

Accident Alarm Indicator and Breaking for Cars with Eye Blink Identification



¹Vinukumar Luckose, ²Feroze Jacob Benjamin, ³Umapathy Eaganathan

¹Faculty in EEE, Nilai University-Malaysia, vinukumar@niali.edu.my

²Faculty in Ford, Malaysia, ferozejacob2u@gmail.com

³Research Scholar in CS, Vels University-India, umapathy_mca2k5@yahoo.com

Abstract : The need of creating the accident alarm indicator is a high as the number of accident is high and it more safe compared to another device. The main aim of this device is to give alarm to the driver and also vibrate the seat of the vehicle at the back and also apply the break of the vehicle. The advantage of this project is to less the number of accident and also save the lives of human beings and also creating a new theory of accident detecting system in this competitive world, as new technology is going to lead the globe. The project is an fully real time work as it is mainly involved in waking up the driver due to the drowsiness of the driver. Mainly some system of accident detection system are very large, but this system is very compact and can be fixed easily in the vehicle. The main duty of this project is to wake up the driver from his sleep and keep him active by the vibration and alarm system. Also the project is concentrating on the breaking of the vehicle, to avoid hitting another vehicle which is coming at the back and front.

Key words: Micro Controller, Relay, Kneil Micro Controller, Matlab, Ansys

INTRODUCTION

The Large numbers of vehicle accidents all over the world are due to diminished driver's vigilance level. Driver's diminished vigilance create a great problem and risk in the life and other peoples life. Automobile accidents tend to be most typical when the travelling

is insufficient. These types of happen of all aspects when the car driver is sleepy or in case he could be alcohol. Car driver drowsiness is known as a key point within the automobile mishaps. It had been indicated that travelling performance dips with an increase of sleepiness with producing accidents constituting a lot more than twenty percent of most automobile mishaps [1]. However the living lost as soon as cannot be re-winded. To some extend advanced technology give we hope to reduce the accidents. Because of this, building systems which actively screens the actual driver's degree of caution and notifying the car owner of any kind of insecure traveling condition is important with regard to accident avoidance. Numerous efforts happen to be documented within the materials for building the security system with regard to reducing the amount of cars accidents because of decreased caution. The last step of detecting drowsiness in driver is by checking the driver's response. This requires regularly requesting the actual driver to deliver a reply towards the program to point alertness. The issue with this particular strategy is that it may ultimately become tedious and irritating towards the car driver. The actual propose program depending on eye closer count number and yawning count number from the car driver [2]. Through monitoring the

actual eyes as well as mouth area, it really is considered that this associated with car drivers fatigue could be recognized early sufficient to prevent an auto accident. The attention blink rate of recurrence increases past the standard price within the tired condition. Additionally, tiny sleeps which are the actual short intervals of rest lasting three or four seconds would be the great indicator from the tired condition. Therefore the actual blink recognition from the eyes is the greatest method to identify the drivers sleeping degree. This project describes a real-time online prototype driver-fatigue monitor. It uses remotely located charge-coupled-device cameras equipped with active infrared illuminators to acquire video images of the driver. Various visual cues that typically characterize the level of alertness of a person are extracted in real time and systematically combined to infer the fatigue level of the driver. The sensors and the Microcontrollers gives instant information of the eye blink rate, and makes the device works [3]. The project is mainly based on the eye blink identification of the driver and it can be counted by the demising of the eye level.

BACKGROUND STUDY

The very first method, while many precise, is not really practical, because realizing electrodes would need to become attached straight onto the actual driver's entire body, and therefore become annoying as well as distracting towards the car owner. Additionally, very long time traveling would lead to moisture within the receptors, reducing their capability to keep track of precisely [3]. The 2nd strategy is perfect for real life traveling conditions because it could be non-intrusive by utilizing did sensors associated with camcorders in order to detect modifications.

EYE BLINK DETECTION

It is vital within our trying to discover the flashing of eyes, because it is utilized to push the product and also to run occasions. Therefore blink recognition needs to be carried out, which is why we are able to get easily accessible blink sensors in marketplace or we are able to include it having a unique instruction created in picture processing which, when there is absolutely no pupil discovered for your specific amount of pre-determined we. Electronic. Period more than our eyes blinking period then think about a meeting known as "blink", which is why the actual group of procedures is going to be implemented. Right here, in this instance we have to arranged time because 1& 2nd or over this, because "blink event" differs through "normal eyes blinking". We have to carry out testing for jus blink occasion evaluation, and never to discover regular eye flashing.

