

# Detection of Epileptic Seizure using Mobile Alert

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**Abstract**— Epilepsy, the neurological disorder is characterized by recurrent and unprovoked seizures. It is due to Stroke, Brain tumour, Alzheimer’s disease, AIDS and other vascular diseases. This condition leads to the brief absent moments, episodes of losing consciousness and falling to the floor and convulsing. Though there are many efficient medications to treat epilepsy there is not a proper way to intimate the occurrence of epileptic condition. Caregivers of people with epilepsy are commonly concerned about unwitnessed seizures causing injury and even death. This project broadly focus on detection and intimation of the epileptic seizure to the care giver. In order to accomplish this a fully developed wearable wrist band is designed using an accelerometer sensor and a wifi module. Once when the recurrent seizures are sensed the message is sent to the care giver with the help of an application named seizure track which is designed using eclipse studio software. For further assurance the EEG signal patterns analysed for the detection of epileptic signals in the five subbands was taken into consideration. Therefore the conformation of epileptic seizure signals is done.

**Key words:** Alzheimer’s disease, epileptic seizure, accelerometer sensor, wifi module, EEG signal

## I. INTRODUCTION

An epileptic seizure is a transient occurrence of signs and/or symptoms due to abnormal excessive or synchronous neuronal activity in the brain. Epilepsy is a disease characterized by an enduring predisposition to generate epileptic seizures and by the neurobiological, cognitive, psychological, and social consequences of this condition. In general Seizures and epilepsy are not the same. A seizure is an event which shows sudden rush of electrical activity in the brain and epilepsy is the chronic disorder involving recurrent unprovoked seizures. Anyone can develop epilepsy, but it’s more common in young children and older adults. It occurs slightly more in males than in females. Epilepsy theretofore has been two unprovoked seizures more than 24 hours apart. People who have photosensitive seizures provoked by flashing lights or patterns do not have epilepsy; whereas, most people think that they do. Some individuals who have had only one unprovoked seizure have other risk factors that make it very likely that they will have another seizure. Many clinicians consider and treat such individuals as though they have epilepsy after one seizure. Finally, some people can have what is called an epilepsy syndrome and these individuals should meet the definition for having epilepsy even after just one seizure. Epilepsy is considered to be resolved for individuals who had an age-dependent epilepsy syndrome but are now past the applicable age or those who have remained seizure-free for the last 10 years, with no seizure medicines for the last 5 years. A person is considered to have epilepsy if they meet any of the following conditions.

- 1) At least two unprovoked (or reflex) seizures occurring greater than 24 hours apart.
- 2) One unprovoked (or reflex) seizure and a probability of further seizures similar to the general recurrence risk (at least 60%) after two unprovoked seizures, occurring over the next 10 years.  
Seizures are usually...
- 3) Unpredictable - you often can't predict when and where a seizure may happen
- 4) Episodic - seizures can come and go
- 5) Brief - usually last only seconds to a few minutes
- 6) Stereotypic - symptoms are similar whenever they occur

## II. OBJECTIVE

- To ameliorate the detection procedures of the epileptic seizures using the accelerometer sensor and esp8266 wifi module.
- To improve the quality of life of the patient by transmitting the location of the patient.

## III. THE SENSING MODULE AND TRANSMITTING MODULE

The recurrent seizures are detected by using the accelerometer sensor and it is transmitted using the wifi module. The EEG signal is picked from the temporal lobe using the EEG leads (T8, T9, T7, T10, TP9, TP1, TP8, TP10). The obtained signal is performed with the wavelet transform feature space reduction and classified using classifying algorithm and then it is transmitted via wifi module as shown in figure 1.

