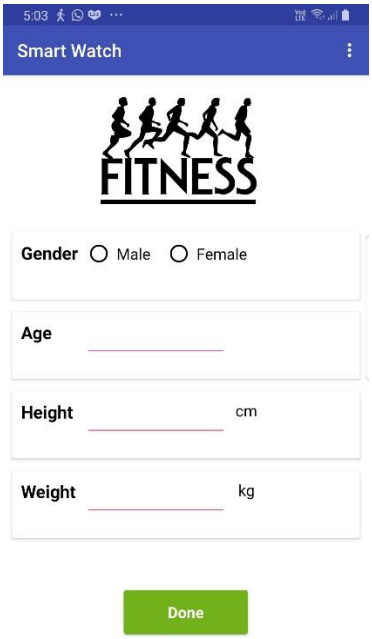

Figure 6: Personal details of the person to be filled

Figure 6 shows the display where the person needs to fill up their personal details to calculate their BMI and the calories burned in a day. BMI is calculated using metric system whereby weight in kilograms is divided by height in meters squared.

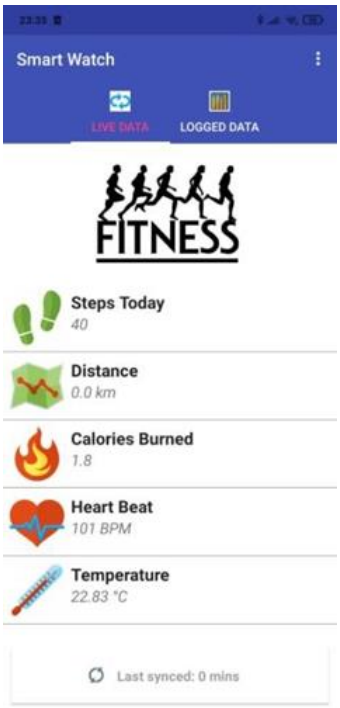

Figure 7: Displayed data of the watch in the application

Figure 7 shows the data displayed of the device in the application. It is shown that the person took 40 steps during that period. The calories burnt was 1.8. This was calculated using the ACSM Calculator. The person's heartbeat was 101 BPM at that minute. This heartbeat fluctuates according to time. The

body temperature of the person was 22.83 degrees. Body temperature fluctuates according to surrounding temperature and the body.

Figure 8: Total number of steps displayed for a day

4. Conclusion

This project was conducted by designing a Fitbit watch that tracks a person's heartbeat, calories burned, body temperature and distance covered. For this scenario this person has burned 1.8 calories, the heartbeat was 101 BPM, and the body temperature was 22.83 degrees. This device is suitable for a person who cares about a healthy lifestyle. The data for this project was collected. Different individuals will have different reading due to their body mechanism. The number of calories burned indicates how much of fats the person has burned throughout the entire day. The calories burnt are calculated from the number of steps taken, height, weight and gender using the ACSM the walking metabolic equation. In future, this watch along with the application could be greatly improved and expanded to include new features. This would mean populating a database with vast amounts of food and nutritional data and allowing the user to enter food eaten after every meal or have an instruction manual which will allow the users to learn from it. This device would then make people be alert about the food they consume and activities they do daily. In future, I would add in a blood pressure sensor into this device. This sensor would be able to detect a person's blood pressure from time to time. Oscillatory devices produce a digital readout and work on the precept that blood flowing thru an artery between systolic and diastolic pressures reasons vibrations in the arterial wall which can be detected and transduced into electrical signals. Furthermore, there would be a detector in this device which would alert the person if they have reached their goals in steps taken and calories burnt in their daily basis.

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