

## Design And Development Of Affordable Cough Monitoring System.

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**Abstract-Cough is the most important symptom experienced by every human in our day to day life. It acts as a defensive and protective mechanism which clears the debris and other mucus particles from the lungs. Coughing is the most efficient and effective mechanism for clearing the lungs and act as an inbuilt natural mechanism. Nerves activities are changed when the pain is high. Our proposed Design and Development of Affordable Cough Monitoring System consists of GSR(Galvanic Skin Response) sensor which monitors nerves activities. The observed reading is monitored by our mobile phones.**

**Keywords-GSR(Galvanic Skin Response), Arduino Uno, Power supply, Relay**

**Introduction:**The cough vibrations can be detected by a suitable hardware for analyzing the phases of cough and the event of cough occurrences. There are three phases of cough which include an initial inspiration, glottal closure and development of high thoracic pressure, followed by an expiration when the glottis opens. Sound is generated during cough due to airflow, vibration of the tissue, and movement of fluid in the lungs. There are numerous causes for cough. Smoking is the

most common cause of dry cough. Hay fever and other allergies can sometimes cause cough which causes a dry or tickly cough. Various sensors can be used to record the activity of cough such as sound vibrational and EMG activity. The pulmonary diseases have varying cough pattern in which all seem to share cough as the common symptom. Hence a low cost cough monitoring system can be designed for the classification of various lung diseases using GSR, analyzing the signal pattern for early screening of pulmonary diseases.

### Related Work:

[1] In Robust Detection of Audio-Cough Events using local Hu moments paper, they used k-NN Classifier technology. Sensitivity in cough detection was between 64% and 72%

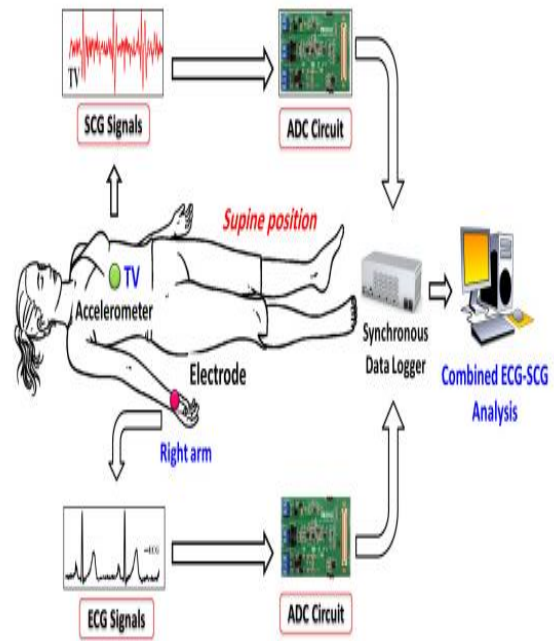
[2] Automatic Croup Diagnosis Using Cough Sound Recognition used Time Delay Neural Network(TDNN) technology. The major focus of this system is on the post-segmentation processing to diagnose croup

[3] This paper, Efficient k-NN Implementation for Real-Time Detection of Cough Events in Smartphones also uses k-NN classifier technology. This systems can be considered as expensive and uncomfortable (i.e., non-wearable during daily activity)

[4]Evaluation of a cough-specific quality-of-life questionnaire used MFCC technology. It can lead to misinterpretation of cough symptoms

[5]COPD uncovered: an international impact of the chronic obstructive pulmonary disease on a working age population used neural network. It was expensive and sensitivity in cough detection

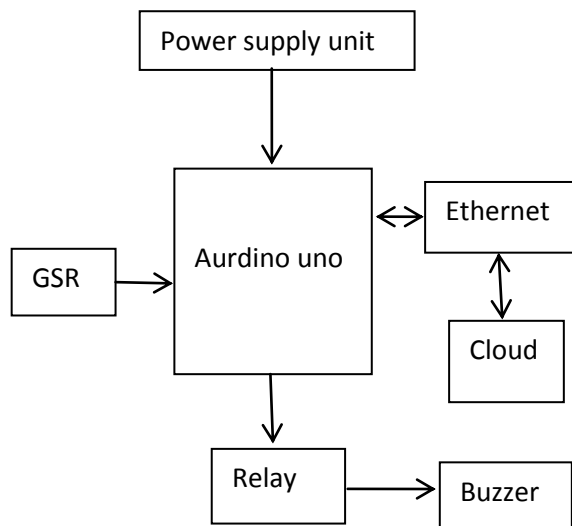
**Existing system:** The present case study reports a case of chronic cough and cough syncope associated with frequent premature ventricular complexes (PVCs). Careful analysis of cough-related symptoms and ECG monitoring led to the suspicion of PVC induced cough. A coincidence between PVCs and episodes of cough was also documented by a portable multichannel recorder. Moreover, Doppler echo cardiography revealed a PVC-induced transient increase in the pulmonary artery blood flow. After exclusion of other possible aetiologies, complete relief of chronic cough and cough syncope was achieved by radio frequency ablation of the arrhythmogenic focus located in the right ventricular outflow tract. Disadvantages of the existing system is Premature ventricular complexes should be considered as a cause of chronic cough and cough syncope and an interdisciplinary cooperation can lead to successful diagnosis and treatment of this condition.



