

EPILEPSY MONITORING AND ANALYSIS

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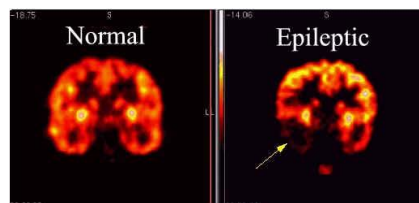
Abstract: Epilepsy is a disordered in brains electrical system in which nerve cell activity of the brain is disturbed, causing seizure. A seizure is a sudden rush of electrical activity in the brain. Now a days epilepsy is a major brain disorder. Epilepsy patient are susceptible to fits. This fits can be occurs any times a day and the main problem is that the patient has no memory that he has had a fit attack. There is a growing need for continuous monitoring and respond to their seizures and to inform the concern doctor for analysis, which is not possible in now a days due to the busy schedule and 24 hours nursing is expensive. The paper presents Epilepsy Patient monitoring system, in which generalize tronicclonic type of epilepsy is is pre-selected by doctor. Microcontroller keeps the track of the patient's activity which is seen on Visual Basic software. The activities are haphazard body movement, temperature increase, sudden fall detection. When epilepsy attack starts and ends SMS is sent to the doctor and concerned person.

Keywords: EPILEPSY, SEIZURE, FIT, CLONIC, MONITORING.

I. INTRODUCTION

Epilepsy is the disorder in brains electrical system. Epilepsy may result from anything that disturbs the brain's natural circuitry such as- Severe head injury, brain infection or disease, stroke, oxygen deprivation. It is a need to monitor the epilepsy patient and inform concerned doctor and parent of the patient. 65 MILLION Number of people around the world have epilepsy. Epilepsy is the fourth most common neurological disorder and affects people of all ages. Epilepsy means the same thing as "seizure disorders." It is characterized by unpredictable seizures and can cause other health problems. It is a spectrum condition with a wide range of seizure types and control varying from person-to-person. Normally brain electrical activity is non-synchronous. Its activity is regulated by various factors both within the neuron and the cellular environment. Factors within the neuron include the type, number and distribution of ion channels, changes to receptors and changes of gene expression. Factors around the neuron include ion concentrations, synaptic plasticity and regulation of transmitter breakdown by glial cells.

The figure shows the condition of normal human brain and the brain of a Person suffering from epilepsy.



The seizures in epilepsy may be related to a brain injury or a family tendency, but often the cause is completely unknown. The word "epilepsy" does not indicate anything about the cause of the person's seizures or their severity. Many people with epilepsy have more than one type of seizure and may have other symptoms of neurological problems as well. Although the symptoms of a seizure may affect any part of the body, the electrical events that produce the symptoms occur in the brain. The location of that event, how it spreads, how much of the brain is affected, and how long it lasts all have profound effects. These factors determine the character of a seizure and its impact on the individual.

There are six main types of generalized seizures: tonic-clonic, tonic, clonic, myoclonic, absence, and atonic seizures. They all involve loss of consciousness and typically happen without warning. Tonic-clonic seizures occur with a contraction of the limbs followed by their extension along with arching of the back which lasts 10–30 seconds (the tonic phase). A cry may be heard due to contraction of the chest muscles, followed by a shaking of the limbs in unison (clonic phase). Tonic seizures produce constant contractions of the muscles. A person often turns blue as breathing is stopped. In clonic seizures there is shaking of the limbs in unison. After the shaking has stopped it may take 10–30 minutes for the person to return to normal; this period is called the "postictal state" or "postictal phase." Loss of bowel or bladder control may occur during a seizure. The tongue may be bitten at either the tip or on the sides during a seizure. In tonic-clonic seizure, bites to the sides are more common. Tongue bites are also relatively common in psychogenic non-epileptic seizures. Myoclonic seizures involve spasms of muscles in either a few areas or all over. Absence seizures can be subtle with only a slight turn of the head or eye blinking. The person does not fall over and returns to normal right after it ends. Atonic seizures involve the loss of muscle activity for greater than one second. This typically occurs on both sides of the body.

II. PROPOSED SYSTEM

Proposed work consists of Embedded hardware in which microcontroller keeps the track of patients activity. The user pre select the generalized tonic clonic type of epilepsy. The three activities which are, increase in body temperature, haphazard body movement and sudden fall are sensed by sensors ADXL335 and LM35. Patients activity is displayed on LCD which is body temperature, head movement and palm movement. Sensor output is given to the microcontroller which keep a track of Fits, which is also monitor on visual basic software. SMS is sent to doctor and concerned person when the fits start and the FIT ends. In this way the system help the doctor to monitor and analyze the Epilepsy attack and also track the progress of patient.

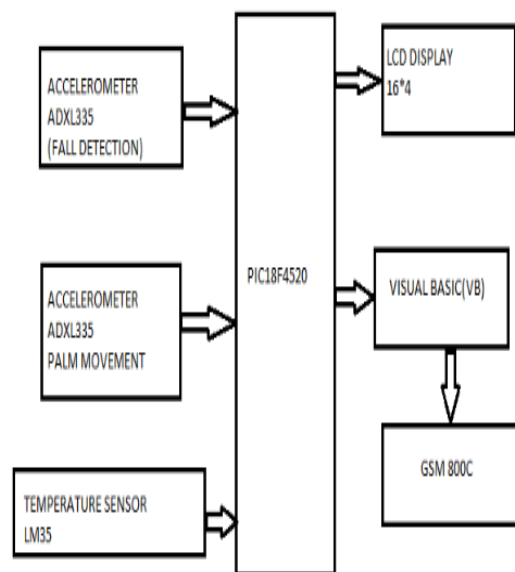


Figure 1: BLOCK DIAGRAM

Block diagram consist of different types of sensing units such as temperature sensor, accelerometer to detect fall detection and haphazard body movement.

