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Smart Inhaler System Based on GSM Communication System

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ABSTRACT

The acquisition of accurate and effective feedback from patients on routine adherence becomes difficult when treating asthma and chronic obstructive pulmonary disorders (COPD). The current methods followed like the face-to-face and oral reporting methods are not satisfactory. A handy electronic device that is attached to the inhaler uses a flow measure and contact sensors to detect users' buffer count, calculate and an embedded digital pro mini microcontroller to capture while the inhaler is in use. The activity, air pressure and corresponding volatile gases around the asthmatics is monitored using a hardware module included in the developed system. The radio frequency device consists of a transmitter and receiver. Here transmitter send the signal to receiver transfer data from the hardware are sent to the patient's doctor by a GSM module. The doctor examines the sensed values and desired action is performed on the asthmatic's treatment and medications. The established system is reliable, cost efficient and easy to use device which aids in finding out the asthma symptoms exhibited by the asthmatics.

Keywords : Buffer count, signal transmission, GSM communication.

I. INTRODUCTION

The acquisition of accurate and effective feedback from patients on routine adherence becomes difficult when treating asthma and chronic obstructive pulmonary disorders (COPD). The current methods followed like the face-to-face and oral reporting methods are not satisfactory. A portable electronic device that attaches to the inhaler uses an buff flow measure and contact sensors to detect users' buff count calculate and an embedded digital pro mini microcontroller to capture while the inhaler is in use. The developed system inbuilt with a hardware module which monitors the air pressure, activity and amount of volatile gases surrounding the asthmatics. The radio frequency device has transmitter and receiver. Here transmitter send the signal to receiver transfer data from the hardware are sent to the patient's doctor by a GSM module. The sensed values allow the doctors to take necessary actions. The developed system is reliable, cost efficient and comfortable nature allows to find out the asthma symptoms in asthmatics.

In this project, to measure the rates of accurate inhaler use, the system is designed to monitor daily inhaler use and analyze the collected data. It provides valuations that show whether patients are in compliance with the usage as per the recommendations. Proposed system has contact sensors to detect users' buffer count calculate and an embedded digital pro mini microcontroller to capture

while the inhaler is in use. If dose is over taken without knowledge of doctors, controller detects its buffer count and RF transmitter transfer the signal to RF receiver if emergency means communicate to doctors and relations through sms notification.

II. METHODS AND MATERIAL

BLOCK DIAGRAM

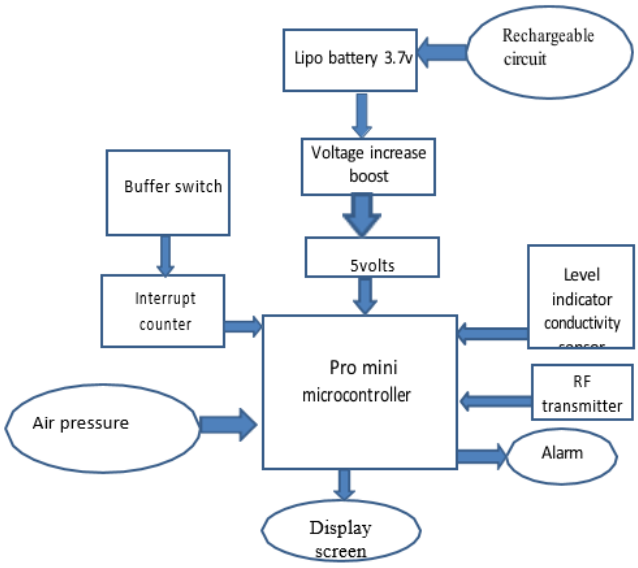

Figure.1 Transmitter Unit

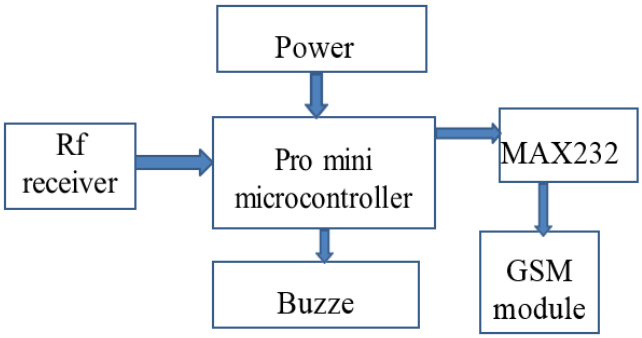

Figure.2 Receiver Unit

The asthmatic patients are generally advised to use inhalers to overcome the problems like breathlessness and wheezing. The smart inhalers also assist in an enhanced way of inhaling medication with alert signals. When the patient is suddenly short of breath, he/she is advised to use an inhaler.