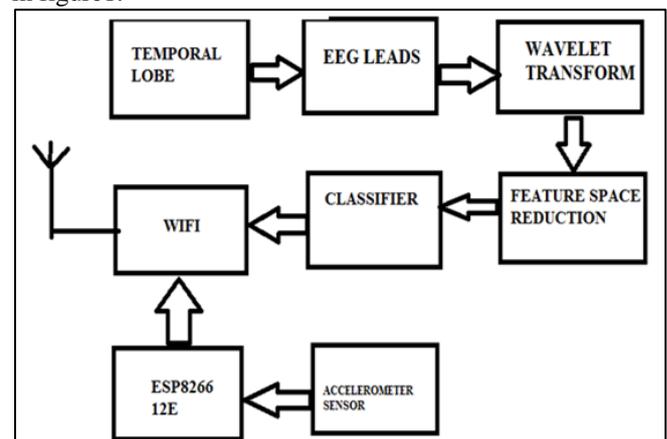


Fig. 1: Block diagram of the sensing and transmitting module

## IV. DESIGN OF MOBILE APPLICATION USING ECLIPSE SOFTWARE

Eclipse is an integrated development environment (IDE) used in computer programming, and is the most widely used Java IDE. It contains a base workspace and an extensible plug-in system for customizing the environment. Eclipse is written mostly in Java and its primary use is for developing Java

applications, but it may also be used to develop applications in other programming languages via plug-ins, including: Ada, ABAP, C, C++, COBOL, D, Fortran, Haskell, JavaScript, Julia, Lasso, Lua, NATURAL, Perl, PHP, Prolog, Python, R, Ruby (including Ruby on Rails framework), Rust, Scala, Clojure, Groovy, Scheme, and Erlang.

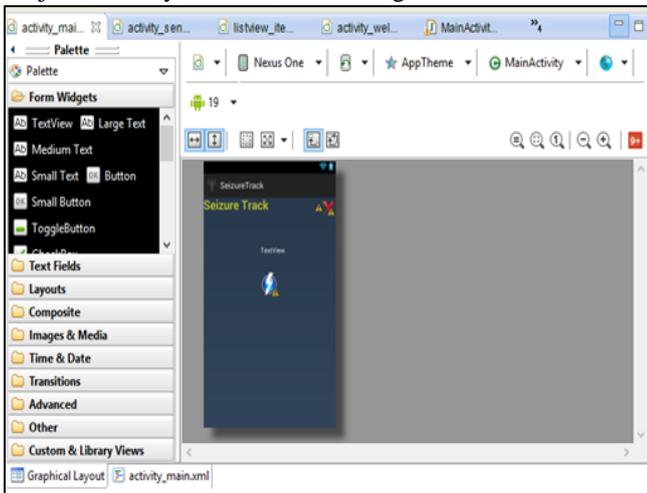


Fig. 2: Designing of front panel of the android application

When a person got seizure, the movement of the person is detected using ADXL345 accelerometer. An Android mobile client is developed using Eclipse studio which is shown in figure 2 and is used to display X and Y axes in the UI interface. C program is written which is used to read the data from the accelerometer to the mobile when the user started using mobile client app.

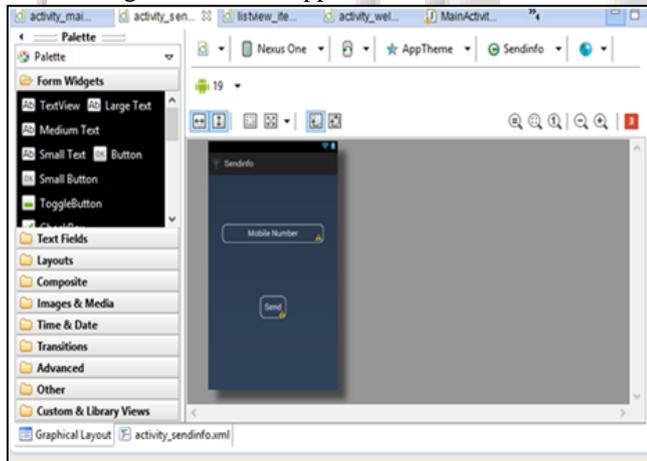


Fig. 3: Designing the panel for sending the alert

When the user gets seizure, accelerometer sensor detects the movements of the person. The program reads the x axis and the y axis. If x axis is greater than -400 and y axis is greater than 300, the program sends an alert to the mobile and mobile number is asked in the seizure app as shown in figure 3

