

# A Novel idea on Epilepsy Alerting System using EEG, Pulse Rate and Acceleration

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**Abstract** - Epilepsy is characterized by the recurrence of epileptic seizures that affect secondary physiological changes in the patient. This prompts a progression of antagonistic occasions in the appearance of convulsions in an uncontrolled environment According to the World Health Organization it affects almost 65 million people worldwide. It affects almost 1 percent of the population and most of the approximately 20–30 percent of patients with refractory epilepsy have at least one seizure for each month. A typical method to treat epileptic seizure is the utilization of prescription. At the point when drug comes up short, medical procedure is normally the proposed yet medical procedures have been found to come up short in various cases leaving casualties with no choice than to deal with their condition. This scenario, prompt to make a system which detect epilepsy and give alert to patient's care taker. The customary strategies of identification dependent on wired emergency clinic checking frameworks are not reasonable for the recognition of long haul observing in outside. As we know the most common symptoms of epilepsy include muscular movements variation in heartbeat rate variations in EEG etc. So to improve the customs of epilepsy patient an Epilepsy alert system with Wearable EEG device( with battery and Bluetooth) - to detect seizures by detecting sharp changes in EEG ,Wearable pulse contraction ( with battery and Bluetooth)- to identify unexpected changes in BP and Pulse A normal, smart mobile with Accelerometer with GPS-to identify abrupt fall ,Application to get cautions from each of the three devices and generate alert in the form of SMS An SMS with location of the patient has to be sent to the care taker. This system makes an in-depth analysis of the main factors that an epileptic detection and monitoring tool should accomplish. Here, Introduce the architecture for a specific epilepsy detection and monitoring platform, fulfilling these factors.

**Key Words:** Epilepsy, Electro cephalogram, Pulse rate, Accelerometer

## 1. INTRODUCTION

Epilepsy is a neurological problem illness that influences the focal sensory system of the human mind that can disturb the action of the sensory cells in the cerebrum which will bring about strange conduct that can lead to loss of awareness called epileptic seizure. The seizure can imperil the life of the patient when driving, swimming, or performing some other exercises. Today the cell Phone based applications are being utilized for tackling human genuine issues. Also, these applications play a imperative function in the wellbeing sciences for improving the methods of treatment by presenting most encouraging techniques. Epilepsy is a genuine and jumbles conduct that influences 5 percentage of the world populace; hence, there is a requirement for building up an effective advanced mobile phone application that can screen the conduct of an epileptic patient just as sending a prompt update to the guardians. The fundamental thought behind building up this android application is to inform time to time conduct of epilepsy patients at the earliest opportunity to all the overseers. A prompt clinical help is required when there is a seizure. The primary thought behind our android application is to give prompt notice of range sign and epilepsy state, and an alert is set off dependent on it. The system comprises of equipment [13] mind wave headset, wristband to catch the EEG, Pulse rate, accelerometer information from the patient to anticipate whether seizure happens or not Support Vector machine classifier is utilized to classify the information to foresee if seizure happens. This examination has built up an android based application which can give quick warnings once a seizure happens to an epileptic patient so s/he can get the correct clinical consideration.

**1.1 Problem Statement:** Proposing a new idea to detect Epilepsy and send alert message using the features of EEG, Pulse rate and acceleration

**1.2 Scope of the Project:** Epilepsy is a problem wherein nerve cell movement in the cerebrum upset, causing seizures. The life of epilepsy tolerant is totally unique in relation to an ordinary individual. Because of the startling assault of Epilepsy, they can't have a customary existence. They reliably required a consideration from the parental figure. By introducing EPICARE System, can improve the traditions of the patient simultaneously it gives an unwinding to the guardian too. System framework is give a day in and day out regard for the patient without guardian. EEG is the clinical procedure to identify epilepsy. By utilizing this EEG, Heartbeat rate and acceleration can keep away from the bogus alert message. This framework causes them to get free and travel alone.

**1.3 Future Enhancements:** The project can be upgraded to a level where specialists can envision the state of the patients. Hence, it helps to improve the treatment of the patient.

