A Sagacious System To Assist Inept Human

N Mohammed Abu Basim

Abstract

Natural disasters like tsunami, earthquakes, cyclones and now a very recent Chelyabinsk meteor in Russia, which cause major fiasco in almost all the major parts of the earth which results in loss of life and property and drastic economic crisis. These are uncontrolled; no one is here to take the responsibility. An extended scenario of all the above disasters, are happening in all over the world, especially in India. A silent tsunami is continued to happen on Indian roads. For this tsunami, human has to take the responsibility in the form of man or any country's government. It has been reported that nearly 60-70% of the accidents are due to manmade faults and more than 40% contributes by drunk and driving. It's a common phenomenon in our country. Even though all the governments set some standards and stringent laws to control this, but there is no one to follow. The main reason behind this is the loop holes in the Indian constitution system and psychology of the human. Alan Kay said "*Those who concern more about their softwares must create their own hardware"*. My concern is to protect the human life which is considered as the most divine creation in this earth. On considering this, I've designed the model and proposing it to implement in all the vehicles. Finally after implementing a car can challenge the human *"Start me, if u can"*. The proposed model continues monitors the Electroencephalogram (EEG) of a person who drives the car and sends the signal to the intelligent system which is embedded inside the vehicle, which takes the decision either to start or to stop it.

Keywords; Fiascoes, Road accidents, Electroencephalogram, Manmade faults, Drunk and Driving

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Introduction

Road crashes deserve to be a strategic issue for any country's public health and can lead to overall growth crisis, if not addressed properly. Road traffic injuries are the leading cause of death globally among 15-19 years old, while for those in the 10-14 years and 20-24 years age brackets they are the second leading cause of death [1]. The projected 40% increase in global deaths resulting from injury between 2002 and 2030 is predominantly due to the increasing no of deaths from road traffic accidents [2].

India already accounts for about 9.5% of the total 1.2 million fatal accidents in the world. In 2009, 1.27 lakhs people in India lost their lives in road mishaps [3] .The month wise distribution of road accidents has also shown more accidents during May (38,928) and June (36,234) sharing 9.2% and 8.6% respectively. Tamilnadu and Maharashtra which accounted for the maximum (14.4%) and (11.6%) of the road accidents in the country have also reported the maximum no of "road accidents" during each month of the year at national level. Delhi, the capital city has reported the maximum no of road accidents, which is 1.8% at the national level. Nearly 16.3% of the road accidents were reported during 3-6 pm, 15.2% during 9am-12 noon and 6.9% during 12am-3am in the night [4]. The cause wise no of persons killed in road accidents indicates that almost three-fourths of the accidents were due to the driver's fault during the period in 2004 for the reporting states [5].

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No of persons killed in road accidents in India (Cause wise) [5]

Causes	2002	2003	2004
Driver's fault	62830	58961	69631
Cyclist's fault	1361	1193	979
Pedestrian's fault	1875	1451	1363
Mechanical defect	1909	1967	2015
Bad roads	936	1224	1506
Other causes	15763	21202	17124
Total	**84755**	**85998**	**92618**

Table 1

Present scenario of road accidents

It is reported that 80%of the road accidents are caused by the human error. The unfortunate victims are predominantly male, within the age group of 5-44 years. World Health Organization (WHO) in the Global Status Report on road safety has pointed out that speeding and drunken driving are the major contributing factors of road accidents. The statistics also shows that mostly young people between the ages of 18-35 more often indulge in drunken driving. According to National Crime Records Bureau (NCRB), the total no of deaths due to road accidents in India every year is now over 1, 35,000. NCRB report also states drunken driving is the major factor for road accidents.

A study report under the title " High spirit takes toll on Bangalore roads ". Bangalore, which is considered as the "pub city of India" reveals the driving under the influence of alcohol is common

among Bangalore residents on Saturdays and Sundays leading to accidents, death. The pub capital of India also reports the highest no of road accident death on week and between 6pm-10pm and there is a little reason to believe that this could be for any reason other than drunken driving, says the city police. 579 road accidents death in 1993, 106 were on Saturday nights and an average of 60-90 deaths were reported on other days of the week.

In 1994, there were 91 deaths on Sundays, 89 on Saturdays and an average of 70-80 on weekdays. The most difficult factor to determine whether an accident was because of drinking and driving. The drivers invariably abscond, only to be found later when the effect of alcohol would have safely worn off. The people at the accident spot concentrate on getting the injured to the hospital rather than nabbing the driver responsible and if they do find the driver, he would be beaten. Besides, the swank pubs which are the toast of the city, smaller bars have sprung up along the highways causing accidents to rise on these already dangerous roads.

Stringent laws on drunk and drive

Though the laws to check drinking and driving do exist in India (it exist since our independence), there is a need to effectively implement the law. The motor vehicle act, 1939 amended in 1989 contains clause117 which reads as: driving by a drunken person or by a person under the influence of drugs- whoever while driving or attempting to drive a motor vehicle or riding or attempting to ride, a motor cycle.