#### V. HARDWARE UNIT

The hardware unit can be done by making use of

- ESP8266 wifi module
- ADXL345 accelerometer
- I2C Bus
- EEG leads

The ESP8266 WiFi Module as shown in figure 3.2 is a self contained SOC with integrated TCP/IP protocol stack

that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime

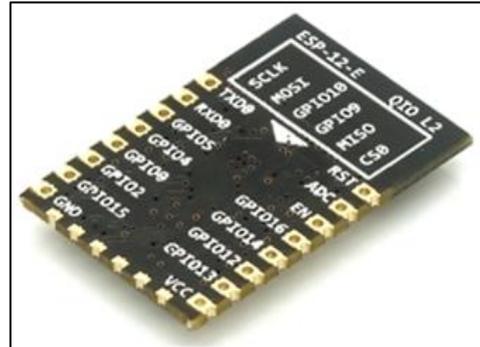


Fig. 4: ESP826612E wifi module

The ADXL345 as shown in figure 5 is a small, thin, low power, 3-axis accelerometer with high resolution (13-bit) measurement. The ADXL345 is well suited for mobile device applications. It measures the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion or shock.

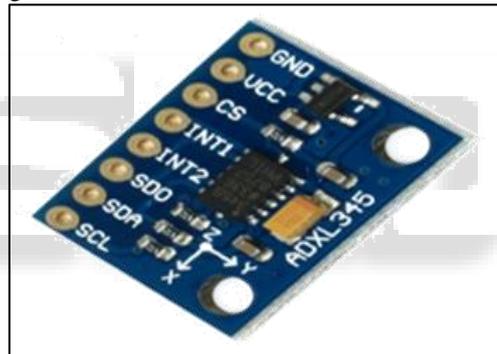


Fig. 5: ADXL345 Accelerometer

I2C is a serial protocol for two-wire interface to connect low-speed devices like microcontrollers, EEPROMs, A/D and D/A converters, I/O interfaces and other similar peripherals in embedded systems which is shown in figure 6.

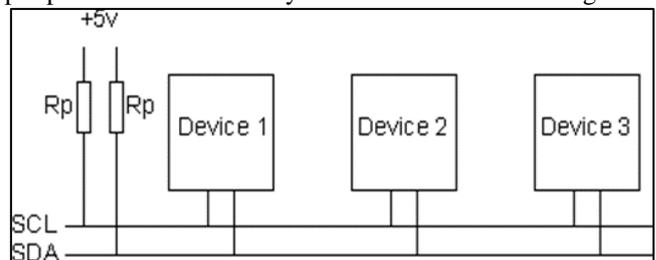


Fig. 6: Block diagram of I2C Bus

#### VI. RESULTS AND DISCUSSION

Seizure detection and prediction provide new and individually targeted opportunities for the diagnosis and intervention in the management of epilepsy. This system may allow for the detection of seizures prior to their clinical onset. Furthermore, this system might be used in accident prevention and seizure tracking and could further be useful in closed-loops to facilitate seizure abortion. Installation of this

system was found to improve parent-reported quality of family life too. Reliable nocturnal seizure monitoring with a seizure detector may help caregivers cope better with the uncertainty of epilepsy and improve their QOL(Quality Of Life).

The proposed device model as shown in the figure7 using its continual upgrading platform evolves to a seizure predicting device that takes in consideration all parameters that cause a seizure that is as simple to use as a wearable one. This wrist based wearable device detect seizure efficiently. The Project states the condition and location of the epileptic patients. The location is determined to the caregiver whenever the abnormal readings are detected from the accelerometer sensor adxl345. This is achieved through the esp826612e wifi module.

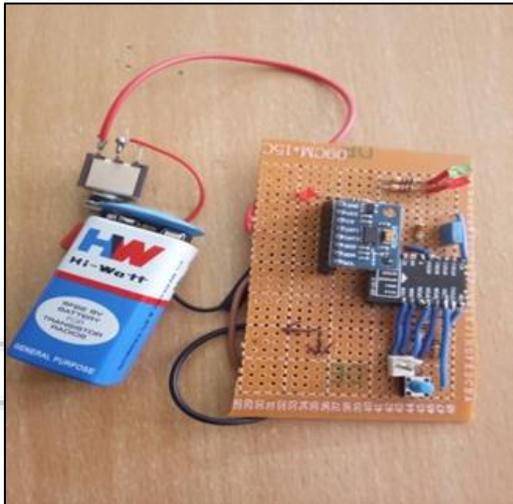


Fig. 7: The hardware unit of the designed model

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