

MEASURING COGNITIVE DISTRACTION OF DRIVERS

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Abstract: Vehicle Accidents are major problem in society because of Driver's Distraction. Information and Communication Technology are the growing fields, which is used in every sort of fields to make its exertion effective. Advancement in Information and Communication Technology has plenty of Devices, embedded in Vehicles (like Four Wheelers), so a part of Misfortune is reducing. 'Driver Escort' is novel methodology which uses Communication Technique embedded in Vehicle with use of Sensors like Eye Blink, Pulse and Embedded Coding reduces Drivers Distraction so major accidents are reduced.

Keywords: Driver Distraction, Information and Communication Technology, Sensors, Embedded Devices.

Introduction

Accidents are unexpected event which is a negative consequences resulting in damages the Vehicle and Road Side, injury to persons travelling and outsiders also. India like countries faces huge amount of Accidents, as survey recorded that 4,80,652 accidents are taken place in past two years, among them 1,50,785 has injured more and leads to death. Major accidents are occurred due to carelessness of Drivers like use of Mobile phones, attending Phone Calls, tuning the Tape Set, communicating with passengers, Not Concentrating on Road Side View, Drivers Drowsiness. Information and Communication Technology (ICT) is emerging field, which used in every sort of domains. ICT refer to the convergence of Audio, Visual and Networks through a cabling or link system and connected to Drivers of Vehicle.

Motivation

Every year the death rate gets increased and claims the lives of 1.3 million people worldwide. Every hour approximately 40 people under the age below 25 are killed in road accidents and are foremost causes, substantial economic loss to their family and nation. Main accidents are caused through distraction of drivers, to reduce the drivers' distraction a Novel Methodology 'Drivers Escort' is developed to identify driver's distraction and evade road crashes.

Literature Review

The effect of fatigue driving on injury severity identifies several common observed influential factors of fatigue driving tendency and fatal injury inclination and reveals a substantial and considerable negative correlation of unnoticed factors between them. (Yan Yan Li et al., 2018), Accident Analysis & Prevention: Multiple driver distractions; A systemic transport problem argues the emerged variety of contemporary driver distractions and identifies the shortfalls in Multiple-Additional-to-Driving (MAD) task model which systematically characterizes multiple driver demands. (Terry C. Lansdown et al., 2015)

Journal of Safety Research: Associations of distraction involvement and age with driver injury severities investigates the associations between the rigorousness of injuries sustained by a driver and type of driver's distraction and their age. Author discussed on increased usage of cell phone, a major cause of drivers inattention (Birsen Donmez et al., 2015), Perceptions of driver distraction among teenage drivers performs a cluster analysis on three classified groups INFREQUENT, MODERATE, and FREQUENT engagers recognized distraction indicated by texting while driving. (Elizabeth Jane et al., 2011)