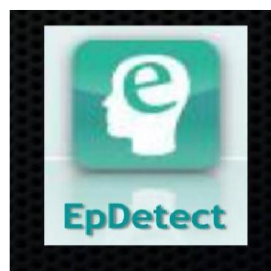
## II. LITERATURE REVIEW

### A. Embrace 2



The Embrace.[1] watch is an FDA-affirmed smart watch that can be worn as a seizure ready framework for kids and grownups. It distinguishes a few sorts of seizure and sends an alarm to your allotted parental figures, revealing to them that you need help, informing them that you need assistance. It recognizes a couple of sorts of seizure and gives an alert sign to your appointed gatekeepers, advising them that you need help. The Embrace watch jobs advancement made by Empatica, an active enlisting association that was spun-o from the Massachusetts Institute of Technology (MIT). The thing was made in association with the Epilepsy Foundation besides, private sponsors. Handle is tweaked with worked in sensors that measure electro dermal activity (EDA). EDA implies skin conductance—the straightforwardness with which an electrical sign experiences the skin—which, consequently, is related to the proportion of sweating that occurs. These fluctuations in the skin happen in light of the changes that occur in the cerebrum when you experience a convulsive seizure. The skin changes are excessively especially inclined to happen due to the sorts of seizures that shut down unwinding. These sorts of seizures can cause unexpected unanticipated death in epilepsy (SUDEP), one of the most veritable results of epilepsy. The implicit identifiers include: EDA sensor: Measures insightful tactile framework development, which is started during various conditions, including convulsive seizures. Spinner: Measures rotational speed 3-Axis accelerometer: High affectability movement detection Fringe temperature sensor: Measures skin temperature Grasp additionally utilizes two applications: An occasion identifier: This distinguishes your electro dermal reaction. An AI[14] calculation is arranged to recognize extents of convulsive seizures and is revamped subject to your history. The occasion marker sends a caution to your parental figure when the watch perceives changes trustworthy with your seizures.

### B. Epdetect



Epdetect[2] is free adaptable application to distinguish epileptic seizures with modernized carer prepared Epilepsy Detector Application Epdetect is an accelerometer based PDA application that uses advanced sign getting ready to perceive epileptic seizures. EpDetect has been intended to consequently distinguish Tonic-Clonic seizures. At the point when a seizure is recognized, Epdetect will consequently tell your cares that a seizure has happened. It will likewise give area data that can be utilized related to Google guides to unequivocally find your position. The identifier utilizes complex sign preparing to separate between ordinary developments and those related with a seizure. Epdetect works by checking development in three measurements. In case the finder sees improvement that looks like a seizure, it will trigger the Seizure Detected alert. For Epdetect to work precisely is should be affixed to the customer. Interfacing the phone to the customer's belt generally speaking gives extraordinary results, as even little advancements can be distinguished. Epdetect can't perceive nonattendance seizures or any seizure that doesn't make convulsions (rhythmic shaking developments).

### III. PROPOSED SYSTEM

#### 3.1 Block Diagram

The proposed framework comprises of three equipment. Mind wave headset, Wrist band and Android smart phone Mind wave headset contains biosensors to catch EEG information of the patient. The information from the headset will move to the wrist band utilizing HC-05 Bluetooth. The wrist band contains ADXL345 accelerometer and MAX86141 Pulse oximeter sensors to gauge the beat rate and acceleration of the body which is associated with ESP32 microcontroller (Refer figure 1). Android smartwatch application [13] connected to wrist band with BLE Bluetooth and capture information. This information will move to the cloud system which hosts SVM algorithm which classify the information to detect seizure If convulsion detected, a request will be sent to text message server which integrates with database server where the numbers of caretakers stored an alert SMS message will send to the care giver figure 1.