Sensors are the devices which converts the physical parameter into electrical signals. The system consist of temperature sensor, accelerometer. The output of sensor is analog signal. The signal is converted into digital signal and then feed to processor. The temperature sensor is used to measure temperature of body. Here LM35 temperature sensor is used. The output voltage of sensor is linearly proportional to the Celcius temperature Accelerometer is an electromechanical sensor that measures acceleration forces. Accelerometer is electronic device which is interface using I2C protocol and provides readings according to requirement of application, microcontroller takes readings from accelerometer and do the necessary operation according to requirement of application.

III. WORKING OF PROPOSED SYSTEM

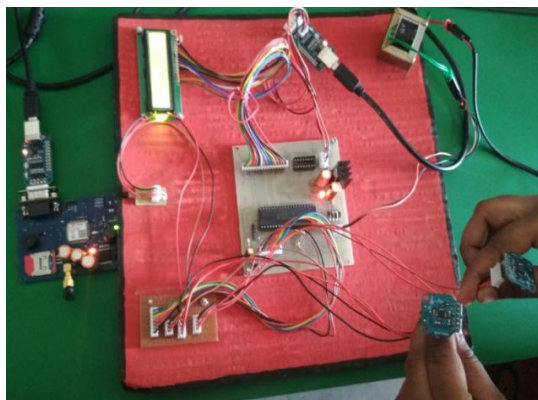


Figure 2: Epilepsy monitoring system

Above figure shows the ON condition of epilepsy monitoring system

The author hadpre selectedthe generalizes tonic clonic type of epilepsy. In proposed system ADXL335 and LM35 sensors were used. Acceleration was pre calculated and according to that X and Y position was set , this position was considered for normal and abnormal condition ADXL335 sensor was used for haphazard body movement which monitored the palm activity. Here five times alternative normal abnormal condition was considered for epilepsy attack. ADXL 335 was also used for fall detection. Here continuous five abnormal condition was considered for epilepsy attack. LM35 was used for sensing body temperature. Here temperature above 45 degree combined with palm movement was considered for epilepsy attack. All the sensor output was given to the microcontroller. LCD displays the current body temperature , palm and head movement patient . GSM sends SMS to the doctor and the concerned person when the epilepsy attack starts. End SMS was sent when five continuous normal state occurred. Simultinously continuous monitoring of the patients activity was also observed on visual basic software. Visual basic software gives the current status of the patient and SMS status which was sent on mobile phone of doctor and concerned person of the patient

III. RESULT



Figure 3: LCD DISPLAY

Head movement, palm movement and body temperature is shown on LCD DISPLAY figure 3

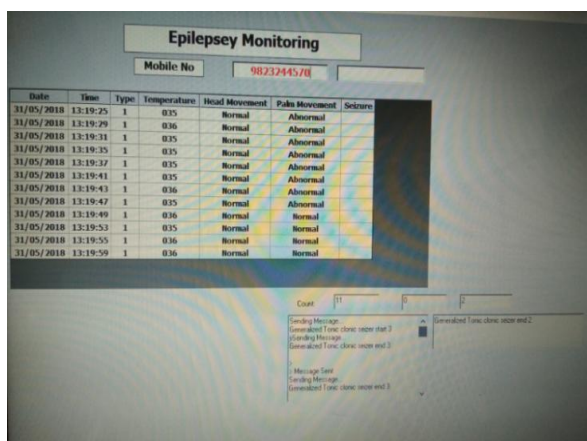


Figure4:VISUAL BASIC SOFTWARE SCREEN

Patient activity status and SMS status is observed in figure 4

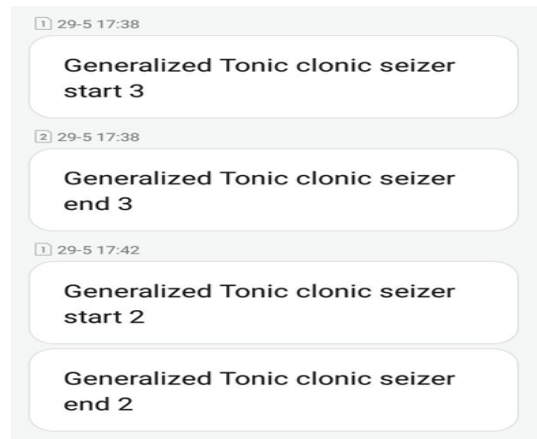


Figure 5: MESSAGE ON PHONE

Figure 5 shows the epilepsy start and end message send by the GSM on mobile screen

IV. CONCLUSION

Generalized tonic clonic type of epilepsy is selected previously. Microcontroller keeps the track of patient's activity which are seen on LCD display and also monitor on visual basic software and. SMS is sent when epilepsy starts and ends This system helps to monitor the patients activities, so that doctor and parent can be updated about the patient's condition and analysis the patient quickly.

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