I has in his blood, alcohol in any quantity, howsoever small the quantity may be or

ii Is under the influence of a drug to such an extent as to be incapable of exercising proper control over the vehicle shall be punishable for the first offence with imprisonment for a term which may extend to 2000 rupees or both; and for a second or subsequent offence if committed within three years of the commission of the previous similar offences, with imprisonment for a term which may extend to 3000 rupees or with both. These laws, if implemented also won't be so effective because, the psychology of drunken drivers is such that they get away by bribing the police.

IAPA's Role

Keeping in view the above factual situation **Industrial Accident Prevention Association (IAPA)** plans to launch, a "Campaign against Drinking and Driving" with the aim of putting science in to action with the following objectives.

- To undertake experimental studies on drinking and driving for correct assessment of traffic safety situation on Indian roads
- Blood alcohol screening should be routinely performed
- Major publicity campaigns will need to be mounted to inform drivers on drinking and driving, the harm that results from drinking and driving and the penalties.
- A monitoring system, with agreed and common measurement and reporting procedures across India should be put in place with Blood Alcohol Content (BAC) to be zero, if possible otherwise not more than 0.02%
- Road side liquor shops, bars should be shifted minimizing their use by drivers
- Strict enforcement on Motor Vehicle Act on drink driving
- Developing the high taxation policies for alcohol beverages which reduces the buying power of the drivers.

Literature Review

At present, government of India has implemented the use of breath analyzers- a device for estimating Blood Alcohol Content (BAC) from the breath sample. Before many years, there are many methods to detect the person who had drunken. The breath of a person is collected in a football bladder and tested this air for the traces of alcohol, discovered that the alcohol content of 2 liters of expired air was a little greater than that of 1cc of urine [6]. In 1927, a Chicago scientist designed a device named as "Breathalyzer" in which the breath moving through the chemicals in water would change in color. The main use of this invention was for housewives to test whether their husbands had been drinking before letting them in the house [7].

The first practical roadside breath testing device intended for use by the police was a "Drunkometer", which was developed in 1938 [8]. It collects the motorist's breath sample directly in to a balloon inside the machine. The breath sample was then pumped through an acidified potassium permanganate solution. If there was alcohol in the breath sample, the solution changes its color. The greater the color change, the more alcohol there was present in the breath [8]. In 1954, another version of breathalyzer was invented which uses chemical oxidation and photometry to determine alcohol concentration. Subsequent breath analyzers have converted primarily to infrared spectroscopy. The invention of breath analyzer provided law enforcement with a non invasive test providing immediate results to determine an individual's breathe alcohol concentration at the time of testing.

Failure of breath analyzer

The blood alcohol concentration test result itself can vary between individuals consuming identical amounts of alcohol due to gender, weight and genetic pre disposition. Breath testers can be very sensitive to temperature, for example and will give false readings if not calibrated periodically to account for ambient or surrounding air, temperature. The temperature of the subject is also very important. Some breath analysis machines assume a hematocrit (cell volume of blood) of 47%. However henatocrit values ranges from 42-52% in men and from 37-47% in women. It has been theorized that a person with a lower hematocrit will have a falsely high BAC reading. Research reveals that breath test

can vary at least 15% from acute blood alcohol concentration. Police in Victoria, Australia use breath analyzers that give a recognized 20% tolerance on readings. Former Victoria police assistant commissioner (traffic and transport) , claims that this tolerance is to allow for different body types [9].

Many handheld breath analyzers sold to consumers' uses silicon oxide sensors also called as a semiconductor sensor to determine the blood alcohol concentration. These sensors are far more prone to contamination and interference from substances other than breath alcohol. The sensors should be calibrated or replaced periodically mainly for every six months. The machines not only identifies the Ethyl Alcohol or Ethanol found in alcoholic beverages, but also other substances similar in molecular structure or reactivity. Some natural and volatile interfering compounds do exist. National highway traffic safety administration has found that dieters and diabetics may have acetone levels hundreds or thousands times higher than others. Acetone is one of the many substances that can be falsely identified as ethyl alcohol by some breath machines. Substances in the environment can also leads to false BAC readings. Methyl Tert-Butyl Ether (MTBE), a common gasoline additive has been alleged anecdotally to cause false positive in persons exposed to it. Test has shown this to be true for older machines. Anyway no machines detect this interference and compensate for it [10].

One of the most common causes of falsely high breath analyzer readings is the existence of mouth alcohol. In analyzing the subject's breath sample, the breath analyzer's internal computer is making the assumption that the alcohol in the breath sample came from alveolar air i.e., air exhaled from deep within the lungs. However, the alcohol may have come from the mouth, throat or stomach for a number of reasons.

