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Remotely Monitoring of Health using Fitband

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Abstract: ***This paper gives monitoring of health of user done remotely using fitband. It can done remotely with the help of bluetooth. The system takes the user data and analyze the data. The system also recommend the user if unusual activity is found out. With the help of DHT11 the system measures sweat and temperature of user's body. With the help of accelerometer ADXL335 step count is counted. With the help of step count, distance travelled and calories burnt can be easily calculated. All these data is then transferred to application which is built in mobile terminal. Mobile terminal and fitband is connected through wirelessly using bluetooth.***

Keywords : ADXL335, Arduino pro mini, Bluetooth, DHT11, Fitband.

I. INTRODUCTION

The fitness trend is increasing nowadays. Specially for urban population it is moving and concentrating on fitness of body. In the era of fitness it also more focused on portability of devices [1]. So the system uses fitband and application based on mobile. Devices are portable it can be accessed anytime, anywhere and analyze the user data. The system will provide more scientific and practical guidance to user [2]. The existing system investigates trends in fitness devices and proposes new fitness device system architecture. DFC gives user flexibility to carry smartphone only if they wish to monitor physical activity[6]. iFit evaluates the physical fitness of older adults. The intent of the test is to help them manage and promote their health and mitigate the effects of aging[7].

The application in mobile terminal and fitband is connected wirelessly. With the help of bluetooth it is connected. Bluetooth is broadway of connecting mobile devices quickly and easily without the need of cable [3]. In fitband, arduino pro mini is used. Arduino pro mini has capability to perform the logic operations [8]. Fitband is used to calculate temperature & humidity sensor DHT11 to collect data of temperature and humidity [4]. It also consists of accelerometer is used to acquire the signals in three axes from the subject [5]. All these data is collected by user and analyzed. Mobile terminal has application which stores the data so it can recommend the user.

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II. PROPOSED SYSTEM

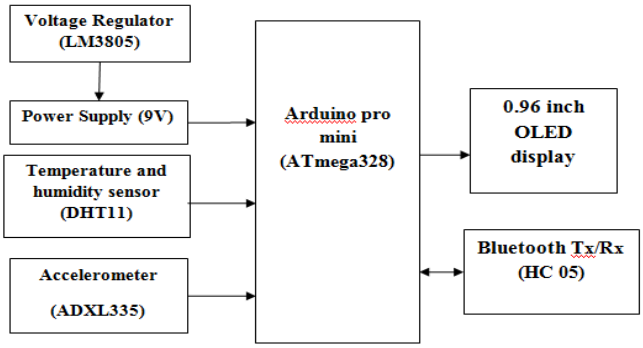

Fig. 1. Block Diagram of the proposed system

The system has fitband based on arduino pro mini which monitors health status of user. It is helpful for user after post workout or real time. It will gather all the informatio n when user is working out. With the help of bluetooth all the data is being transferred to mobile.

A. Fitband

Fitband have arduino pro mini, DHT11, bluetooth module HC05, ADXL335, display of 0.96 inch, 9V power supply, LM3805 to regulate the power supply.

Arduino pro mini

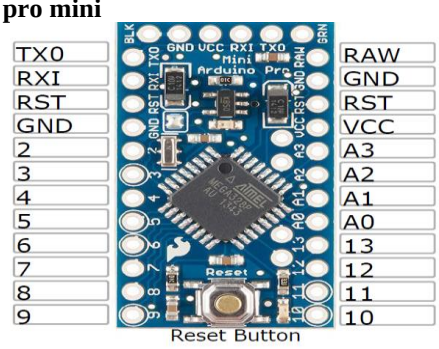

Fig. 2 Arduino Pro mini

Arduino pro mini uses microcontroller ATmega328. ATmega328 is a low-power CMOS 8-bit microcontroller. It executes powerful instructions in a single clock cycle, the ATmega328/P achieves throughputs close to 1MIPS per MHz. Arduino pro mini comes in 3.3V and 5V. In this system we use 5V, as it has twice the speed of instruction execution. It works on 16MHz crystal frequency [8]. Arduino pro mini is used as it has faster and easy in prototyping. It can be programmed in C language with no complex hardware is required for interfacing. Arduino pro mini has 14 digital input/output pins with ground and Vcc, reset button on it. It has holes for mounting pin headers.