The patient places his/her fingertip on the buffer switch which calculates the number of times the medication is entering through the airways. The LCD display is set to display the number of counts, the charge in the system is indicated. The pressure of the medication is also indicated on the display. The maximum limit of the counts will be preset in the system. If the count outdoes the preset value, an alarm signal indicates caution. The buzzer attached to the system produces an alerting sound. While charging, an LED light glows and another LED light is the one showing the alarm signal.

The conductivity sensor indicates the decreasing levels of medicine in the inhaler. The charge in the system is provided by a 3.7 Volts Lipo battery which is further boosted up by a voltage booster. A USB port allows the charging of the system. The signals from the system are picked up the RF transmitter. These are the elements of the first part of the project.

The signals from the transmitter end are collected by the receiver. It is then send to the microcontroller to process the fetched signal. A GSM module is attached to this part which helps in transmitting the messages. A sim card placed in it has certain important contacts like those of the doctor the patient usually consults and close family members. Any chances of over dosage will be immediately informed to those members. At the same time, the patient will also be alerted that the dosage levels taken has increased. Buzzers placed on both the transceiver parts gives alert signals.

The previous usage results will be stored in the system itself so that it can be viewed by the doctor when the patient visits the doctor the next time.

If the doctor finds improvements in the patients' health condition, then the buff count can be reduced.

The system is liable to changes and the preset number of counts can be altered.