Requirement of imperative planning for road accident relief

Road crashes deserves to be a strategic issue for any country's public health and can lead to overall growth crisis, if not addressed properly. Thus there is an immediate need to recognize the worsening road safety situation in order to take appropriate action. Road traffic injury prevention and mitigation should be given the same attention and scale of resources that are currently being channeled towards other predominant health issues, if increasing human loss and injury on the roads, with their devastating human impact and large economic cost to society have to be avoided. None of the government hasn't organized any particular program to combat morbidity and mortality on Indian roads, while there are structured programs to combat communicable diseases, with substantive allocation of plan funds. The following table 2 indicates the no of fatalities reported from a few selected communicable diseases and plan allocation for combating these diseases as compared to the allocation of road safety [11].

Diseases	No of deaths	Centrally sponsored schemes	Outlay Xth plan (2002-2007) Crores
Tuberculosis	37,639 (2004)	National TB Control Programme	680
Malaria	638 (2005)	National Vector Borne Disease Control Programme	1370
AIDS	1094	National AIDS Control Programme including blood safety measures and national STD Control Programme	270
Road Crashes	92618 (2004)	----------	187

Table 2

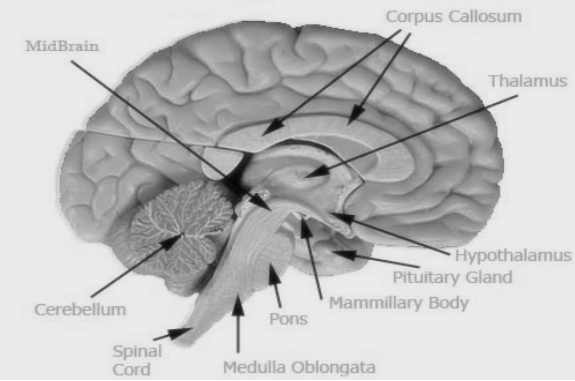
Human Brain

Our brains are filled with neurons, a human's mechanical, spectral, thermal, and chemical and energy input are made to the many thousands of nerve endings called "dendrite nerve", which are attached to the "soma" and are outputted through axon to axon terminals. The theory is that the group of biological neurons interacts and through a process, not exactly understood, but theorizes learns. This learning is in some way stored within the last bundle of nerves. The neurons consists of several distinct portions , the dendrite tree consisting of a system of branching dendrites from many synopses , the body of neurons , the soma and axon system. Energy or information arrives at one or more dendrite input and during the transition through the neuron, the amount of energy is modified by excitation or inhibitory post synaptic potentials.

Anatomy of Human Brain

From the anatomical point of view, the brain can be divided in to 3 sections: **Cerebrum, Cerebellum and Brain stem.** The

cerebrum consists of left and right hemisphere with highly convoluted surface layer called "Cerebral Cortex", which is a dominant part of the central nervous system. The cerebrum obtains the centers for movement initiation, conscious awareness of sensation, complex analysis and expression of emotions and behavior. The cerebellum coordinates voluntary movements of muscles and balance maintaining. The brain stem controls respiration, heart regulation, bio rhythms, neuron hormone and hormone secretion etc [12],



Fig;1

What happens inside our brain?

Every time we think, move, feel or remember something, our neurons are at work. This work is carried out by small electrical signals that zip from neuron to neuron as fast as 250mph.The signals are generated by differences in elastic potentials carried by ions on the membrane of each neuron. Although the paths, the signals taken are insulated by something called "myelin", some of the electric signals escapes. Scientists can detect these signals, interpret what they mean and use them to direct a device of some kind.

This challenge is rectified with the help of a device named as "Electroencephalogram" (EEG) which is a medical imaging technique that reads scalp's electrical activity generated by brain structures. The EEG is defined as an electrical activity of an alternating type recorded from the scalp surface after being picked up by metal electrodes and conductive media [13]. The EEG reading is completely non invasive procedure that can be applied repeatedly to patients, normal adults and children with virtually no risk. Only large populations of active neurons can generate electrical activity recorded on head surface. Between electrodes and neuronal layers current penetrates through skin, skull and several other layers. Weak electrical signals are detected by the scalp electrodes are mainly amplified and the displayed on paper or stored to computer memory [14]

Brainwave classification

There are five different waves

Name of waves	Frequency
alpha	8-13 Hz
beta	13-30 Hz
gamma	30-100+ Hz
delta	Up to 4 Hz
mu	8-13 Hz

Table 3

Among all the waves, alcohol has been shown to decreases the slow wave sleep and delta power, while increasing stage 1 and Rapid Eye Movement (REM) incidence in both men and women. In long term alcohol abuse, the influence of alcohol on sleep architecture and reductions in delta activity has been shown to persist even after the long periods of abstinence [15]. Other disorders frequently associated with disrupted delta wave activity includes [16]

- Depression
- Anxiety
- Attention Deficit Disorder(ADD)

To find whether alcohol consumption can be detected with the help of EEG, this can be done by the Power Spectral Density Analysis (PSDA) for finding out the power of the signal over a particular frequency band [17]. The literature survey reveals that the power of EEG signals in the frontal region decreases with the increase in the amount of alcohol intake and the power of the EEG signal in the central, occipital region increases. This indicates that wave stimulation of alcohol has a strong influence on central region, so people will become excited after drinking [18] [19] [20].