It can do easy analysis for computation and programming. Arduino pro mini comes without pre- mounting headers, allowing the use of direct soldering of wires. FTDI is used to program the arduino pro mini as it does not have the serial to USB converter.

Sensors Used

DHT11

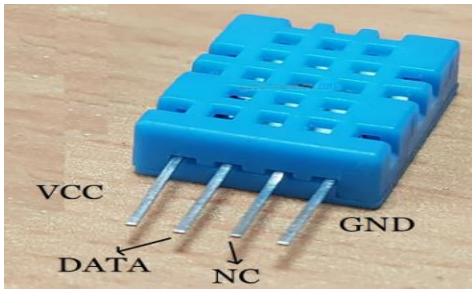

Fig. 3 DHT11

DHT11 is Digital Humidity and Temperature sensor. DHT11 gives digital output as its name indicates. DHT11 is used as it has a smaller size and it can measure two parameters in just single sensor. It has long term stability and high reliability. Supply voltage for this sensor is 3V-5.5V. It has low power consumption, fast response and small size. Humidity sensor in this is used to measure the sweat of the body. It will check the water content around the air in body depending on that sweat is calculated. In this humidity sensor two electrodes are used which have moisture holding substrate in between them. As the humidity of body changes, conductivity of substrate changes and so the resistance between the electrodes changes [10]. In the system the threshold value for humidity is kept as 70% so when the humidity value crosses this threshold value it will gives alert to user. Humidity accuracy is +/- 5%.

Temperature of user is also measured in DHT11. It uses negative temperature coefficient (NTC) like thermistor. When the temperature increases, resistance deceases. This will be calculated and processed by IC which is on back of sensor. DHT11 has 4 pin connections VCC, Data, GND, NC. From these connection data pin is connected to the D2 pin of arduino.

ADXL335

ADXL335 is accelerometer sensor. Figure shown is the circuit diagram of ADXL335. As it is shown it works on three axis x, y, z. In this accelerometer, the change in capacitance is measured. On the top of a silicon wafer the sensor of polysilicon surface-micromachined structure is built. Polysilicon springs suspend the structure over the surface of the wafer and provide a resistance against acceleration forces. Deflection of the structure is measured using a differential capacitor that consists of independent fixed plates and plates attached to the moving mass. Acceleration deflects the moving mass and unbalances the differential capacitor resulting in a sensor output whose amplitude is proportional to acceleration [11].

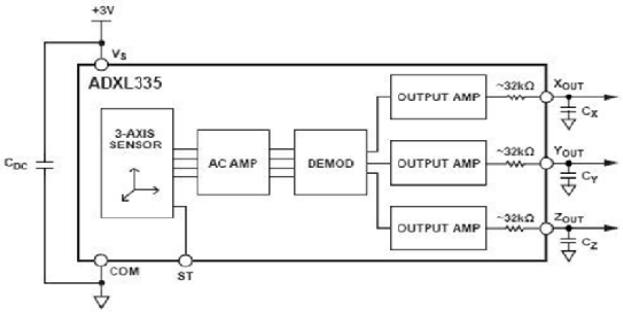

Fig. 4 ADXL335

ADXL335 has 5 pins X, Y, Z, Vcc and ground [9]. From these pins X, Y, Z shows the three direction of motion. X is connected to A3, Y is connected to A2 and Z is connected to A1 of the arduino. ADXL335 gives the step count done by user. With the help of equation (1) and (2) we can calculate distance travelled and calories burnt [12].