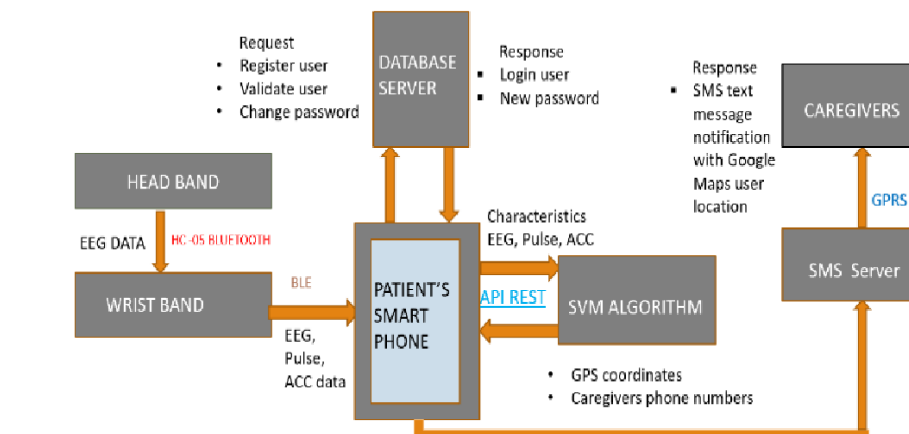


Figure 1 Block Diagram

#### 3.2 Hardware

Hardware framework comprises of a mind wave headset with HC-05 Bluetooth which is equipped for gathering EEG signals from temple, a Wrist band with ADXL345 Accelerometer, MAX 86141 Pulse Oximeter sensor, ESP32 microcontroller with BLE and HC-05 Bluetooth and an Android Smart Phone. Mind wave headset comprises of a customizable head band, Ear clip and a sensor arm on the front head over the eye [fp1 position], it utilizes a solitary AAA battery with 8 hrs of battery life. This gadget can decrease clamour by having subjects sit still in a controlled environment and by applying a conductive glue to the cathode it's called us dry terminal. This terminal is available in the ear cut which goes about as a ground and reference to sift through all the electrical commotion from the body. Here TGAM (Think Gear ASIC Module) is utilized which pre-process the information inside the headsets itself. TGAM portrays both the crude mind waves and the sense meters (consideration and intervention and so forth) are determined on this chip itself calculated values are yield by the TGAM chip through the headset by Bluetooth association with the application program TGAM additionally along with dry cathode and it detects the signs from human cerebrum channels outs unessential commotion and electrical obstruction and convert to computerized power. The Bluetooth utilized in this gadget is HC-05 which is a simple to utilize Bluetooth [6] SPP (sequential port convention) intended for straightforward remote sequential association setup. It can be utilized in an expert or slave Bluetooth comprise of 8 pins

1. Pin 1-Enable key
2. Pin 2-VCC
3. Pin 3-Ground
4. Pin 4-TX sends
5. Pin 5-RX beneficiary
6. Pin 6-State
7. Pin 7-LED

## 8. Pin 8-Button

### 1 Enable/Key

This pin is used to flip between Data Mode (set low) and AT request mode (set high).

### 2 VCC

Forces the module. Associate with +5V Supply voltage

### 3 Ground

Ground pin of module, associate with framework ground.

### 4 TX – Transmitter

Communicates Serial Data. Everything got by methods for Bluetooth will be given out by this pin as successive data

### 5 RX – Receiver

Get Serial Data. Each consecutive data given to this pin will be imparted through Bluetooth

### 6 State

The state pin is related with on board LED, it will in general be used as an analysis to check if Bluetooth is working appropriately.

### 7 LED

Shows the status of Module Flicker once in 2 sec: Module has entered Command Mode Kept Blinking: Waiting for relationship in Data Mode Flicker twice in 1 sec: Connection successful.

### 8 Button

Used to control the Key/Enable pin to flip among Data and order Mode This Bluetooth is effectively interfaced with PC and cell phones what's more, Bluetooth is working with a voltage of 4-6 v and current 30mA Though the head set is right around 90 g gauge it is effectively wearable it's sensor arm - up arm :225mm stature, 155 mm width and profundity around 2 mm.

*Wrist band with max 86141 heartbeat oximeter and Esp32 microcontroller with BLE and HC-05 Bluetooth*



*Figure 2 Wrist Band*

Normal degrees of blood oxygen fall in the 95 percent to 100 percent [14] territory with 90 less warrants a talk with a specialist. So on the off chance that any individual who need their spo2 checked needed to visit clinical facility. so to maintain a strategic distance from this issue benevolently presenting a wearable gadget with biosensors, however are giving the capacity to consistently observing blood - oxygen levels and their imperative signs. The gadget named as Wrist band [4] Which is utilized to catch beat rate and increasing speed of patient. The upper piece of wrist band is comprised of Elastane and lower part with neoprene, materials that permit long lasting use in various conditions of the patient's everyday life, just as being agreeable to use in conditions, for example, sweating. Elastane contributes with moistness retention and shields the circuit