- Theta wave begins to appear and gradually enhances after consuming alcohol as the subjects are driven in to the state of sleepy and the central nervous system of the subjects is inhibited [21] [22]
- Alpha wave gradually decreases and the region of alpha wave is expanded after consuming alcohol [21] [23]
- The cerebral cortex remains in an excitable condition after consuming alcohol, which leads to beta waves gradually enhanced and the area of beta waves are expanded [20] [24].

Why we've to use EEG?

When compared to EEG, obviously there are many advanced imaging techniques to diagnose human body. The group of electro biological measurements comprises items as Electrocardiography (ECG), Electromyography (EMG), Computer Tomography (CT), Magnetic Resonance Imaging (MRI), Functional MRI (fMRI), Positron Emission Tomography (PET) and Single Photon Emission Computer Tomography (SPECT) [25]

Modality	Energy

MRI	Radio Frequency
fMRI	Radio Frequency
SPECT	Gamma rays
PET	Radioisotope
CT	X Ray
EEG	Electric current
MEG	Magnetic dipole

Table 4

Advantages of EEG

The greatest advantage of EEG is speed. Complex patterns of neural activity can be recorded occurring within the fractions of a second after a stimulus has been administered. EEG provides less spatial resolutions compared to MRI and PET. Therefore for better allocation within the brain EEG images are often combined with MRI scans. EEG can determine the relative strengths and positions of electrical activity in different brain regions [25]; since it is non invasive and painless it is being widely used to study the brain organization of cognitive process such as Perception, Memory, Attention, Language and Emotion in normal adults and children

Proposed design of the sagacious system

On considering the above factors, it is better to design the system which completely eliminates all the drawbacks of the present scenario. Therefore this system is designed with more sophistication and bit complicated. It consists of 2 main divisions

- Firstly, system to start the vehicle
- Secondly, system which continuously monitors the entire movement of the vehicle throughout the driving sessions.

These systems are not separate; they are designed and programmed separately but embedded inside the sagacious system.

Part I: TO START THE VEHICLE

Proposed Block Diagram

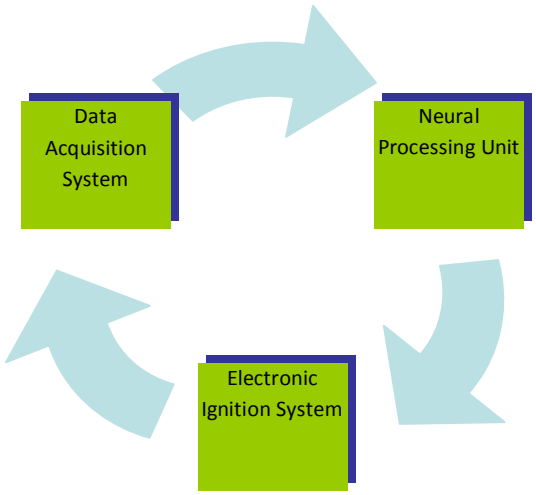


Fig 2

Data Acquisition System

Our communications with machines are always very limited to our consciousness or direct forms such as: programming robots, turning on switch, starting CNC machines, in order to activate these we've to give certain commands. Therefore to introduce human interactions to human computer interactions so that computer can understand not only what they are programmed, but also they can act according to our facial expressions, thoughts. This is called as *"Humanizing Technology"*

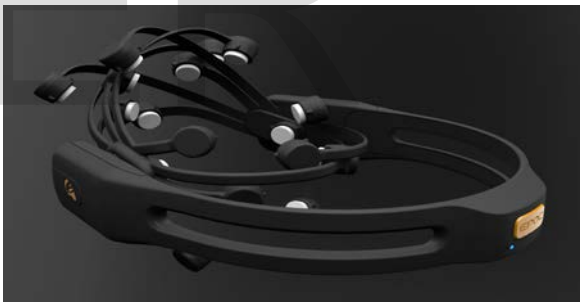


Fig 3

Fig 4

By interpreting the signals produced by the brain is not an easy task, because our brain is made up of billions of active neurons of 170,000 km of combined axon length. When these neurons interacts chemical reactions ignites the electrical impulses which can be measured. The majority of the functional brain is distributed over the outer surface layer of the brain, which is

highly folded. This folding is a significant challenge to interpret the signals which is nothing but electrical impulses. Each individual cortex is folded differently exactly like our finger prints. Physical locations of the signals are different, even for monozygotic twins, therefore no consistency in surface signals. The tedious task is to create an algorithm and to unfold the cortex, map the signals closer to the source and then make it to work across mass population. Researchers are working towards this pursuit and finally they devised the most sophisticated wireless EEG headset. Once the person enters the car, he/she is alleged to wear this EEG headset

Specification of EEG headset [26]