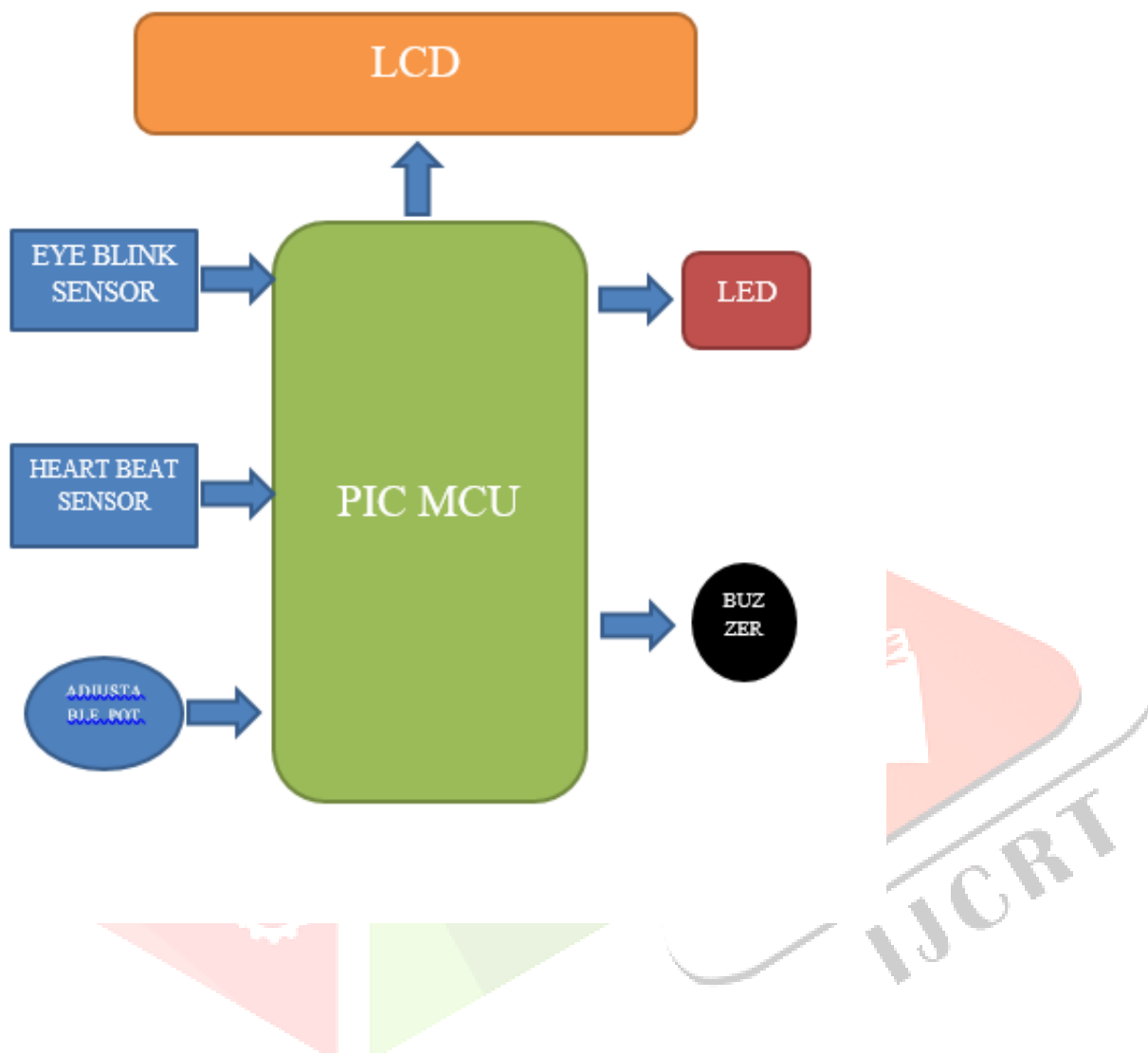
Driver distraction and driver inattention: Definition, relationship and taxonomy provides a framework on different forms of driver inattention as contributing factors in crashes and comparison made on major factors of driver inattention. (Michael et al., 2011), Creating the environment for driver distraction: A thematic framework of socio methodological factors aims to review the drivers self-reported assessment to slot in with technological errands while driving and their reasoning for doing the same. (J. Parnell Neville et al., 2009)

Driver distraction constitutes a particular human issue of road misfortune causation. Driver distraction is generally defined as "a diversion of attention from driving, because the driver is temporarily focusing on an object, person, task or event not related to driving, which reduces the driver's awareness, decision making ability and/or performance, leading to an increased risk of corrective actions, near-crashes, or crashes" (Regan et al., 2008), Examining teen driver crashes and the prevalence of distraction: Recent trends, identifies types of vehicle crashes mainly caused by teen drivers and distracting activities involved in these crashes. Paper also suggests the findings that usage of cell phone causes the increasing number of crashes for teen drivers. (Carneya Karisa et al., 2007)

Shrinivas, P.L.L. Studies undertaken to identify critical causes of accidents in the highways of Tamil Nadu. "Indian Highways" 31: pp.11(2004), V. Goud, & "Vehicle Accident Automatic Detection and Remote Alarm Device ", International Journal of Reconfigurable and Embedded Systems (IJRES) Vol.1.no 2. 2012.