from the client's perspiration; furthermore, it is a material with profoundly versatile properties which permits it to be effortlessly adapted to the wrist of the user. Neoprene is likewise flexible and has electric and warm protection resources that give circuit security from synthetic specialists. Furthermore, a belt that were incorporated for changing the band to the proportion of the wrist of every client. Wrist band contain a maximum 86141 heartbeat oximeter which intended to catch beat rate from wrist. It has all around improved design for intelligent and transmissive oxygen immersion or pulse monitoring. The max 86141 are super low-power totally coordinated, optical information obtaining systems. It has 3 programmable high current LED drives on the transmitter side that can be arranged to drive up to six LEDs utilizing an outer 3\*2:1 mux with 2 max86141 gadgets working in expert slave mode. Max 86141 has 2 optical readout channels that can work simultaneously.

The gadget have low clamour signal moulding simple front end including 19 cycle ADC, an industry lead encompassing light dropping (ALC) circuit and suppliant function due to the low force consumption compact size, usability, and industry lead surrounding light dismissal ability. Operations on 1.8V primary stock voltage and 3.1 5.5V stockpile to drive LED. It is Designed with low dim current commotion, of 50pA RMS and high goal with 19-digit accurate coordinated ADC, of 3-low commotion, 8bit LED current DAC, dynamic reach more prominent than 90dB and ultra - low-power operations. Beside this it additionally utilized for muscle oxygen immersion (SMO2 and STO2) [3], optical pulse and streamlined for wrist, finger, Ear and different areas. This gadget put a cost on. In wrist band it comprises of a microcontroller named as ESP32. ESP32 is a progression of minimal effort, low-power framework on a and double mode Bluetooth. The ESP32 arrangement utilizes a Tensilica Xtensa LX6 microchip in both double centre and single-centre varieties and incorporates worked in radio wire switches, RF balun, power speaker, low-commotion get intensifier, channels, and force the board modules ESP32 executes TCP/IP, full 802.11 b/g/n/e/I WLAN MAC convention, and Wi-Fi Direct detail. This implies ESP 32 can address the majority of the Wi-Fi Routers out there when utilized in station(client) mode ESP32 additionally underpins the Wi-Fi Direct. Wi-fi-Direct is acceptable alternative for shared association without the need of an entrance point b/g/n/e/I WLAN MAC convention, and Wi-Fi Direct specification.

The Wi-fi-Direct is simpler to arrangement and the information move speeds are far superior to Bluetooth. This could potential be utilized to design ESP32 based undertakings from a telephone/tablet that underpins Wi-Fi direct ESP32 not simply bolsters the most recent BLE Bluetooth 4.2, it likewise bolsters exemplary Bluetooth. It essentially implies it can address old and new Bluetooth telephones/tables. This would one be able to of the best highlights particularly, in case you're planning a gadget that necessities to work with existing just as new telephones/tablets on the lookout. The ESP32 Bluetooth Radio and Baseband underpins. Class-1, class-2 and class-3 send yield powers and more than 30 dB dynamic control range it 1/4 DQPSK and 8 DPSK balance High execution in NZIF collector affectability with more than 98 dB dynamic reach Class-1 activity without outer PA Internal SRAM permits max throttle information move, blended voice and information, and full piconet activity.