Number of channels	14 (plus CMS/DRL references)
Channel names (Int. 10-20 locations)	AF3, AF4, F3, F4, F7, F8, FC5, FC6, P7, P8, T7, T8, O1, O2
Sampling method	Sequential sampling, Single ADC
Sampling rate	~128Hz (2048Hz internal)
Resolution	16 bits (14 bits effective) 1 LSB = 1.95µV
Bandwidth	0.2 - 45Hz, digital notch filters at 40Hz and 60Hz
Dynamic range (input referred)	256mVpp
Coupling mode	AC coupled
Connectivity	Proprietary wireless, 2.4GHz band
Battery type	Li-poly
Battery life (typical)	12 hrs
Impedence measurement	Contact quality using patented system

The EEG headset mentioned above is a high fidelity, 14 channel portable EEG system mainly designed for practical research applications. This headset is completely inbuilt in the vehicle and is provided by the vehicle's manufacturer. It requires certain time to detect the brain waves; here if a person if a person is intoxicated it takes nearly 15-20 minutes to process the alcohol from the lungs to the brain. After it completes, the brain waves acquired from the driver can directly fed to the neural processor, since the headset is Bluetooth enabled.

Most of the headset uses Electroencephalogram, but certain device uses the combination of EEG and EMG (signals from the muscle). This type of headset is more advanced than the former one.

Neural Processing Unit (NPU)

Fig 5

The neural processor which we use here is an Application Specific Integrated Circuit (ASIC) is a customized IC only for specific use, not for general purpose because it has to process the neural signals to classify, characterizes and identifies them. There is a need to analyze the operations of neural process of several neurons which have been collected by EEG and it has to process them simultaneously. Therefore the neural processor what we are using must be the most sophisticated system to carry out the applications [27].

The neural processor used here is the heart of the Neural Processing Unit (NPU) which is used to process the brain waves which is capable of recording single unit activity on up to 64 simultaneous channels from areas such as motor cortex. The system is powered and controlled over an inductive bidirectional wireless link and also transmit the processed neural activity to the outside world. The sensed signals are transferred to a hermetically-sealed electronics package over ribbon cables. The signal conditioning front end consists of four 16 channel amplifier chips with a gain of 60dB and a bandwidth from typically less than 100 Hz-10 KHz. Measured input – referred noise of the amplifiers for the frequency band of 10 Hz-10 KHz is 8 Vrms. A Bidirectional Telemetry Module (BTM) interfaces with the outside world i.e., application. It retrieves the clock and data carried by RF signal received through the forward telemetry link and uses energy received through the same link to generate regulate power for the EEG. There is also an application specific controller on BTM, which receives checks and interprets the incoming data packets. The control and timing signals required for the system are generated by controller in response to commands conveyed by data packets [27].

The NPU is designed to support the 3 operational modes:

Scan Mode, in this mode all the neural channels are searched for the occurrence of neural spikes. The address of active channels, i.e. the channels with above threshold neural activity is sorted, packed and seat to the outside world (application) through the reverse telemetry link. Here spike detection setup, i.e. selecting the spike detection method and threshold adjustment can be performed for each channel individually.

The neural processor is programmed based on the several spike detection programs. In a typical spike detector, the signal is preprocessed to accentuate spikes and attenuate noise and then passed through a threshold detector to determine spike locations [28]. Several spike detection and spike sorting algorithm rely on a simple voltage threshold with little or no preprocessing. Static detectors use either a single threshold to detect one stage [29] or a pair of threshold to detect both rising and falling spike edges [30].Adaptive thresholds contend with the changing background noise levels common to the no stationary extracellular neural signals [31].

Although, simple thresholding is attractive for the real time implementations because of its computational simplicity. It is thought to be sensitive to noise and often requires user input to set effective threshold levels [32]. Overlapping spikes further reduces the efficiency of simple threshold detectors. Another algorithm uses template matching. This method is particularly effective when the spike waveform to be detected is known, since this is rarely the case, the user must manually select spikes from a set of test data, which are then averaged to form a template [33]. Both template matching and simple thresholding performs poorly when spike signal to noise ratios are low [34]. The neural signals may also be filtered with a family of wavelets to extract details about signals energy in particular time frequency windows [35] [36] [37]. Energy based spike detectors may also been used to detect neural spikes[38]. The Nonlinear Energy Operator (NEO) estimates the square of the instantaneous product of amplitude and frequency of a sufficiently sampled signal [39]. In this regard, NEO may be considered superior to other energy estimates that simply average the square of the signals and are independent of frequency variations of NEO have also been proposed to improve detection.NEO based spike detection is attractive because of its ease of implementation and computational simplicity [40] [41].

Comparison Mode, in this mode, the spikes which are scanned is hereby compared with the previously stored data of the healthier persons. The data includes the brain waves of healthier person which are responsible for smoking, intoxication of alcohol, stress levels, autistic disorders etc. it is programmed to compare the data based on the above mentioned and store it which is transmitted to the outside world (application) based on telemetry link.

Monitor Mode, in this mode, one or two of neural channel are selected, sampled at high resolution and transmitted to the outside world. It is necessary to use more complicated system to increase the resolution for analog to digital conversions in this mode as much as possible.

