DIGITAL SPIROMETER BASED MEDICAL PEDOMETER

Suprriya Lohar
Department of Engineering in E&TC
AISSMS's Institute of Information Technology
Pune, India.

Pratiksha Jagadale
Department of Engineering in E&TC
AISSMS's Institute of Information Technology
Pune, India.

Anshuma Ikhare
Department of Engineering in E&TC
AISSMS's Institute of Information Technology
Pune, India.

Pallavi Jadhav
Department of Engineering in E&TC
AISSMS's Institute of Information Technology
Pune, India.

ABSTRACT:-

It is in India there are many cases of limited lungs functionality due to air pollution,genetics,allergies,poor dietary conditions,many patients have respiratory disease throughout their life,So constant medical checkup is mandatary.Spirometer is a wearable wireless device which can continuously monitor the health parameters of patient like the counts of steps the user has been travelled or walked.The message of any critical conditions displayed on Android App so, it is aslo possible to relatives of the patient to monitor the patient's fall.Digital spirometer gives us information about how well our lungs works by measuring how much air we exhale.All the sensor information is sent to Android App wirelessly via WIFI.The information is also displayed on LCD placed on the pedometer.Medical pedometer is a device which will warn the patient through buzzer for over exertion due to any medical condition.

KEYWORDS: MICROCONTROLLER,WIFI, ACCELEROMETER, PRESSURE SENSOR ,BUZZER

I. INTRODUCTION:-

The person who having respiratory disease like Asthma,COPD causes many critical conditions due to over exertion.Due to respiratory problem user faces many problems in day to day life.People faces the problem of limited lung functionality during overexercise and when they travelled the distance beyond limit.So patient needs a device which helps to solve this problems.The combination of Digital spirometer and medical pedometer will offer wide functionality to the user with a simple and intuitive User Interface at a low cost. Spirometer is a device used by doctors to test how well your lungs work. Spirometry test is used to measure how much air you exhale. Spirometry is used to diagnose chronic lung diseases,Asthma. Also medical pedometer is very useful for user who having respiratory problems as it counts the number of steps. Thus digital spirometer and medical pedometer is very helfful to maintain a contineous check on health parameters like number of steps taken,distance travelled by user.

II. METHODOLOGY
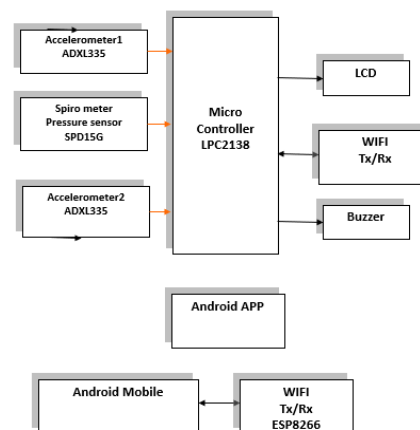
Figure1.Block diagram

The working of digital spirometer based medical pedometer is as follows:

1.Firstly, enter the patient's name,age,gender and the disease type.Depending upon the above details the Android APP will apply a set point to the number of steps taken by the patient.

2.When the patient overdoes any exercise the system will warn the user through buzzer and manage the exercise or daily activity to a safe limit.

3.Here ,the accelerometer is used to count the number of steps taken,depending upon this information the calculations of the distance travelled,is done. All this information is sent to Android APP wirelessly via WIFI

4.Whenever there is critical condition of overexertion the microcontroller will inform the APP via WIFI and the message will be displayed on App as well as on Lcd display so, it is aslo possible to relatives of the patient to monitor the patient's condition by detecting patient's fall.

Age	Height (Women)					Age	Height (Men)				
	55"	60"	65"	70"	75"		60"	65"	70"	75"	80"
20	390	423	460	496	529	20	554	602	649	693	740
25	385	418	454	490	523	25	543	590	636	679	725
30	380	413	448	483	516	30	532	577	622	664	710
35	375	408	442	476	509	35	521	565	609	651	695
40	370	402	436	470	502	40	509	552	596	636	680
45	365	397	430	464	495	45	498	540	583	622	665
50	360	391	424	457	488	50	486	527	569	607	649
55	355	386	418	451	482	55	475	515	556	593	634
60	350	380	412	445	475	60	463	502	542	578	618
65	345	375	406	439	468	65	452	490	529	564	603
70	340	369	400	432	461	70	440	477	515	550	587

PEAK FLOW VALUES IN LITERS/MINUTE

Figure 2. Standard chart for lung capacity

III. HARDWARE FRAMEWORK

1) MICROCONTROLLER

Microcontroller is a heart of the system. The devices like Accelerometer,Pressure sensor,LCD,WIFI are connected to microcontroller.All the sensor information is given to the microcontroller. Microcontroller convert all analog information into ditital form using inbuilt ADC. This digital information is displayed on LCD display as well as on APP wirelessly Via WIFI.