### 3.2.1 ADXL345 Accelerometer

ADXL345 is small, slim, low-power, 3-pivot accelerometers ideal for cell phone applications. ADXL345 measures the static increasing speed of gravity in tilt-detecting applications, just as powerful quickening coming about because of movement or stun. The accelerometers have a high goal (13-piece) estimation at up to  $\pm 16g$ . The gadgets' high goal (4mg/least critical piece) empowers estimation of tendency changes under  $1.0^\circ$ . Action and latency detecting identify the presence or absence of movement and whether the speeding up on any pivot surpasses a client set level. Tap detecting identifies single and twofold taps while free-fall detecting recognizes whether the gadget is falling. These capacities can be planned to one of two interfere with yield pins. A coordinated memory the executives framework with a 32-level first in, first out (FIFO) cushion can be utilized to store information to limit have processor movement and lower by and large framework power utilization. Low force modes empower canny movement-based force the board with edge detecting and dynamic quickening estimation at amazingly low force scattering. The ADXL345 is provided in a little, slim, 3 mm  $\times$  5 mm  $\times$  1 mm, 14-lead, plastic package. Accelerometer chips away at the guideline of Piezoelectric impact. At whatever point we will tilt the sensor the ball should move toward that path due to Gravitational power. The dividers are made of Piezoelectric components. Along these lines, each time ball is contacting the divider an electric flow will be delivered which will be deciphered as qualities in any 3D space. The sensor comprises of a miniature machined structure on a silicon wafer. The structure is suspended by polysilicon springs which permit it to divert easily toward any path when subject to increasing speed in the X, Y and additionally Z hub. Diversion causes an adjustment in capacitance between fixed plates a lot joined to the suspended structure. This adjustment in capacitance on every pivot is changed over to a yield voltage corresponding to the speeding up on that axis. It has x, y, z arrange values with is utilized to gauge the position and the quickening of the gap. Utilizing change in capacitance we can discover quickening.

$$f = ma$$

$$ma = kx$$

$$c = f(A/d)$$

### 3.3 Software

This section gives the detailed description of software. The software enables connection with wristband and capture the data [11]. The software in the proposed system displays Raw EEG signal, the pulse rate and acceleration in 3-axis of the body. The data provided by sensors will be classified using SVM algorithm. If epilepsy is detected the system will send an alert message to the caregiver’s number which is already saved in the database server. The front end of the software uses language c# and back end use c# and python.

#### 3.3.1 Software Interface

The product uses software components such as Xamarin (Android app development Platform), .net framework, Docker container, Anaconda and other Machine Learning Scikit Learn library in python with other scientific libraries like numpy, scipy given by anaconda environment. The product will consist of a single user interface for any user accessing the product. The interface will allow the user to input mail id, phone number, caretaker number and user can set a password to ensure security to the software. Software displays the EEG raw signals, Pulse rate and acceleration.

### 3.3 Analysis and feature extraction of EEG

In this section describes the analysis of EEG signal. The analysis of EEG signal is performed in three stages In first step the Discrete Wavelet Transform is used for decompose EEG signal into delta(04 Hz) , theta(4-8 Hz) , alpha (8-12Hz) , beta (13-30 Hz) and gamma (30Hz).

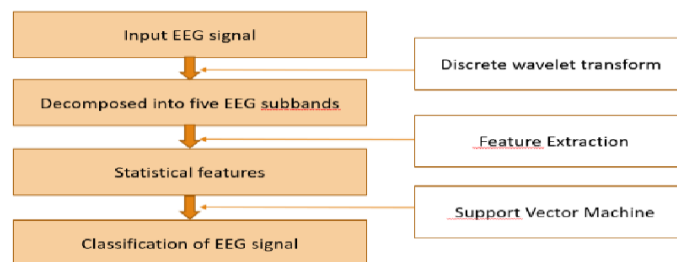


Figure 3 Feature Extraction

Sub band decomposition of EEG based on wavelet F or extracting individual EEG sub bands a wavelet filter (DWT) is used. The wavelet transform has an advantage of time-frequency localization, multi rate filtering and scale space analysis. The primary EEG signal contains five sub bands: delta, theta, alpha, beta and gamma. The EEG segment is then subject to a 6level decomposition using Haar wavelet transform.

#### 3.3.1 Sub Feature extraction of EEG

Transforming the input data into the set features is called feature extraction [12]. The purpose of feature extraction is to reduce the original data by measuring certain features that distinguish one input pattern from another.

### 3.4 Pulse rate and Accelerometer

This section discussed the classification criteria of pulse and acceleration data Pulse rate of an ordinary person is 60 to 100 beats per minute. Resting of heart fewer than 60 beats per minute qualifies as bradycardia. Resting of heart higher than 100 beats per second is called tachycardia. The heart rate during epilepsy varies from one patient to another. Both conditions are found in epilepsy patient. Accelerometer is used to detect human fall. During human fall the accelerations in 3- axis approximately equals 9.8 m/s, that is acceleration of gravity.