CIRCUIT DIAGRAM

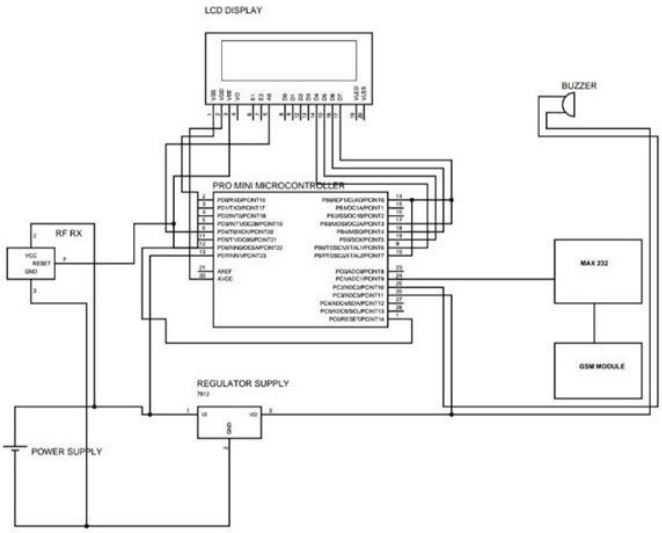

Figure. 3 Circuit for Transmitter

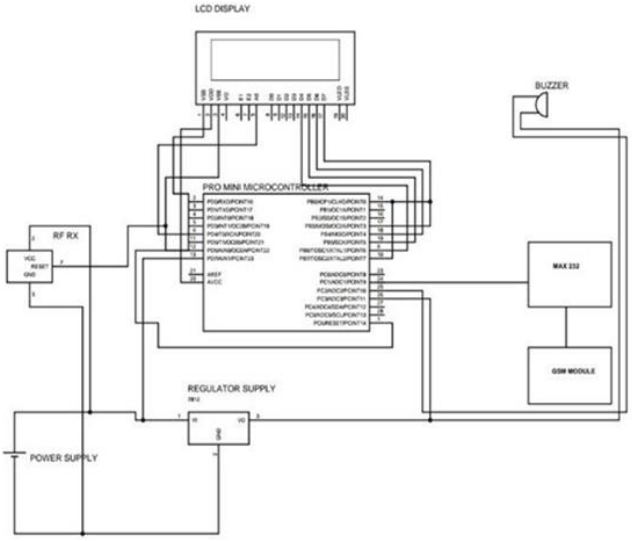

Figure. 4 Circuit for Receiver

III. SIMULATION RESULT

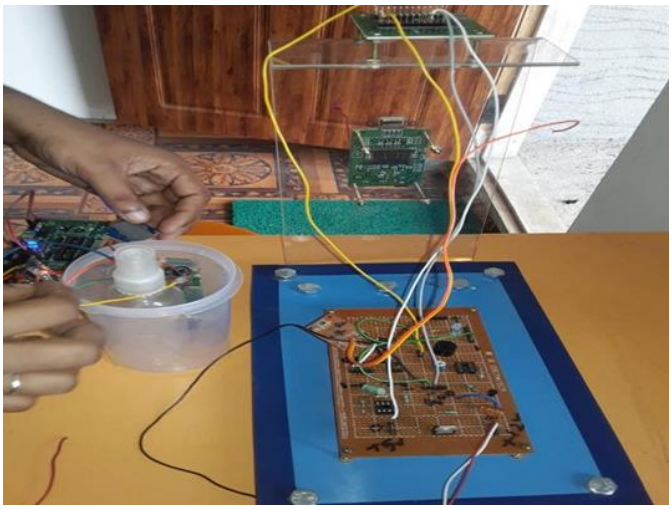

Figure. 5 Working of the Smart Inhaler

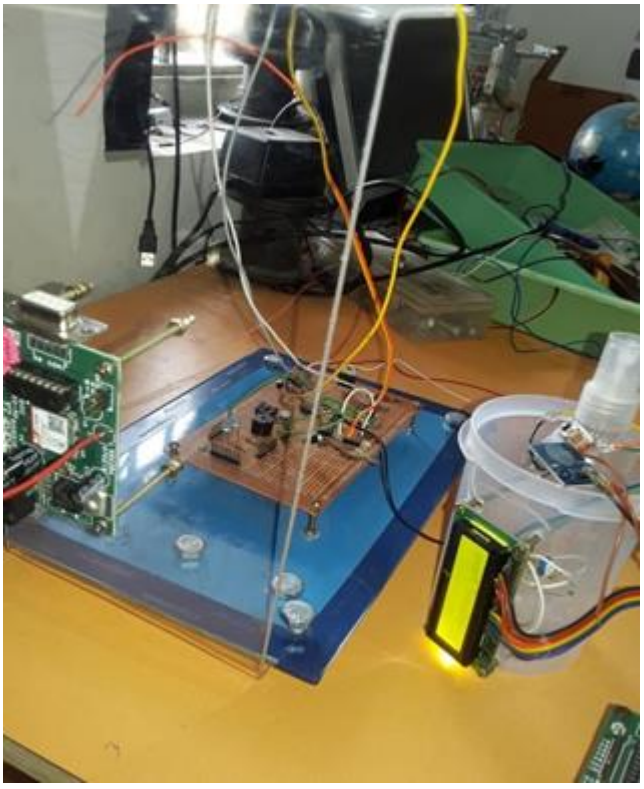

Figure. 6 Entire View of the System

IV. CONCLUSION

The use of smart inhalers will enhance the treatment methodologies of the patients. It supports the issues arising between the patients and clinicians. The patients using these inhalers will be conscious about

the consequences and will be able to manage the situation. It has increased the patient participation and cooperation toward the treatment. This system will have a better impact on the life of the patients and will help them overcome their difficulties by themselves.

V. REFERENCES

[1]. Manuel Lozano, Jos´e Antonio Fiz, and RaimonJan´e, "Automatic Differentiation of Normal and Continuous Adventitious Respiratory Sounds Using Ensemble Empirical Mode Decomposition and Instantaneous Frequency",IEEE Journal of Biomedical and Health Infomatics,Vol 20, No.2,March,2016.

[2]. ChinazunwaUwaoma and GunjanMansingh, "Towards Real-time Monitoring and Detection of Asthma Symptoms on Resource-constraint Mobile Device", IEEE Consumer Communications and Networking Conference (CCNC),2015.

[3]. Menghan Liu and Ming- Chan Huang,"Asthma Pattern Identification via Continuous Diaphragm Motion Monitoring", IEEE Transactions on Multi-Scale Computing Systems, Vol 1, No.2, April-June 2015.

[4]. Ke Yan, David Zhang, Darong Wu, Hua Wei and Guangming Lu, "Design of a Breath Analysis System for Diabetes Screening and Blood Glucose Level Prediction", IEEE Transactions on Biomedical Engineering, Vol 61, No11, November 2014.

[5]. Wolfram Miekisch, Andreas Hengstenberg, Sabine Kischkel, Udo Beckmann, MarenMieth, and Jochen Klaus Schubert, "Construction and Evaluation of a Versatile CO2 Controlled Breath Collection Device", IEEE Sensors Journal, Vol 10, No1, January 2010.

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