After acquiring the data from the EEG headset via Bluetooth, the NPU starts processing the brain waves. It already stores the brainwaves of healthier person as mentioned above. Let these stored signals can be named as “Healthier Stored Signals” (HSS). After processing, the NPU compared the acquired signals with (HSS) based on the “Programmable Spike Detector Module”. Let the “Acquired Brain Signals” can be called as (ABS). The processor generates the voltage based on the compared and processed signals. If ABS is almost similar to HSS, which indicates that there is no abnormamilities or insignificances found, these signals are programmed to trigger the ignition switch. If ABS is not similar to HSS, which indicates that there is abnormamilities found. These signals won’t generate any voltage. Therefore, no triggering operation which results in no ignition process. As a result vehicle is not able to start.

How ignition system works?

Electronic ignition system

When the brain signals triggered the ignition switch it is turned “ON”. Therefore current flows from battery through ignition switch to the coil’s primary winding

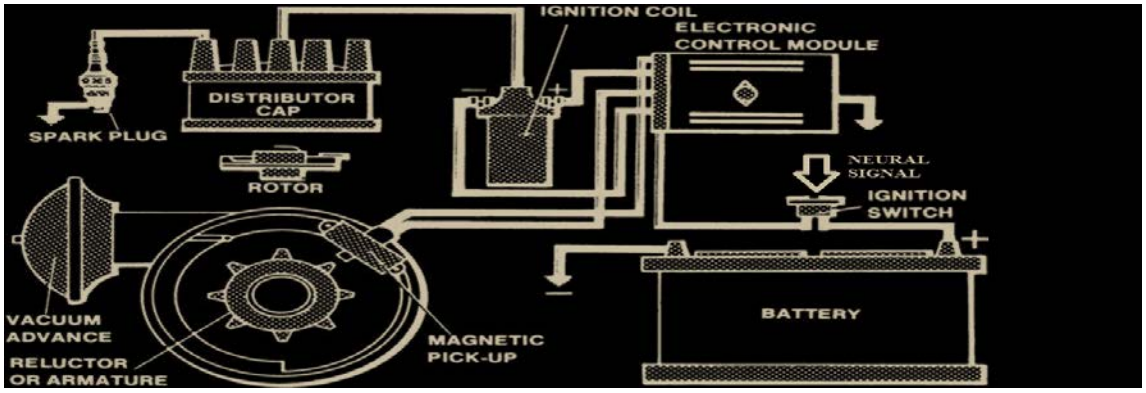


Fig 6

When armature tooth comes in contact in front of the pickup coil, a voltage signal is generated. The electronic module senses the signals produced by the pickup coil and stops the current to flow from the primary circuit. A timing circuit inside the ignition module turns “ON” the current flow again when the armature tooth rotates away from the primary coil. Due to the continuous make and break of current a magnetic field is generated in the ignition coil... This can be understood by the following diagram. From the diag. when the current passes through the coil’s primary winding creates magnetic lines of force that cut across and induce voltage in the secondary winding,

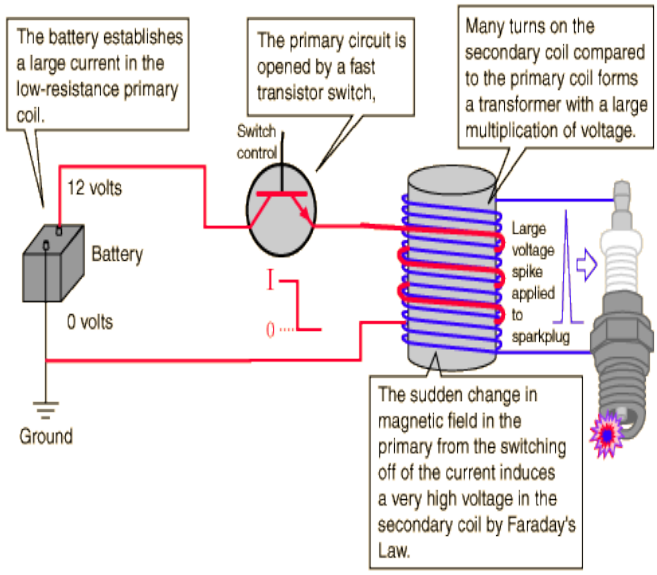


Fig 7

Causing the voltage to increase up to 50,000V. This high voltage is then transferred to the distributor. A rotor inside the distributor rotates according to the ignition timing.When rotor comes exactly in front of the distributor point, the voltage jumps due to the air-gap from rotor to the point. High voltage is then transferred from the distributor to the spark plug terminal via a high tension cable. A voltage difference is generated between the central electrode and ground electrode. The voltage continues to transfer through the central electrode which is sealed using insulator. When the voltage exceeds the dielectric strength of the gases between these electrodes, the gases are ionized. Due to the ionization, gases become a conductor and allow the current to flow through the gap and spark is finally produced

