

# Zigbee Based Portable Patient Training Device For Lung Cancer Treatment

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**Abstract** – Lung cancer has killed many people in recent years. Early diagnosis of lung cancer can help doctors to treat patient. The cancer adds a difficulty of breathing level. This device is used for the training of the breathing level in patients who experiences the tomotherapy treatment. The transmitter contains the air flow sensor, Atmega328 microcontroller, 12v battery, LCD display, Zigbee transmitter. As the patient breathes, the sensor detects the airflow rate. The input values are transmitted through Zigbee wireless link. The Zigbee receiver which receives the output values which fed to the USB to UART module. This module is used to plug into a broadband correctly. The output is monitored on the system with the docklight software, which can send out user defined sequences.

**Keywords:** Lung cancer-tomotherapy-airflow sensor-zigbee-docklight software.

## I. INTRODUCTION

Major diseases like cancer occur in people who smoke. A new technique which is used to deliver radiations for the surgery of cancer is Tomotherapy [1]. The underlying principle is to damage the target tissues more than the surrounding tissue. It also uses helical radiation delivery pattern. By concentrating the radiation on the target tissue & avoiding the healthy surrounding tissue [2]. Cancer can be located with minimal damage to the body. As patient breathes the tumor will locomote. This adds a difficulty. The breathing level is tough to reach in many patients. Even normal breathing has deeper or shallower breathes, there is an obvious change in the breathing levels, when exercising computed to the levels at rest [3]. Patients believe that through home practice, they will be able to breathe a repeatable level when the time comes for tomography procedure. As a part of future work, the team will make the use of Zigbee technology which is interchange of high level information of protocols [4]. These devices interact without wires. It uses star, tree or mesh topology. The mesh networking extends over a large area. These network link a number of electronic devices. Zigbee provides the performance [5].

## II. EXISTING SYSTEM

In the existing system, the training device is used to measure a patient breathing pattern waveform and exhibit the signal opposed to an established waveform on a PDA. After the treatment of lung cancer, the patient may encounter a shortness of breathe. Thus, it is significant to begin their training program with breathing. Restoring breathing will help with ability and will enable patients to more easily attain their day-to-day activity. This training device has three major components, they are breathing device, signal and data processing and PDA with software. This project contains a linear potentiometer which determines the breathing patterns of patients, the project box is connected with nylon chest trap that is fixed to the body and also uses A/D converter. The LabView program used in this project detects and evidences the breathing and plot the actual-time breathing pattern on the screen [6].

## III. PROPOSED SYSTEM

This project overcomes the disadvantages (i.e) the cost of string potentiometer are high and also the device are not capable to transmit input values to the doctor. The proposed system has the air flow sensor which helps to figure out the patient breathing. If the patient is elder or blind, they are not capable to identify the breathing. So we are using an alarm and also a wireless technology. This technology is used to transmit the signal to then the doctor will receive a signal from a patient.

Wireless technology which is Zigbee technology has interchanging of high level information protocols. Zigbee is spotted at RF applications. It travel across greater distance and handles many sensors that can be linked to perform different tasks. The core aim is to design system with low cost, low powered and compact size.

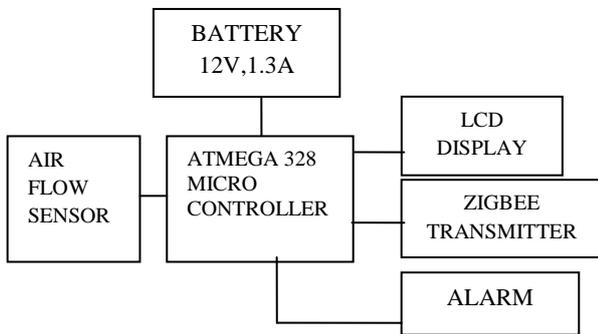
## IV. METHODOLOGY

### AIR FLOW SENSOR

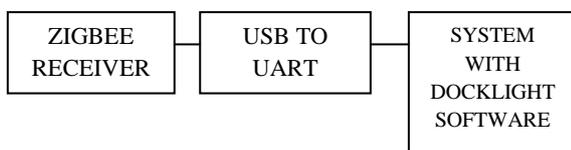
This sensor determines airflow rate to a patient in necessary of respiratory help. All airflow sensors functions on heat transfer stream and distinctive pressure. Silicon chip blueprint is created from thin film, thermally secluded bridge structure, containing heater and temperature sensing

