

**Intelligent vehicle control for driver behaviour using wireless in transportation system**

1L Pradhan, 1D P Behera, 1J P Jena, G S Dora, 1A Mallick, 2Sailendu Behera

1Department of Electrical &amp; Electronics Engineering, GITAM, BHUBANESWAR ODISHA

2 Student of Department of Electrical &amp; Electronics Engineering GITAM, BHUBANESWAR ODISHA

**ABSTRACT**

Existing driving behavior models have a strong emphasis on the driver's cognitive components including aspects such as motivation, risk assessment, attention, compensation, capability, workload, individual traits and experience. Each existing model was designed specifically for a particular driving situation such as speeding or fatigue. This system defines a framework for a new context aware driving behavior model capable of predicting driver's behavior. This approach broadens the cognitive focus of existing driving behavior models to integrate contextual information related to the vehicle, environment, driver and the interactions between them. In this system used to consist of different types of sensors such as alcohol sensor, eye blink sensor, lane detection sensor, heart beat sensor, accident sensor. And also mainly used to GSM modem, GPS receiver, RFID reader and finger print scanner. GSM and GPS based vehicle location and tracking system will provide effective, real time vehicle location, mapping and reporting this information value and adds by improving the level of service provided. The system has an "On Board Module" which resides in the vehicle to be tracked and a "Base Station" that monitors data from the various vehicles. The On Board module consists of GPS receiver, a GSM modem. The Alcohol Sensor is used to sense weather the person driving the car taken Alcohol or not and this data is also given to ADC, The ADC is used in this system because the signal comes from the Sensors are analog in nature, so we want to convert the Analog signals into digital signal for this purpose ADC is used. Heart Beat sensor used in the system is used to sense the heart beat of the person driving the vehicle and sends the data to the embedded system, and the eye blink sensor is used to sense the person driving the vehicle is sleeping or not. Accident sensor is used to identify weather the vehicle is running in normal condition or not when the accident occurs it send the information to the embedded system. The Embedded system is programmed like when it receives the signal from the signal sensor it activates the Vehicle system control system and level converter unit. And also this system consist of RFID reader and finger print sensor is used to prevent non-licensees from driving and therefore causing accidents. And identify the person going to drive the vehicle is the owner of the vehicle or not.

**Introduction**

Driving behavior models explain and predict the behavior of drivers. Existing models are largely subjective and based on self-report scales (Ranney 1994). They strongly emphasise the driver's cognitive state and have incorporated important behavioral change concepts such as motivation, or risk assessment. However motivational models such as risk

compensation (Wilde, 1982), risk threshold (Naatanen et al., 1976) or risk avoidance (Fuller, 1984) remain highly subjective concepts. For example, risk is often associated with perceived probability of harm or negative event and its severity. The measurement of perceived risk is often focused at the probability of the risk. The probability of negative event is rarely the same for everyone and varies per

circumstances. The possible use of a baseline measures to compare risk perceptions is debatable. Understanding one's personal sensitivity to risk requires knowledge of other factors such as personal behaviors, family history, and environmental exposures that determine that probability (Weinstein, 1999). Although the driver is the main actor in the driving activity, driving is not an isolated activity. It takes place in a wider context in which the driver constantly interacts with its immediate environment and the vehicle. The observation of how drivers actually act on the road, also known as "driver behaviour" as opposed to "driver performance" (what the driver can do, e.g., perceptual and motor skills), has generated significant body of work in which traffic psychologists have played major roles (Dorn, 2003). Driver behavior and driver performance have mainly been used to analyze factors contributing to crashes. Pre crash analysis to create predictive models as well as post crashes analysis to identify contributing factors leading to crashes are the two complementary approaches used to address crash prevention. The contributing factors as broad as cognitive abilities, social context, emotion, driver's trait, experience, hazard perception skills and so on have been identified as driver's individual factors affecting driver's performance. The situation in which the driver evolves plays a crucial role in determining the type of actions. A situation is also called context in the rest of this document. Existing "cognitive" models do not take into account the dynamic nature or context in

Without the context, the validation of these models in real driving situations would be difficult. The lack of a data base model to predict drivers' behaviour is a major weakness of existing models. Heart rate is a term used to describe the frequency of the cardiac cycle. It is considered one of the

four vital signs. Usually it is calculated as the number of contractions (heart beats) of the heart in one minute and expressed as "beats per minute" (bpm). A gas detector is a device which detects the presence of various gases within an area, usually as part of a safety system. This type of equipment is used to detect a gas leak and interface with a control system so a process can be automatically shut down. A gas detector can also sound an alarm to operators in the area where the leak is occurring, giving them the opportunity to leave the area. This type of device is important because there are many gases that can be harmful to organic life, such as humans or animals.