TECHNIQUES FOR DETECTING DROWSY DRIVERS

Feasible processes for finding drowsiness within drivers could be usually broken into the next groups: realizing of physical features, realizing of car owner procedure, realizing of automobile reaction, checking the reaction of car driver [4]. The very first method, while many precise, is not really practical, because realizing electrodes would need to become attached straight onto the actual driver's entire body, and therefore become annoying as well as distracting towards the car owner. Additionally, very long time traveling would lead to moisture within the receptors, reducing their capability to keep track of precisely. The 2nd strategy is perfect for real life traveling conditions because it could be non-intrusive by utilizing did sensors associated with camcorders in

order to detect modifications [5]. Amongst these techniques, the actual techniques which are greatest, depending on precision would be the types depending on human being physiological tendency. This method is actually implemented within two methods: calculating within physical indicators, for example mind dunes, heart rate, as well as eye flashing; as well as measuring actual physical changes for example loose position, inclined from the driver's mind and also the open/closed says from the eye.

METHODOLOGY

RUNNING OF THE SYSTEM

The system works when the driver closes the eyes for around 3 seconds. There is an Infra-red sensor in the system, it senses the eye blink of the driver and when the eye is closed for 3 seconds, the system gives an alarm and also there is a vibrator present at the back of the seat, the vibrator vibrates and the break is also applied gradually. This is how the project works [5].

WORKING OF THE SYSTEM:

There is two transformer in the system and the first transformer is 230 V and it converts power to 12 V as all the parts in the system needs only 12V-6V. The first transformer is connected to the rectifier diode in which it converts AC current to DC current as all the components need only 12 V DC current. From this rectifier the connection goes to the two relay which connects the D.C gun and the motor. The transformer is 220 volt it converts power to 12 volt – 5 volt. It is connected to the Microcontroller, Timer circuit, buzzer and the alarm. When the system is on the circuit works and the wheel rotates as the relay circuit is closed [6]. When the driver closes his eyes for around 3 seconds, the IR sensor gives information to the timer circuit it activates the Microcontroller and the microcontroller gives information to the three

relays and the relays gets open and the wheel gets stopped, the break is applied and also the vibrator will vibrate and the alarm will be ringing. In the circuit there are capacitor, Resistance, diode and also regulator to control and purify the current flow. Capacitors and regulator are mainly fixed for adequate current flow to the components.

WORKING OF THE CIRCUIT OF THE SYSTEM:

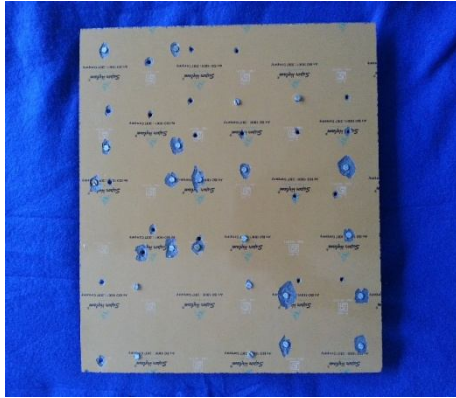
There are many circuit present in this system, all the circuit are interconnected with each other with wires. The circuits are

- Microcontroller Circuit.
- Relay Circuit.
- Driver Circuit.
- Timer circuit.
- Alarm Circuit.
- Rectifier Circuit.

MANUFACTURING AND ASSEMBLY PROCESS OF THE SYSTEM

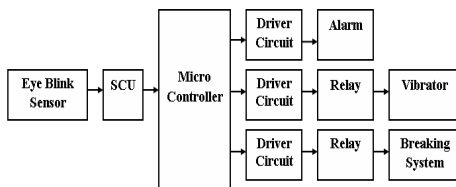
THE BASEMENT BOARD:





The basement board was drilled by a driller. On the basement board many circuits should be placed and is to be mounted with a screw. For inserting the screw we should drill some hole on the board as shown on the board. The basement board holds all the electrical parts and circuits.