From the following circuit diagram

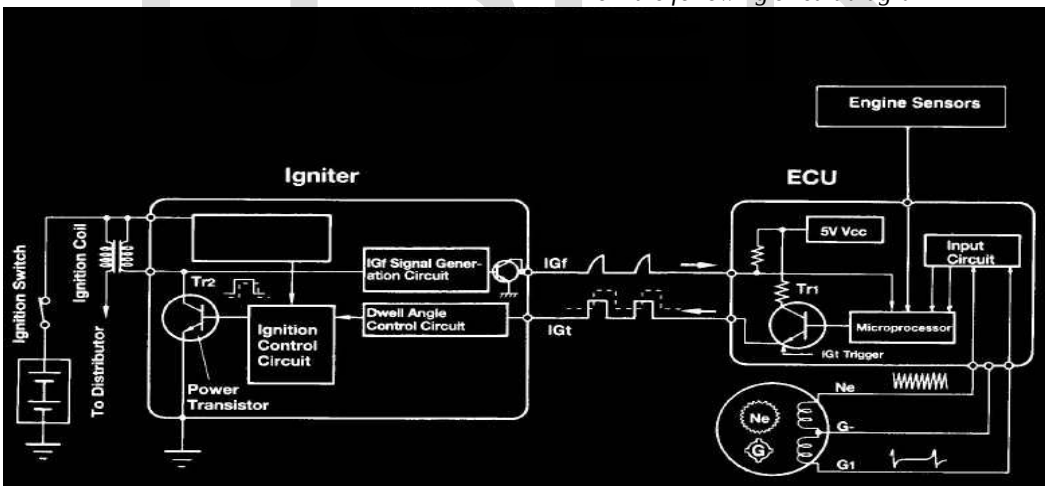


Fig 8

IGT Signal: The primary coil current flow is controlled by ECM through Ignition Timing (IGT) signal. The IGT signal is a voltage signal that turns ON/OFF the main transistor in the igniter. When the IGT signal voltage drops to "0" volt, the transistor in the igniter turns OFF When the current in the primary coil is turned OFF, thus rapidly collapsing magnetic field which induces a high voltage in the secondary coil. If the voltage is high enough to overcome the resistance in the secondary circuit, there will be a spark at the spark plug.

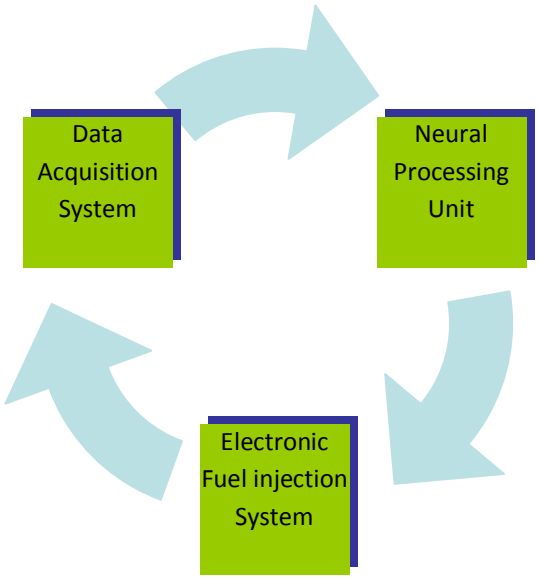
IGC Signal: On some ignition systems, the circuit that carries the primary coil current is called as IGC (Ignition Current). IGC is turned ON/OFF by the igniter based on IGT signal