Section II describes related work. Section III,IV,V briefly describes the Heartbeat sensor, Finger print sensor, Alcohol sensor. Section VI presents our context aware prediction framework based on Global Positioning System. Section VII shows a MATLAB software. Section VIII shows the context aware driver behavior detection system output. Finally, Section IX concludes the paper and discusses future work.

### **Related work**

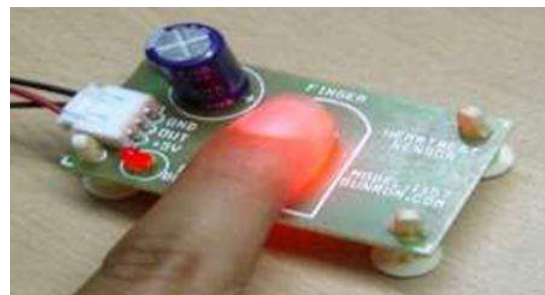
In this system embedded system plays a major role. This system consist of embedded system, alcohol sensor, eye blink sensor, lane detection sensor, heart beat sensor, ADC, signal conditioning unit, accident sensor, emergency call button, vehicle control system, vehicle, level converter, GSM modem, GPS receiver, RFID reader and finger print scanner's and GPS based vehicle location and tracking system will provide effective, real time vehicle location, mapping and reporting this information value and adds by improving the level of service provided. A GPS based vehicle tracking system will inform where your vehicle is and where it has been, how long it has been. The system uses

geographic position and time information from the Global Positioning Satellites. The system has an "On Board Module" which resides in the vehicle to be tracked and a "Base Station" that monitors data from the various vehicles. The On Board module consists of GPS receiver, a GSM modem. The Alcohol Sensor is used to sense whether the person driving the car taken Alcohol or not and this data is also given to ADC, The ADC is used in this system because the signal comes from the Sensors are analog in nature, so we want to convert the Analog signals into digital signal for this purpose ADC is used. Heart Beat sensor used in the system is used to sense the heart beat of the person driving the car and sends the data to the embedded system, and the eye blink sensor is used to sense the person driving the vehicle is sleeping or not. Accident sensor is used to identify whether the vehicle is running in normal condition or not when the accident occurs it send the information to the embedded system . The Embedded system is programmed like when it receives the signal from the signal sensor it activates the Vehicle system control system and level converter unit. Level converter is used in this circuit to convert the logic of the signal comes from the Embedded system that is acceptable by the GPS and GSM modem. GPS receiver is used to find the current location of the vehicle. All the sensor value and GPS location are given to embedded system, the embedded system will sends the data's to the particular mobile number through SMS. When the heart beat of the person is in abnormal condition or if the person driving the vehicle taken alcohol the Embedded system will activates the Vehicle control system that will slow down the Engine and park the vehicle in the near by lane the lane detection sensor will do this function. At the same time An SMS

is send to the hospital that a person needs help and it also indicates the location of vehicle so it is easy to ambulance to reach the place. And also this system consist of RFID reader and finger print sensor is used to identify the person going to drive the vehicle is the owner of the vehicle or not. And if emergency call button is pressed the Embedded system will activates the level converter and it will sends the SMS to the nearby hospital indicating the position of the vehicle.

### Heartbeat Sensor

Heart rate is a term used to describe the frequency of the cardiac cycle. It is considered one of the four vital signs. Usually it is calculated as the number of contractions (heart beats) of the heart in one minute and expressed as "beats per minute" (bpm). "Heart" for information on embryofetal heart rates. The heart beats up to 120 times per minute in childhood. When resting, the adult human heart beats at about 70 bpm (males) and 75 bpm (females), but this rate varies among people. However, the reference range is normally between 60 bpm (if less termed bradycardia) and 100 bpm (if greater, termed tachycardia). Resting heart rates can be significantly lower in athletes. The infant/neonatal rate of heartbeat is around 130-150 bpm, the toddler's about 100–130 bpm, the older child's about 90–110 bpm, and the adolescent's about 80–100 bpm.