### 3.5 Support Vector Machine Classifier

Support Vector Machine algorithm [8] is a supervised machine learning algorithm which can be used for classification problems. Proposed system us e SVM [15] to classify data to predict seizure. In the absence of EEG data, the system works based on the pulse rate and accelerometer. In ML, the radial basis function kernel, or RBF kernel, is a popular kernel function used in various kernelized learning algorithms we use RBF svm kernel function to classify data. SVM [12] algorithm was developed using Machine Learning [9] Scikit Learn library in python with other scientific libraries given by anaconda environment. Docker container is used for provide the svm with a python ecosystem provided by anaconda.

### Algorithm

Step 1. Start

Step 2. Input EEG, Pulse rate P and Acceleration x, y, z.

Step 3. Flag =0

Step 4. Check the variance of each sub band in the EEG signal.

Step 5. If the variance lies in the not seizure range: i) flag == 1

Step 6. End if

Step 7. If the EEG data is absent, check the pulse rate and accelerations of 3-axis.

Step 8. If (60 P 100): i) flag == 09.

Else :

i) flag == 1

Step 10. End if

Step 11. If flag == 1: i) System confirms epilepsy ii) Request will send to text message sever which integrates the database server. iii) Text message will send to the caretaker number along with patient's location

Step 12. End if

Step 13. Stop

## 4. DESIGN DESCRIPTION

### 4.1 Modules

#### Module 1

##### Hardware Module

Wrist band with ADXL345 Accelerometer, MAX86141 Pulse oximeter sensor and ESP32 microcontroller with BLE Bluetooth and HC - 05. Android smart phone. Mind wave headset used to catch EEG information of the patients. Headset moves the information to the wrist band utilizing HC - 05 Bluetooth. Gadget comprises of Adjustable Headband,

Ear clip and a sensor arm Wrist band is utilizing to catch beat rate and increasing speed of patient. Wrist band comprises of ADXL 345 Accelerometer, MAX 86141 Pulse oximeter sensor and ESP32 microcontroller with BLE Bluetooth and HC-05Wristband move information to PDA utilizing BLE Bluetooth. MAX 86141 Pulse oximeter is intended to catch beat rate from the wrist. It has a very much upgraded engineering for intelligent and transmissive oxygen immersion or pulse monitoring. Operations on 1.8V primary stock voltage and 3.1 5.5V inventory to drive LED .Designed with low dim flow commotion, of 50pA RMS and high goal with 19-cycle accuse incorporated ADC , of 3-low clamour , 8 bit LED flow DAC , dynamic reach more prominent than 90dB and ultra - low-poweroperations.ADXL345 Accelerometer is a little ,slender , lower power , 3-pivot accelerometer with high goal (13 - bit) estimation from - 16 to +16.It measures quickening of a movement or shock.ESP32 is a progression of ease , low-power framework on a chip microcontrollers with coordinated Wi-Fi and double mode Bluetooth.ESP32 not simply underpins the most recent BLE Bluetooth . It additionally bolsters exemplary Bluetooth. HC-05 is an illustration of exemplary Bluetooth. We can utilize Arduino IDE as improvement platform. Esp32 is multiple times quicker than arduino and inner SRAM permits max throttle information move.

## Module 2

### Connection Module

Correspondence interface utilized in Bluetooth and APP, which is generally embraced conventions in Bluetooth Point-to-Point Protocol (PPP), Wireless Application Protocol (WAP). In advanced mobile phone, open Bluetooth terminal application and interface with coordinated device HC-05. It is direct to pass on, we essentially need to type in the Bluetooth terminal utilization of PDA. Characters will get sent distantly to Bluetooth module HC-05. HC-05 will thusly convey it consecutively to the PC, which will appear on terminal. Same way we can send information from PC to smartphone Search for new Bluetooth gadget from your telephone. You will discover Bluetooth gadget with HC-05 name. Snap on interface/pair device elective; default pin for HC-05 is 1234 or 0000. In the wake of coordinating two Bluetooth. devices, open terminal programming (for instance Teraterm,Realterm etc) in PC, and select the port where we have related USB to consecutive module. Also select default baud pace of 9600 bps.

## Module 3

### Login Module

The Login Module is a bunch of accreditations used to confirm a user. These comprise of a username and secret key. logins make client accounts conceivable. In this framework which require a special user names, which guarantees each client's login is unique. On a further developed level, login give a security layer among unsteady and secure development. When a client signs [11] in to application, for instance, all information moves are commonly encoded. This keeps different frameworks from review or recording the information moved from this worker. Login are a safety effort intended to forestall unapproved admittance to private information.