**Proposed system:** An affordable cough monitoring system is developed for analysis the cough level and Nervous activities produced, by using sensors placed on any areas and a necessary amplification system for processing of cough signals in time and frequency domain is done for the analysis of various pulmonary diseases. By analyzing the signal pattern we are able to distinguish between normal and infectious cough and quick medical attention is given to people suffering from pulmonary disorders which seem to be a relief for the rural population in controlling the number of deaths due to Chronic Obstructive Pulmonary Disease (COPD). In our proposed model, By using power supply GSR monitors nerves activities and calculate the resistance of our nerves. In power supply unit for supplying constant +5v to our body we use step down transformer, bridge rectifier, filter circuit and voltage regulators 7812 ,7805. The observed reading is

sent to aurdino,if the value is abnormal then buzzer sounds. All the readings are continuously monitored by our mobile phones. Ethernet shield is used to protect and sent the datas to cloud which is received by our mobile phones.

Block diagram:



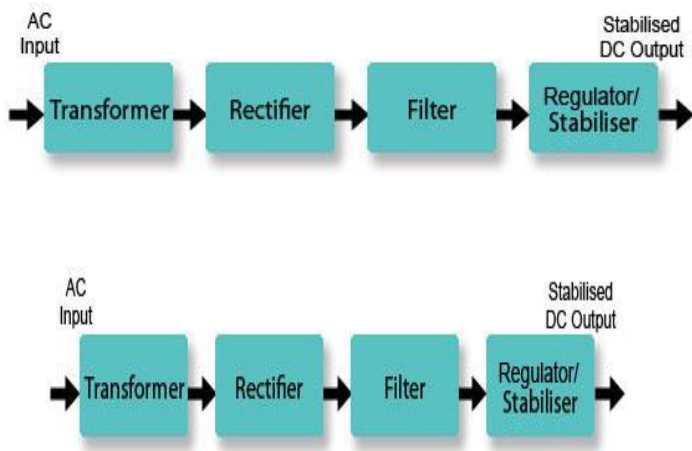
**GSR Sensor-**A GSR sensor allows us to measure cough level. To measure GSR, we take advantage of the electrical properties of the skin. The most common measure of a GSR signal is not resistance, but conductance. The most common method to measure a GSR signal for emotional research purposes is based on a constant voltage system. The GSR sensor applies a constant voltage—usually 0.5 V—to the two electrodes that are in contact with the skin. The circuit also contains a very small resistance compared to the skin resistance that is in series with the voltage supplier and the electrodes. The purpose of this circuit is to measure the skin conductance and its variation by applying Ohm’s law ( $Voltage = Intensity \times Resistance = Intensity/Conductance$ ). As the

voltage (V) is kept constant, skin conductance (C) can be calculated by measuring the current (I) flow through the electrodes. It is important to highlight that the voltage applied to the electrodes is very small, and the current that can flow through them is very low and not noticeable.

**Aurdino Uno-** The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. In this project we use aurdino board because it reduce over voltage. It also comes with open source software feature which enables experienced software developers to use the Arduino code to merge with the existing programming language libraries and can be extended and modified. It is easy to use for beginners. We can develop an Arduino based project which can be completely stand alone or projects which involve direct communication with the software loaded in the computer.

**Power supply unit-** Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most commonly applied to

electrical energy supplies, less often to mechanical ones, and rarely to others.



Basic power supply the input power transformer has its primary winding connected to the mains (line) supply. Voltage regulator ICs are available with fixed or variable output voltages. They are also rated by the maximum current they can pass. Negative voltage regulators are available, mainly for use in dual supplies. Most regulators include some automatic protection from excessive current and overheating. The LM78XX series of three terminal regulators is available with several fixed output voltages making them useful in a wide range of applications.

**Relay-** The main operation of a relay comes in places where only a low-power signal can be used to control a circuit. It is also used in places where only one signal can be used to control a lot of circuits. The application of relays started during the invention of telephones. They played an important role in switching calls in telephone exchanges. They were also used in long distance telegraphy.

They were used to switch the signal coming from one source to another destination. After the invention of computers they were also used to perform Boolean and other logical operations. The high end applications of relays require high power to be driven by electric motors and so on. Such relays are called contactors.

**Ethernet shield-** The Arduino Ethernet Shield connects your Arduino to the internet in mere minutes. Just plug this module onto your Arduino board, connect it to your network with an RJ45 cable (not included) and follow a few simple instructions to start controlling your world through the internet. As always with Arduino, every element of the platform – hardware, software and documentation – is freely available and open-source. The Arduino Ethernet Shield allows an Arduino board to connect to the internet. It is based on the Wiz net Ethernet chip (datasheet). The Wiz net W5100 provides a network (IP) stack capable of both TCP and UDP. It supports up to four simultaneous socket connections. Use the Ethernet library to write sketches which connect to the internet using the shield. The Ethernet shield connects to an Arduino board using long wire-wrap headers which extend through the shield. This keeps the pin layout intact and allows another shield to be stacked on top.

**Conclusion:** We have used GSR sensor for monitoring the nerves activities which is very simple and least cost. In previous model, they used ECG and SCG signals for monitoring

cough. Here we used aurdino board for regulate the power supply.

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