**Fig.1 Heat Beat sensor**

**Fig.1 shows the Heart beat sensor.**

### Fingerprint Sensor

A fingerprint in its narrow sense is an impression left by the friction ridges of a human finger. In a wider use of the term, fingerprints are the traces of an impression from the friction ridges of any part of a human hand. A print from the foot can also leave an impression of friction ridges. A friction ridge is a raised portion of the epidermis on the fingers and toes (digits), the palm of the hand or the sole of the foot, consisting of one or more connected ridge units of friction ridge skin. These are sometimes known as "epidermal ridges" which are caused by the underlying interface between the dermal papillae of the dermis and the interpapillary (rete) pegs of the epidermis. These epidermal ridges serve to amplify vibrations triggered, for example, when fingertips brush across an uneven surface, better transmitting the signals to sensory nerves involved in fine texture perception. These ridges also assist in gripping rough surfaces, as well as smooth wet surfaces.



**Fig.1 Fingerprint being Scanned**

**Fig.2 Shows the Fingerprint sensor and Fingerprint being scanned.**

### Alcohol Sensor

A gas detector is a device which detects the presence of various gases within an area, usually as part of a safety system. This type of equipment is used to detect a gas leak and interface with a control system so a process can be automatically shut down. A gas detector can also sound an alarm to

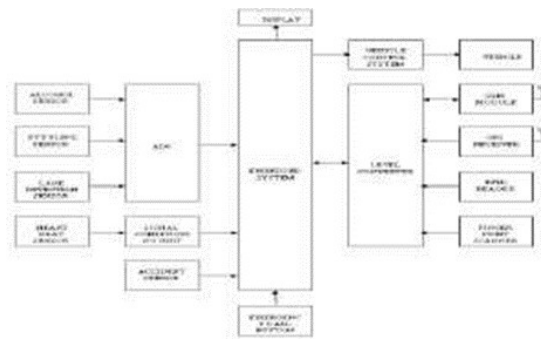
operators in the area where the leak is occurring, giving them the opportunity to leave the area. This type of device is important because there are many gases that can be harmful to organic life, such as humans or animals.

### Global Positioning System

A GPS receiver calculates its position by precisely timing the signals sent by the GPS satellites high above the Earth. Each satellite continually transmits messages containing the time the message was sent, precise orbital information, and the general system health and rough orbits of all GPS satellites (the almanac). The receiver measures the transit time of each message and computes the distance to each satellite. Geometric trilateration is used to combine these distances with the location of the satellites to determine the receiver's location. The position is displayed, perhaps with a moving map display or latitude and longitude; elevation information may be included. Many GPS units also show derived information such as direction and speed, calculated from position changes. It might seem three satellites are enough to solve for position, since space has three dimensions. However, a very small clock error multiplied by the very large speed of light the speed at which satellite signals propagate results in a large positional error. The receiver uses a fourth satellite to solve for  $x$ ,  $y$ ,  $z$ , and  $t$  which is used to correct the receiver's clock. While most GPS applications use the computed location only and effectively hide the very accurately computed time, it is used in a few specialized GPS applications such as time transfer and traffic signal timing. Although four satellites are required for normal operation, fewer apply in special cases. If one variable is already known (for example, a ship or plane may have known elevation), a receiver can determine its position using only three satellites. Some GPS receivers

may use additional clues or assumptions (such as reusing the last known altitude, dead reckoning, inertial navigation, or including information from the vehicle computer) to give a degraded position when fewer than four satellites are visible.

The below fig.3 shows the driver behaviour detection system,

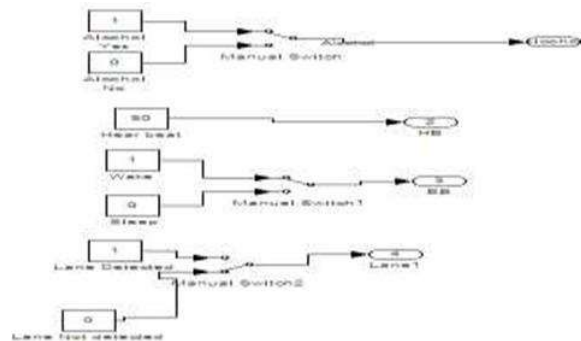


**Fig.3 Driver behaviour detection system block diagram Matlab**

MATLAB® is a high-level language and interactive environment for numerical computation, visualization, and programming. Using MATLAB, we can analyze data, develop algorithms, and create models and applications. The language, tools, and built-in math functions enable you to explore multiple approaches and reach a solution faster than with spreadsheets or traditional programming languages, such as C/C++ or Java. We can use MATLAB for a range of applications, including signal processing and communications, image and video processing, control systems, test and measurement, computational finance, and computational biology. More than a million engineers and scientists in industry and academia use MATLAB, the language of technical computing.