## Module 4

### Database Module

During enrolment period framework store the mail id of the patient, password, patient's versatile number, and parental figure's portable number. Login id of the framework is mail id and client can set a secret phrase (must contains numerical, Alphabets and images and in excess of 6 digits) to make sure about the application. Framework needs to make four information base table utilizing mysql to store the information[7]. An information base is a gadget for social event and assembling information. The purpose behind a data base structure is to conquered any hindrance among information and data - the data set aside in memory or on plate should be changed over to usable information. The data ends up being hard to appreciate in summary structure, in addition, there are confined techniques for looking or pulling subsets of data out for review. During enlistment period framework store the mail id of the patient, secret phrase, patient's portable number, and guardian's versatile number. Login id of the framework is mail id and client can set a secret phrase (must contains numerical, Alphabets and images and in excess of 6 digits) to make sure about the application. Framework needs to make four information base table utilizing mysql to store the data.

## Module 5

### Function Module

Function modules are sub-programs that contain a bunch of reusable assertions with bringing in furthermore, trading boundaries. Here function modules are displayed on screen while login to the system, the displayed content include Pulse, EEG, Accelerometer. These can view by the user and while it is not in normal condition a alert message is gone to the caregiver so the SVM [12][15] technology also a function.so here the function module tell the user is epilepsy patient or not. This can be normally understandable by a use-case diagram. shows the relationship between hardware, patient and care taker.

## Module 6

### Permission Module

User permissions specify what tasks users can perform and what features users can access. System permissions control a user's ability to perform tasks that apply to all apps—such as “Modify

All Data”—or tasks that don't apply to any apps—such as “API Only User. Here some protocols are used to set the communication interface between App and Bluetooth, App and Text message service, app and GPS service. In Bluetooth



interface Point-to-Point Protocol (PPP), Wireless Application Protocol (WAP) is forged. Also, for GPS Tracker which sends the GPRMC string of the NMEA 0183 protocol, at fixed periodicity, to a predefined number as SMS. For software which can port these incoming SMS to a COM port to plot them dynamically to Google Earth or a custom GIS application, and use the name of the sending GPS as a label on the map. The software should be prepared to do all the while following numerous GPS trackers at the same time. and one more communicative interface is between App and text message service is the SMPP protocol, which is the "true SMS" protocol and is developed by the telecommunications industry specifically for transmitting SMS messages. "SMPP" stands for short message peer-to-peer protocol and is the convention utilized at whatever point an instant message is sent from a cell phone to another cell phone.

## 5. CONCLUSION AND FUTURE SCOPE

Epilepsy is a neurological disorder caused due to abnormal discharges in the brain. It varies from one person to one. The recurrence of epileptic seizures that affect secondary physiological changes in the patient. This leads to a series of adverse events in the manifestation of convulsions in an uncontrolled environment. The prediction of the epilepsy can be easily done with machine learning [9] experiments [10]. Most of the medication is not a perfect treatment for epilepsy any how it is temporary. These leads to intend further integrate and miniaturize the wearable system. The framework proposed in this system can identify specific seizure movement, namely generalized tonic seizures, in patients with epilepsy. This work zeroed in on two important regions: (1) the plan of a long agreeable gadget and (2) the implementation of a SVM algorithm framework for identification seizure assaults. By utilizing this gadget, Checking of Epilepsy patient will be done across all day, every day. Any anomalies will send the alarm messages to the Specialist. Epilepsy is affirmed by the 4-principle boundary, that is, EEG (Mind waves head set), Pulse (max86141 pulse oximeter), Circulatory strain and Fall identification(accelerometer) to have better exactness. further examinations require working with epileptic patients all together to improve the unwavering quality and exactness of the proposed seizure recognition algorithm. However, the restricted outcomes introduced here demonstrate that the calculation [9] offers promising identification results. As indicated by system outcomes can expand its utilization with a Li-Po battery or with a AAA battery with more capacity. What's more, planning is to proposed approach of a cloud-based system to record seizure information of different patients with epilepsy is by all accounts reasonable and efficient.