2) ACCELEROMETER

The accelerometer gives the acceleration in X ,Y and Z direction.The module gives analog output.The system has two accelerometers. Accelerometer1 is mounted on the shoulder of user and accelerometer2 is placed on the feet of user.

ACCELEROMETER 1:-

When the user is in the standing position the output of accelerometer1 is 1.5 V. When the user is moving towards the extreme Left position the voltage is 0V and when moves in extreme right position it is 3.3V. So it is very easy to detect the patients fall. When the patient fall to extrem left or right position , microcontroller will displays the message of fall detection to LCD display and Androide APP. By using Androide APP this message is also transferred to the registered mobile number.

ACCELEROMETER 2:-

Accelerometer 2 is mounted on one of the feet of user. It is used to count the number of steps taken by user .Depending upon the lung capacity, APP will apply the set points to number of steps taken by user.

When lung capacity is low which is below 250 liters then user is able to take 2 steps.

User is able to take 5 steps when lung capacity is between 250 to 500 liters.

And for the range between 500 liters to 1000 liters user is able to take 10 steps.

3) PRESSURE SENSOR

It is a device which is used for pressure measurement of gases or liquids. Pressure sensor is used to measure exhale capacity of lungs on the basis of volume of air is exhausted. It is act as spirometer. Digital spirometer is nothing but the cylinder shape pipe and on top of the pipe pressure sensor is mounted which measures exhale capacity of lungs.

- **RESULT OF SYSTEM ON LCD DISPLAY**

4) WIFI MODEM

The information of all sensors like, number of steps taken, calories burned and volume of air exahale by the patients is sent to Android APP wirelessly via WIFI.

5) Androide App

Androide APP acts as a pedometer.All sensor information is given to pedometer wirelessly via WIFI.

Figure 5. Step count

IV. RESULT OF SYSTEM

Android APP will apply a set point to the number of steps taken by the patient. Due to this When the patient overdoes any exercise the system will warn the user through buzzer and manage the exercise or daily activity to a safe limit. System calculates the number of steps taken,distance travelled by using accelerometer.All this information given to the pedometer wirelessly via WIFI. Message of any critical condition due to overexersion is send to LCD display, android app. And registered mobile no of relatives of patient.so it is possible to relatives of the patient to monitor the patient's condition by detecting ptient's fall.Thus System makes the patient's lifestyle easy.

Figure 6.Alert for limit cross

Figure 7.Fall detection

. **Result on APP for fall detection**

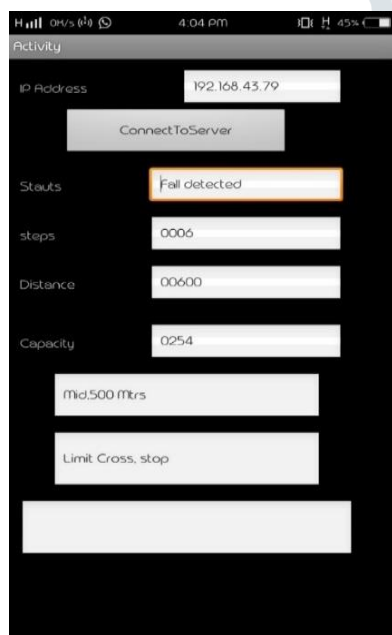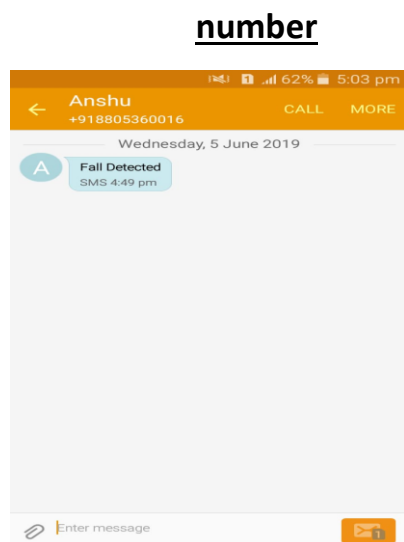**Figure 4. Result on APP for fall detection**

- ## SMS received on registered mobile number

Figure 7. SMS received on registered mobile number

> ### APPLICATIONS
- Hospitals
- Clinics
- Day care centers

> ### ADVANTAGES
- Effective way for monitoring and analyzing the data of recovering patient
- High degree of automation
- Cost-effective
- User friendly GUI (VB GUI)
- Easy to Use

V. ACKNOWLEDGMENT

VI. CONCLUSION

Digital spirometer based medical pedometer is a unique combination of digital spirometer and medical pedometer which is a very helfful for the valuation of respiratory sytem .The device will help to maintain a check on the patient's overall health by monitoring the parameters of patient like the counts of steps the user has been travelled or walked.It is aslo possible to monitor the patient's fall.It makes patients lifestyle easy by displyaying all sensor information on the Android App.The information is also displayed on LCD placed on the embeded device.This project can be consider as an economical modern digital medical device.

VII. REFERENCES

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