BLOCK DIAGRAM

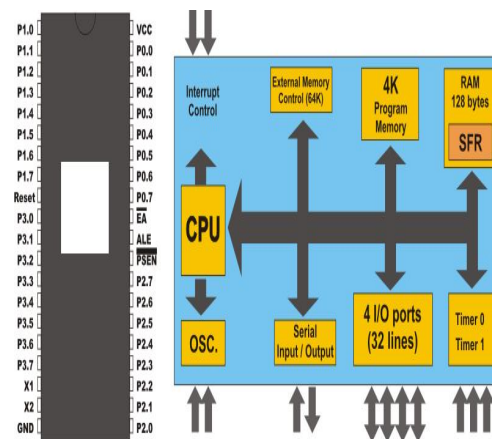


MICROCONTROLLER:

A microcontroller is a Computer-On-A-Chip, or if you prefer, a single-chip computer. Micro suggests that the device is small, and controller tells you that the device' might be used to control objects, processes, or events. Another term to describe a microcontroller is embedded controller, because the microcontroller and its support circuits are often built into, or embedded in, the devices they control.

A microcontroller is a complete microprocessor system built on a single IC. Microcontrollers were developed to meet a need for

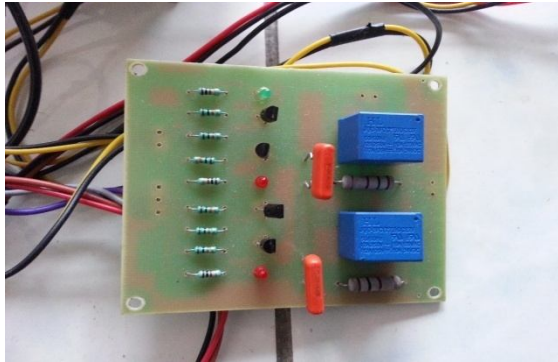
microprocessors to be put into low cost products. Building a complete microprocessor system on a single chip substantially reduces the cost of building simple products, which use the microprocessor's power to implement their function, because the microprocessor is a natural way to implement many products. This means the idea of using a microprocessor for low cost products comes up often [7]. But the typical 8-bit microprocessor based system, such as one using a Z80 and 8085 is expensive. Both 8085 and Z80 system need some additional circuits to make a microprocessor system. Each part carries costs of money. Even though a product design may requires only very simple system, the parts needed to make this system as a low cost product.



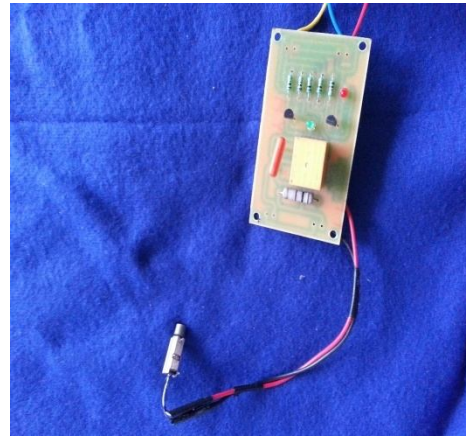
EYEBLINK SENSORS

The eye blink sensor consists of an Infrared transmitter and a Receiver. The infrared transmitter transmits the rays and the receiver receives the rays. The sensors sense our reaction of the eye and gives information to the system that is the timer circuit. The timer circuit then proceeds the information to the microcontroller and all the processing are done. When IR transmitter passes the rays to receiver, the IR receiver is conducting due to that non inverting

input voltage is lower than inverting input [8]. Now the comparator output is -12V so the transistor is cut off region. The 5v is given to 40106 IC which is the inverter with buffer. The inverter output is given to microcontroller or PC. This circuit is mainly used to for counting application, intruder detector etc.

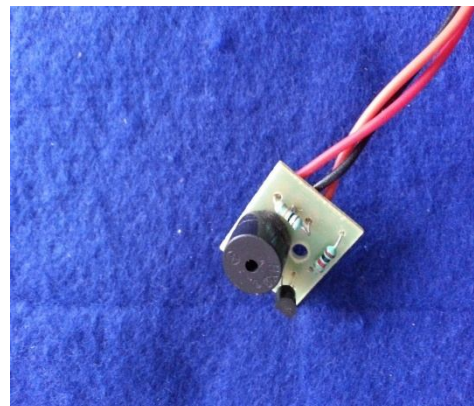


The first driver circuit has two relays and also capacitors and also resistance, the two relays are connected to the breaking system. One relay is connected to the motor and the relay is connected to the D.C gun. The resistance is given to give resistance to the connection. The red light on the circuit shows the working of the open and close of the relay. When the relay is open the wheel rotates and the gun is in the normal position when the relay is closed the gun is operated and also the wheel stops working [9]. The eye-blink and motion interface works by illuminating the eye and/or eyelid area with infrared light, then monitoring the changes in the reflected light using a phototransistor and differentiator circuit. The exact functionality depends greatly on the positioning and aiming of the emitter and detector with respect to the eye. Relays are usually SPDT or DPDT but they can have many more sets of switch contacts, for example relays with 4 sets of changeover contacts are readily available.