Next subsequent stage is to perform tests in epileptic patients and incorporate more frequency[16] features that may improve the presentation and precision of the seizure detection algorithm. Likewise, we mean to additionally coordinate and scale down the wearable system and more applicable to the machine learning [9] environment. Moreover, intending to build up an administration framework in which specialists can visualise seizure information from patients to Likewise, proposed system approach of a cloud-based system to record seizure information of different patients with epilepsy is by all accounts handy and efficient. This work can be very attractive when implemented on an embedded device for monitoring Epileptic patients and this system is mainly focused on patient who leads a solitary life.

## REFERENCES

1. <https://www.empatica.com/en-eu/embrace2/>
2. <http://www.epdetect.com/>
3. Vandecasteele K, De Cooman T, Gu Y, Cleeren E, Claes K, Paesschen WV, Huffel SV, Hunyadi B. 2017 Oct 13. "Automated Epileptic Seizure Detection Based on Wearable ECG and PPG in a Hospital Environment. *Sensors (Basel)*." 13;17(10):2338. doi: 10.3390/s17102338.
4. Poh MZ, Loddenkemper T, Reinsberger C, Swenson NC,
5. Goyal S, Sabtala MC, Madsen JR, Picard RW. 2012
6. May;53(5):e93-7. doi: 10.1111/j.1528-1167.2012.03444.x. Epub 2012 Mar 20. PMID: 22432935." Convulsive seizure detection using a wrist-worn electrodermal activity and accelerometry biosensor. *Epilepsiadoi*: 10.1111/j.1528-1167.2012.03444.x. Epub 2012 Mar 20. PMID: 22432935.
7. Klapuri, Jussa-Helsinginyliopisto, Matemaattisluonnontieteellinen tiedekunta, Matematiikan ja tilastotieteen laitos(2013)."Epileptic Seizure Detection Using a Wrist-Worn Triaxial Accelerometer". <http://hdl.handle.net/10138/42219>.
8. <https://store.neurosky.com/pages/mindwave>
9. Mathai, P. P., Balan, R. S., & Babu, I (2017). An efficient approach for item set mining using both utility and frequency based methods. *International Journal of Applied Engineering Research*, 12(12), 3470-3473.
10. Mathai, Paul P. and R. V. Siva Balan, Optimizing The Achieved Frequent Item Sets Using Genetic Algorithm, *International Journal of Applied Engineering Research*, Volume 10, Number 6, pp. 13855-13862, 2015
11. Ierin Babu, R V Siva Balan and Mathai, Paul P., Machine Learning Approaches Used For Prediction In Diverse Fields, *International Journal of Recent Technology and Engineering (IJRTE)*, Volume 8, Issue 2S4, pp. 762-768, July 2019
12. Babu, I., Balan, R. S., & Mathai, P. P. (2019, October). Envisaging the Academic Performance of Students. In 2019 International Conference on Computing, Communication, and Intelligent Systems (ICCCIS) (pp. 90-94). IEEE.

13. Mathai, S., Mathai, P. P., & Divya, K. A (2015, December). Automatic 2D to 3D video and image conversion based on global depth map. In 2015 IEEE International Conference on Computational Intelligence and Computing Research (ICCCIR) (pp. 1-4). IEEE
14. Abidha, T. E., & Mathai, P. P. (2013). Reducing false alarms in vision based fire detection with nb classifier in eadf framework. International Journal of Scientific and Research Publications, 3(8), 50.
15. Abidha, T. E., Mathai, P. P., & Divya, M (2013). Vision Based Wildfire Detection Using Bayesian Decision Fusion Framework. International Journal of Advanced Research in Computer and Communication Engineering, 2(12), 4603-4609.
16. Johny, C. P., & Mathai, P. P. (2017). Customer Churn Prediction: A Survey. International Journal of Advanced Research in Computer Science, 8(5).
17. Michael, D., Mathai, P. P., & Abhidha t, E (2014). Automatic vehicle detection and tracking in aerial surveillances using SVM. International Journal of Computer Applications, 85(9).
18. Mathai, P. P., & Balan, R. V. (2016). An Efficient Data Mining Algorithm Based on Item Sets Frequency and Priority Using Distribution Model. Journal of Computational and Theoretical Nanoscience, 13(11), 8392-8399.