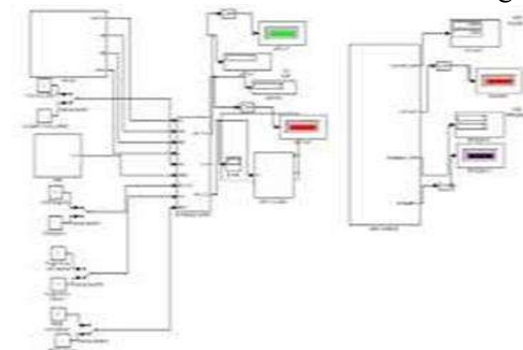
R2013b (Version 8.2) Language and Programming

- table data container for managing, sorting, and filtering mixed-type tabular data
- categorical array for ordered and unordered categorical data
- time it function for robust time estimates of function execution
- local functions function for getting handles to all local functions in a file
- Functions for writing, executing, and verifying tests using the matlab, unit test testing framework without creating custom classes 18
- matlab. mixin.Custom Display utility class to write custom display methods
- Improved viewing and editing of one-dimensional structure arrays in the Variables editor
- Simulation Output



**Fig.4 Increased heart beat level**

Fig.4 shows the increased Heart beat level. The normal Human Heart beat level is 72-85 but this system shows the 90. So the driver is in abnormal stage.



**Fig.5 Left turn the vehicle**

Fig.5 shows the heartbeat of the person is in abnormal condition or if the person driving the vehicle taken alcohol the Embedded system will activates the Vehicle control system that will slow down the Engine and park the vehicle in the nearby lane the lane detection sensor will do this function.

### Conclusion

The progress in technology about intelligent transportation is non-stop process. In this system is fully prevent accident in real time. It will be fully automatic control. It saves time as well as control this also helps to maximize profit margin in utility company working in vehicle manufacturing. This system defines a framework for a new context aware driving behavior model capable of predicting driver's behavior. This approach broadens the cognitive focus of existing driving behavior models to integrate contextual information related to the vehicle, environment, driver and the interactions between them. GSM and GPS based vehicle location and tracking system will provide effective, real time vehicle location, mapping and reporting this information value and adds by improving the level of service provided. This work mainly focus to implement the software simulation of the hardware modules using MATLAB. In future enhancement will be provided for safety and security of vehicle. It will fully avoided for vehicle theft. It will bypassing of vehicle when the collision of traffic occurring in it.

### References

- [1]. Administration N. H. T. S, (2005) "Vehicle safety communications project task 3 final report, identify intelligent vehicle safety applications enabled by dsrc," U.S. Dep. of Trans., Tech. Rep. DOT HS 809 859.
- [2] Berndt. H, J. Emmert, and K. Dietmayer, (2008) "Continuous driver intention recognition with hidden markov models," in Proc. IEEE ITSC, Beijing, China, pp. 1189–1194.
- [3]. Dai. J, J. Teng, X. Bai, Z. Shen, and D. Xuan, (2010) "Mobile phone based drunk driving detection," in Proc. IEEE PervasiveHealth NO PERMISSIONS, Munich, Germany, pp. 1–8.
- [4]. Devi. M. S and P. R. Bajaj, (2008) "Driver fatigue detection based on eye tracking," in Proc. IEEE ICETET, Nagpur, Maharashtra, pp. 649–652.
- [5]. Harris. D. H, (1980) "Visual detection of driving while intoxicated," HumanFactors: J. Hum. Fact.Ergo.Soci., vol. 22, no. 6, pp. 725–732.
- [6]. Helander. M, (2002) "Applicability of drivers' electrodermal response to the design of the traffic environment," J. appl. Psych., vol. 63, pp. 481–488.
- [7]. Imamura. T, H. Yamashita, Z. Zhang, M. R. bin Othman, and T. Miyake, (2008) "A study of classification for driver conditions using driving behaviors," in Proc. IEEE SMC, pp. 1506–1511.
- [8]. Jackson. P, C. Hilditch, A. Holmes, N. Reed, N. Merat, and L. Smith, (2012) "Fatigue and road safety: A critical analysis of recent evidence," UK Department for Transport, Tech. Rep. [9].Mitrovic. D, (2012) "Reliable method for driving events recognition," IEEE Trans. Intell. Transp. Syst., vol. 6, no. 2, pp. 198–205.
- [10]. Miyaji. M, M. Danno, and K. Oguri, (2008) "Analysis of driver behavior based on traffic incidents for driver monitor systems," in Proc. IEEE Intell. Veh.Symp., Eindhoven, Netherlands, pp. 930–935.
- [11]. Olariu. S and M. C. Weigle, (2009) Vehicular Networks: From Theory to Practice. Chapman & Hall/CRC.