ALARM UNIT:

The alarm indicates the driver by giving an alarm sound and the driver gets alert about the sleeping temptations. For this alarm in this system a beeper is set. A **buzzer** or **beeper** is a signaling device, usually electronic, typically used in automobiles, household appliances such as a microwave oven, or game shows. It most commonly consists of a number of switches or sensors connected to a control unit that determines if and which button was pushed or a preset time has lapsed, and usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound. Initially this device was based on an electromechanical system which was identical to an electric bell without the metal gong (which makes the ringing noise). In real time it is recommended to keep a ringing device in which it rings and alerts the driver about the accident.



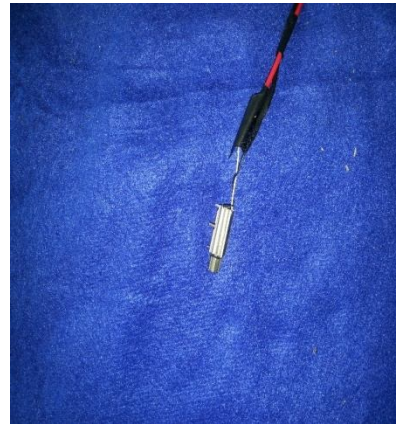
RELAY UNIT

The relay unit is same as the driver circuit in which the three relays are connected in the driver circuit. The relay open and close is controlled by the microcontroller. The microcontroller gives the relay the command and by the relay the D.C gun and the wheel is rotated. There are three relay in this system one is for vibration, another is for alarm and other one is for rotation of the motor. A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and they are double throw (changeover) switches. Relays allow one circuit to switch a second circuit which can be completely separate from the first. For example a low voltage battery circuit can use a relay to switch a 230V AC mains circuit. There is no electrical connection inside the relay between the two circuits; the link is magnetic and mechanical. The coil of a relay passes a relatively large current, typically 30mA for a 12V relay, but it can be as much as 100mA for relays designed to operate from lower voltages. Most ICs (chips) cannot provide this current and a transistor is usually used to amplify the small IC current to the larger value required for the relay coil. The maximum output current for the popular 555 timer IC is 200mA so these devices can supply relay coils directly without amplification.

VIBRATOR

This is the vibrator kept in the circuit of the system. In real time the vibrator is set under the seat of the driver or at the back of the seat of the driver. The vibrator has a separate driver circuit and a separate relay for its control. The vibration is controlled by the microcontroller. A vibrator is fixed in the circuit in which it will vibrate and make the driver alert about

the drowsiness condition. In the real time application the vibrator is fixed under the seat of the driver, in which it vibrates and alerts the driver. The vibrator works along with the alarm and also alerts in motion to the driver. The vibrator wakes up the driver in real time. The vibration makes the driver alert to dangerous driving conditions and from uncontrolled of the vehicle.



BREAKING SYSTEM:

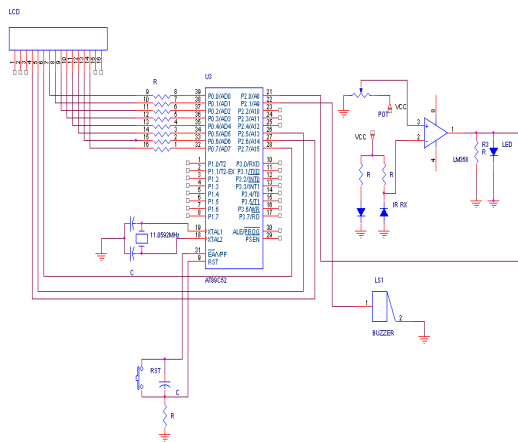
The breaking system is the main component in this project. The breaking system has a tyre in which it rotate in its axis and also a D.C gun which works according to the working of the command of the microcontroller. The breaking system breaks the vehicle when the driver circuit gives information to the breaking system. The breaking system is consists of a wheel, in which the wheel is connected to a 1500 rpm motor for the wheel rotation. The wheel rotates

in its axis and for the breaking there is a D.C gun connected to the system. When the circuit gives information to the D.C gun it ejects and stops the wheel from rotation and thus break is applied

SPECIFICATION OF THE MOTOR:

- SPEED = 1500 RPM
- VOLTAGE = 12 VOLT
- WATTS = 18 WATT
- Torque = 5.72×10^3 NM

OVERALL CIRCUIT OF THE SYSTEM



POWER SUPPLY DESCRIPTION

The ac voltage, typically 220V rams, is connected to a transformer, which steps that ac voltage down to the level of the desired dc output. A diode rectifier then provides a full-wave rectified voltage that is initially filtered by a simple capacitor filter to produce a dc voltage. This resulting dc voltage usually has some ripple or ac voltage variation. A regulator circuit removes the ripples and also remains the same dc value even if the input dc voltage varies, or the load connected to the output dc voltage changes. This voltage regulation is usually obtained using one of the popular voltage regulator IC units.

TROUBLESHOOTING OF THE COMPONENTS

VIBRATOR

The vibrator is tested and it had some problem some time due to the voltage fluctuation and after the test it was analysed and a separate capacitor was given to the circuit board of the vibrator and after that it works well. When the microcontroller gives information the vibrator is activated and it is a real time indication to the driver. The vibrator is activated in three seconds

BREAK

The breaking system had some noise and it was analysed by running it and then it was rectified that it is the mistake of the flange and the flange was changed and then it was well working ,but another problem occurred is that to avoid the friction between the flange and the wheel a material should be kept. Then it was rectified and given correct position. The break is applied in 3 seconds.

DC GUN

The gun was working well but after some time the gun got burned and then it was rectified. It is then identified as the gun is six volt but high current was going in so it was burned. Then a separate capacitor is fixed on the circuit board. After that it was working well. The gun was somewhat away from the flange so it was rectified and kept closer. The gun is activated in three seconds.

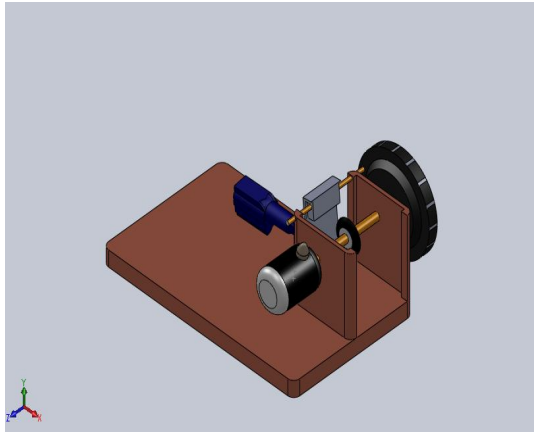
ALARM

The alarm gives alarm after 3 seconds, the alarm is connected to the timer circuit and connected to the microcontroller the microcontroller activates the alarm continuously. Thus the alarm is working properly without any disturbance. The alarm is thus active in three seconds.

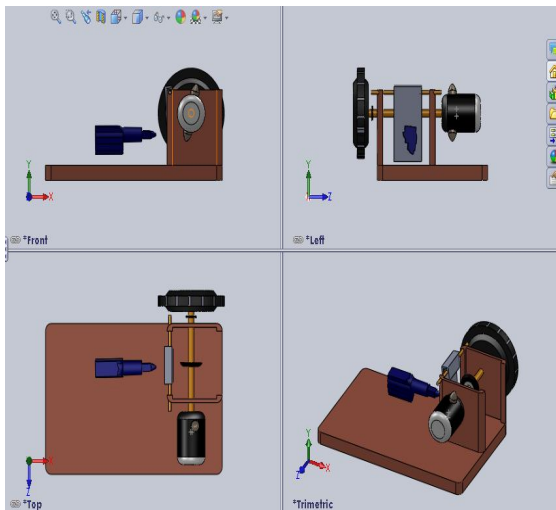
WHEEL STOP

The wheel was running very fast and then it was identified that motors rotation speed was high then the motor is changed and the wheel was running slowly. After that there was sound in the motor then it was rectified and bearings were inserted in the wheel and the wheel was rotating well. The wheel stops in 5 seconds

ISOMETRIC VIEW



1.1.1 FOUR VIEW OF THE PRODUCT:



CONCLUSION AND RECOMMENDATIONS

The components in the systems are revised and checked for the proper working of the system and all the components are working. The torque of the

motor is calculated. The input power and the output power of the transformer 1 and transformer 2 is found and it is found to be the accurate current flow. The Electronic parts are checked. The time taken for the break, buzzer and the vibrator to apply is calculated and shown in the result. The system is drawn in solid works and the analysis is done in Ansys. The displacement strength, the von misses stress and also the factor of safety of the system is found by analysis. The analysis shows the product is safe to use. The above results and the works shows the present design is best and the Accident alarm indicator and breaking is working good according to the eye blink closing and opening of the driver and it is successful.