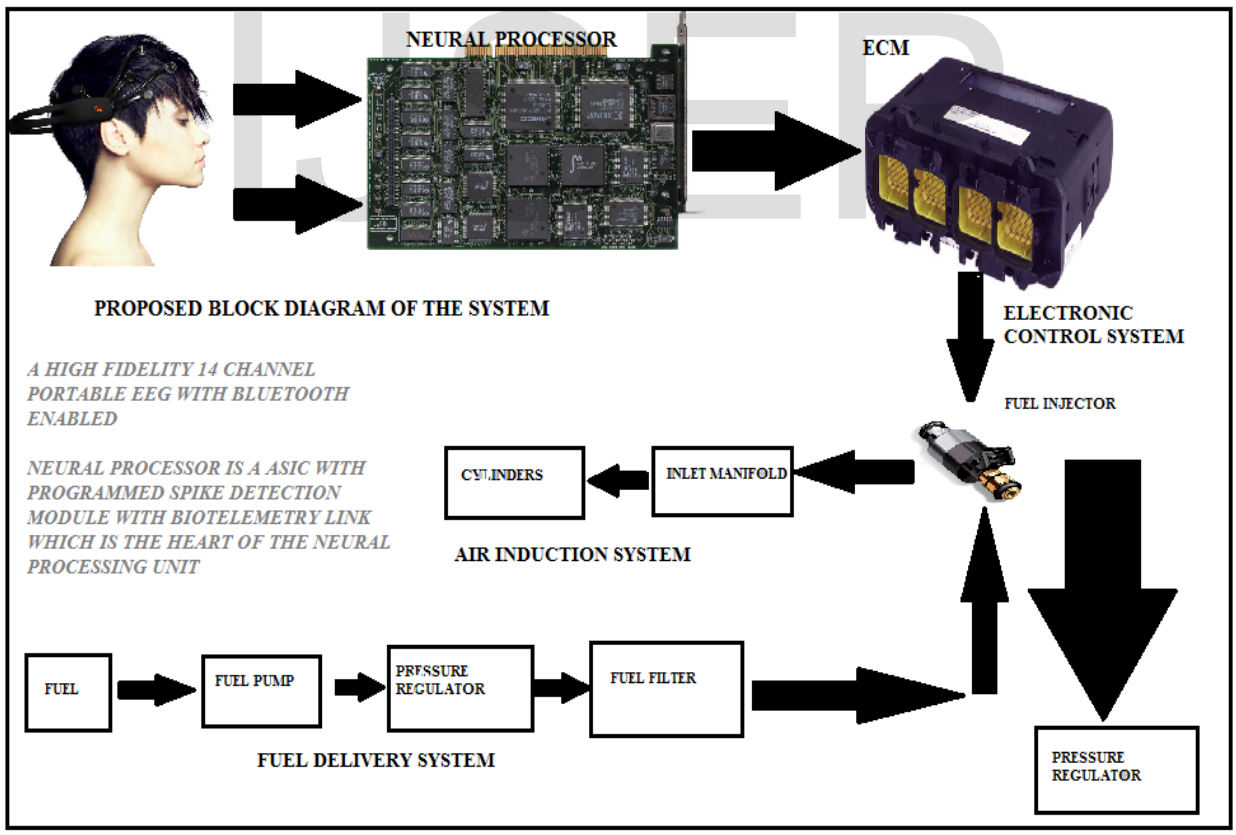
IGF Signal: The IGF signal is used by the ECM to determine if the ignition system is working. Based on IGF, the ECM will keep power supplied to the fuel pump and injectors on most ignition system. Without IGF, the vehicle starts momentarily and then stops

Part II: TO MONITOR THE VEHICLE CONTINUSLY

Proposed Block Diagram

Fig 9





Electronic Fuel Injection System

The electronic fuel injection system consists of 3 main parts, they are

- Fuel delivery system
- Air induction system
- Electronic control system

The fuel delivery system consist of fuel pump, filter, and fuel delivery pipe, fuel injector, fuel pressure regulator and fuel return pipe. Fuel is delivered from the tank to the injector by means of

an electronic fuel pump. The pump is typically located near the fuel tank. Contaminants are filtered out by a high capacity in line fuel filter. The fuel, which is maintained at constant pressure, is maintained by pressure regulator.

The air induction system consist of the air cleaner, air flow meter, throttle valve, air intake chamber, intake manifold runner and intake valve. When the throttle valve is opened, air flows through the air cleaner, air flow meter. This passes through the throttle valve and through the well turned intake manifold runner to the intake valve. The delivery of the air to the engine is a function of driver's demand. As the throttle valve is opened further, more air is allowed to enter the engine cylinders

The electronic control system consists of various sensors, ECU and fuel injector assemblies and related wiring. The ECU determines precisely how much fuel needs to be delivered by the injector by monitoring the engine sensors. The ECU turns the injectors ON for a precise amount of time, referred to as injection pulse width or injection duration, to deliver the proper A/F ratio to the engine

Most of the injectors consist of a solenoid, a needle valve and a nozzle. The solenoid is attached to the nozzle valve. The ECM controls the injector by controlling the ground circuit through the driver circuit. The signal in terms of voltage from NPU is fed to the ECM, which in turn energizes the solenoid winding that creates a magnetic field that draws the armature back and pulls the needle valve from its seat. Fuel then sprays out of the nozzle. When the solenoid is de-energized, the magnetic field gets collapsed and a helical spring forces the needle valve back to its seat, shutting off the fuel flow. Therefore the vehicle gets halt during running so that the driver should not have access to any illegal activities throughout the driving sessions.

Conclusion

Finally, based on the above speculations I'd like to conclude that this system not only prevent the accidents caused by the human due to drunk and driving, but also helps to achieve greater safety for the pedestrians. This proposed system is the first of its kind, because it utilizes the central theme named *"Humanizing Technology"*, it utilizes the concern's brainwaves which makes it entirely different. The most advanced and sophisticated than any other smart systems *(existed and existing)*. It is completely embedded inside the electronic control unit which is a part of the vehicle's management system, therefore it can't be hacked. The reason is *"Each and every brainwave is completely different exactly like our fingerprints"*. Some antisocial practices like murder, extortions etc. are still prevailing in this earth and these activities leads to certain problems directly, but some activities like drunk and driving which contributes the major losses. Humans don't have any idea about these consequences, so there is a need to implement such a sagacious system to assist these inept human. In automobile sector, this world had seen so many milestones, but still remains. It would take some time to incorporate this type of system in all the vehicles, but anyway *we've to wait and watch……*

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