Distance travelled = steps*0.003 (1)

Calories burnt = steps*0.085 (2)

Display

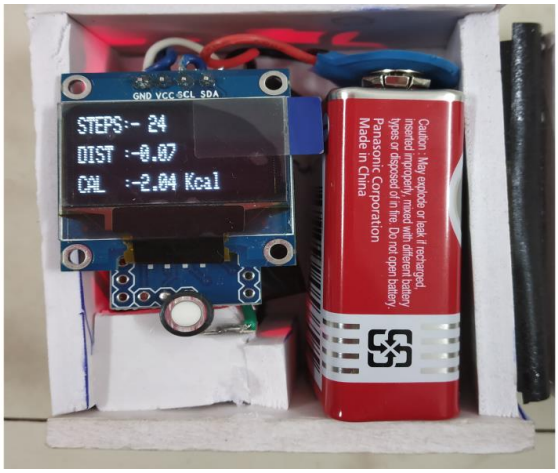

Fig. 5 Fitband

Display used in this system is 0.96 inch OLED display. This display is used in this as it is small and portable. The parameter shown in this is visible. So this will be considered as the perfect size for the given system. It has good picture quality. It looks even from extremes angles too.

Data Acquisition

Data acquisition is done with the help of bluetooth. HC05 is used as bluetooth module. It is used to transfer the data that is collected by fitband to application which is built in mobile. This module use serial port protocol (SPP) [9]. The Bluetooth module is an open standard particular for a radio recurrence based, short-run network innovation. The data acquisition is done on the basis of frames. The frames of digits are send from fitband which is received by application. Bluetooth module has 5 pins status, Vcc receiver, transmitter, ground. Connection is done by connecting receiver pin of Bluetooth to transmitter pin of arduino i.e D0 and transmitter pin of Bluetooth module to receiver of arduino i.e D1.

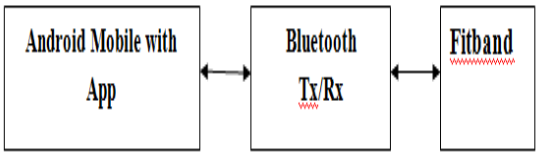

Fig. 5 Block diagram for data acquisition in system

B. Application

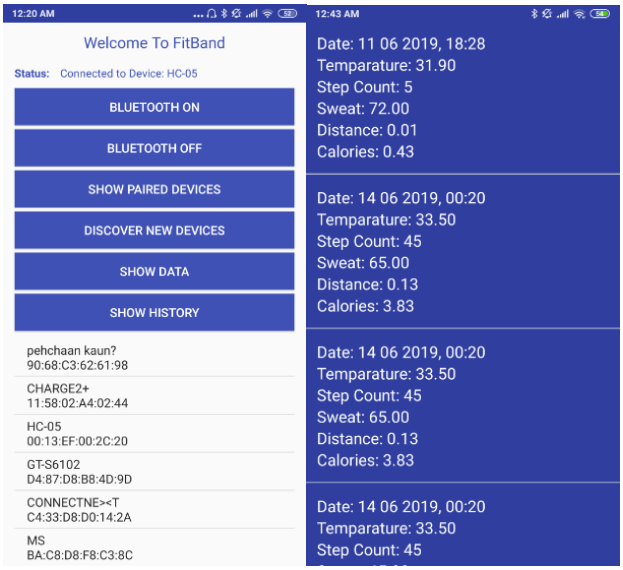

Fig. 7 Application build on Android platform

Application is built on android studio platform. It's code is in java language. It will collect the data and display it on mobile. Fitband has less memory storage so it's data will be stored in mobile with the help of application. The data stored is then analyzed and helpful for user. As the humidity increases it shows the water level in body and then gives notification to user.

III. RECOMMENDATION SYSTEM

Remotely health monitoring is done with the help of fitband and application in mobile terminal. When the user is walking, running or working out if body exhausted over the threshold value that is set by fitband is 70% it will recommend user. The recommendation is provided on fitband is user is sweating. İf fitband is connected to mobile then mobile also shows the message to calm down. The recommendation system also useful even for the blood pressure patient. İf the user is not working out but sweat is measured by fitband then also it will show the warning message.

IV. CONCLUSION

The system presents the health monitoring of user. Arduino pro mini uses Atmega328/P controller. İt monitors body temperature and sweat of the body with the help of sensor DHT11. Step count, distance travelled and calories burnt is calculated with the help of ADXL335 sensor. Analysis the calculated data and recommendation to user according is given to user. Data is stored in mobile so that it can be analyzed.

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