FUTURE RECOMMENDATIONS

Better models of accident alarm indicator and breaking should be developed according to our present traffic conditions. For the next level of improvement some recommendations are given down.

- The IR sensor used for the eye blink detection should be taken and a web cam should be used for the eye blink detection rate.
- Microprocessors should be used instead of microcontrollers as it is advanced method and system can be run efficiently.
- The technology of Image processing should be used for the eye blink detection for the accurate detection.
- Battery should be used as a source of power and there should be an adequate flow of power as high power is needed for microprocessor.
- An alarm should be used instead of a buzzer and a large vibrator should be used instead of small vibrator.

- The breaking system should be made more compact and should be designed according to disc break.
- The connections should be made wireless by using some transmitters and sensors.
- Colour display should be given for showing the seconds and other information.
- Sensors should be fitted on the back and front of the car so that it avoids from hitting other vehicles coming in front and back.

REFERENCE

- [1] Davies, E.R. "Machine Vision: theory, algorithms, and practicalities", Academic Press: San Diego, 1997.
- [2] Eriksson, M and Papanikolopoulos, N.P. "Eye-tracking for Detection of Driver Fatigue", IEEE Intelligent Transport System Proceedings (1997), pp 314-319.
- [3] Gonzalez, Rafel C. and Woods, Richard E. "Digital Image Processing", Prentice Hall: Upper Saddle River, N.J., 2002.
- [4] Grace Retal. "A Drowsy Driver Detection System for Heavy Vehicles", Digital Avionic Systems Conference, Proceedings, 17th DASC. The AIAA/IEEE/SAE, I36/1-I36/8 (1998) vol. 2.
- [5] Perez, Claudio A. et al. "Face and Eye Tracking Algorithm Based on Digital Image Processing", IEEE System, Man and Cybernetics 2001 Conference, vol. 2 (2001), pp 1178-1188.
- [6] Singh, Sarbjit and Papanikolopoulos, N.P. "Monitoring Driver Fatigue Using Facial Analysis Techniques", IEEE Intelligent Transport System Proceedings (1999), pp314-318.
- [7] Ueno H., Kanda, M. and Tsukino, M. "Development of Drowsiness Detection System", IEEE Vehicle Navigation and Information Systems Conference Proceedings, (1994), ppA1-3,15-20.
- [8] Weirwille, W.W. (1994). "Overview of Research on Driver Drowsiness Definition and Driver Drowsiness Detection," 14th International Technical Conference on Enhanced Safety of Vehicles, pp 23-26.
- [9] F. D. Torre, C. J.G. Rubio, E. Martinez, "Subspace Eye Tracking for Driver Warning," in Proceedings of the IEEE, Vol. 8, No. 3, 2003, pp 329-332.



Mr. Vinukumar Luckose has a Master Degree in Power Electronics and Drives Engineering from Anna University, India and has a Bachelor Degree in Electrical and Electronics Engineering from Manonmaniam Sundaranar University, Tirunelveli, India. He has 9 years of teaching experience in India and abroad. He also has worked in Johnson Lift Ltd. Company in India as a Senior Engineer. He is now currently working as a Senior Faculty of Engineering, Science and Technology (FEST) at Nilai University, Malaysia. His specialization is power electronics, mobile technologies, image processing and communication engineering.



Feroze Jacob Benjamin was born in Erode in the year of 1990. He is very much interested in automobile engineering. He studied his diploma in automobile engineering. Further he graduated in Bachelor of Engineering under Coventry University, UK. He done lot of digital circuits for the power electronics and micro controller. His area of interest covers digital processing, power electronics, thermo dynamics and hydraulics and so on. Currently he is working as system engineer in Ford, Malaysia.



Mr. Umapathy Eaganathan was born in Walajapet, India in 1982. He received his Bachelor Degree in 2002 from APCOS, Arcot, India. He has a Masters Degree in Computer Applications in 2005 from Vels College of Science, Chennai, India. He has completed his Master of Philosophy (Computer Science) in 2008 from Vinayakka Mission University, Salem. He has 8+ years of teaching experience. He is now a PhD research scholar at the department of Computer Science, Vels University, India, since 2010. Currently his specialization of research is under image processing and he has fine interest in web and mobile technologies.