elements. This provides retorts to the air or gas flow, delivers an output voltage. This sensor is worn to determine the breathing a patient [7].

**BLOCK DIAGRAM TRANSMITTER PART:**



**RECEIVER PART:**



**ATMEGA328 MICROCONTROLLER**

It is the single chip microcontroller from atmel and included in AVR series. It is a high interpretation and low capacity 8-bit microcontroller family. Atmel 8 bit microcontroller is designed based on technology using high capacity non-explosive memory. It improves the structure designer to make the device effective for power consumption versus processing speed.

**LCD DISPLAY**

Liquid crystal display used to exhibit in notebooks and computers. It is devised of several layers which include two polarized panel filters and electrodes. LCD holds a liquid crystal to make a visible image. LCD needs backlight as they do not emit light by them. LCD's utilizes less amount of power contrast to CRT and LED.

**ZIGBEE TRANSCIEVER**

Zigbee is a designation with an elevated level transmission protocols holding small, shorter-speed digital radios. A technology define by the Zigbee classification is contemplated to be similar and less expensive. Zigbee requires low data charge, low battery and stable networking. A Zigbee matrix connects an integer of electronic devices (nodes). All nodes in the web configure a bit of the transmission chain.

**USB TO UART**

All USB protocol is to manipulate within the module. Revolution feature like 256 byte receiver and 128 byte transmitter utilize new buffer smoothing technology. It converts the output voltage into binary values [8].

**SYSTEM WITH DOCKLIGHT SOFTWARE**

Docklight allows to monitor the communication between two serial devices or to test the serial communication of a single device. Docklight has been a huge productivity tool in testing our reader software. It has allowed automating some difficult sequences.

**V. RESULT**

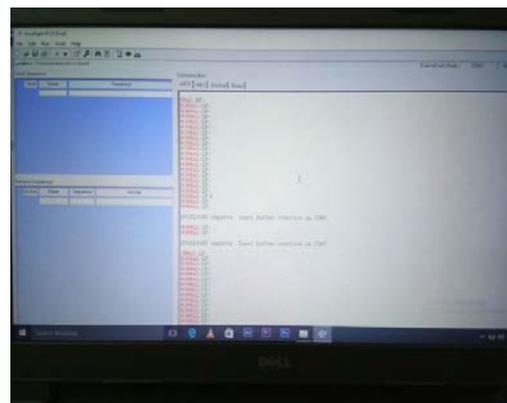
**HARDWARE OUTPUT**

Patient training device for lung cancer treatment has been designed which gives the training for breathing to a patient. It takes the breathe per minute for a patient. Whenever the patient breathing is not in normal range then the alarm rings.



**SOFTWARE OUTPUT**

Zigbee matrix is used for sending the breathing of the patient to a doctor. They receives the level of breathing and then docklight software is to view the breathing of a patient is in normal range.



**APPLICATIONS**

- It acquires the stable breathing level of a patient.
- It is especially used for breathing training of a lung cancer patient.
- It is for daily use in the home after the tomography treatment.

## VI. CONCLUSION

In this project, the device has a potential to function as a breathing training system. By using wireless communication zigbee module, the messages can be sent to the patients doctor or caretaker. The technology has to be enhanced to measure the breathing level without making any disturbance to the lung cancer patient. This is also cost efficient and reduces the effort made by patient.

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