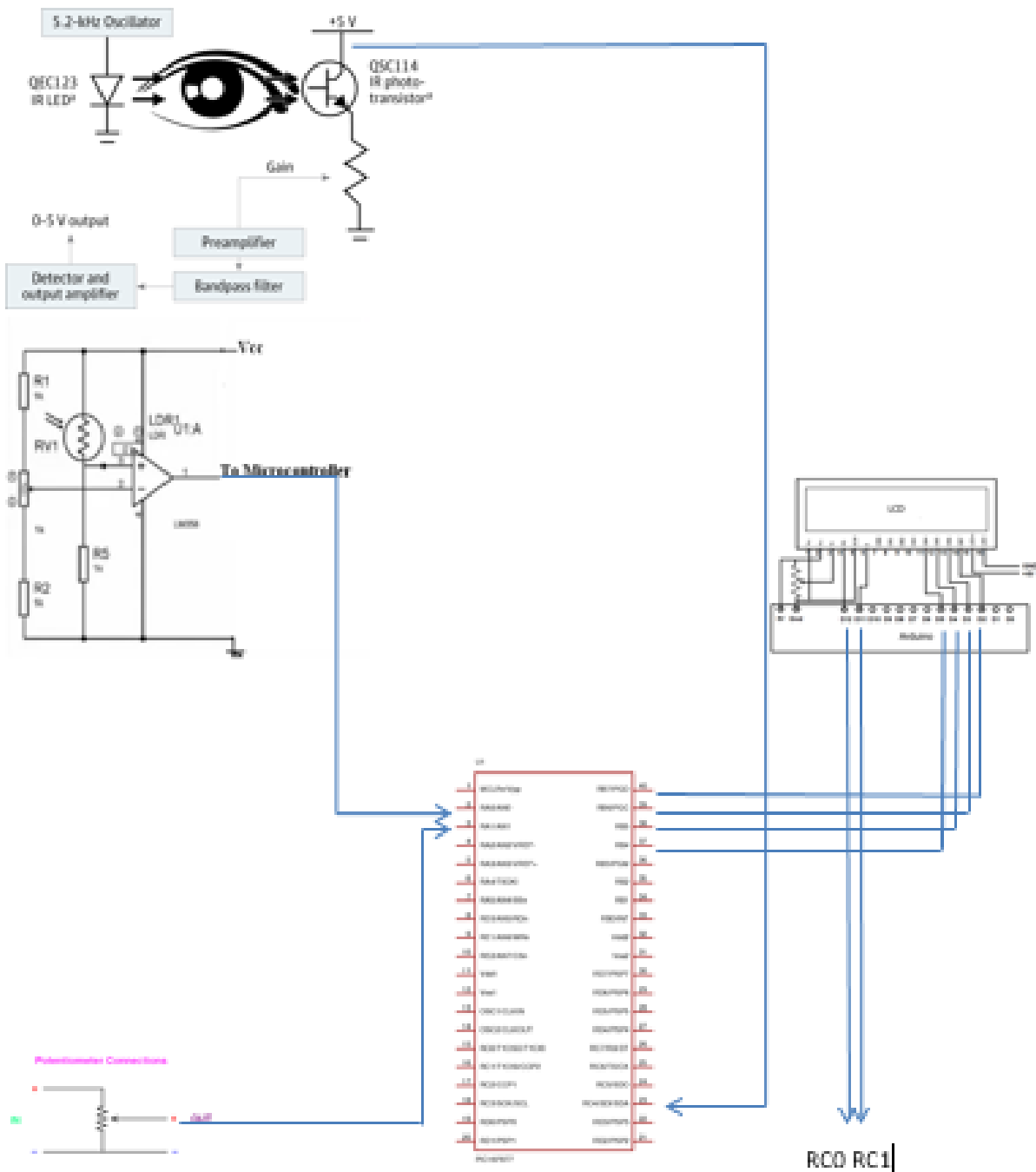
PROPOSED METHODOLOGY:

Figure 1:block diagram



Materials and its Work

Figure 2: circuit diagram

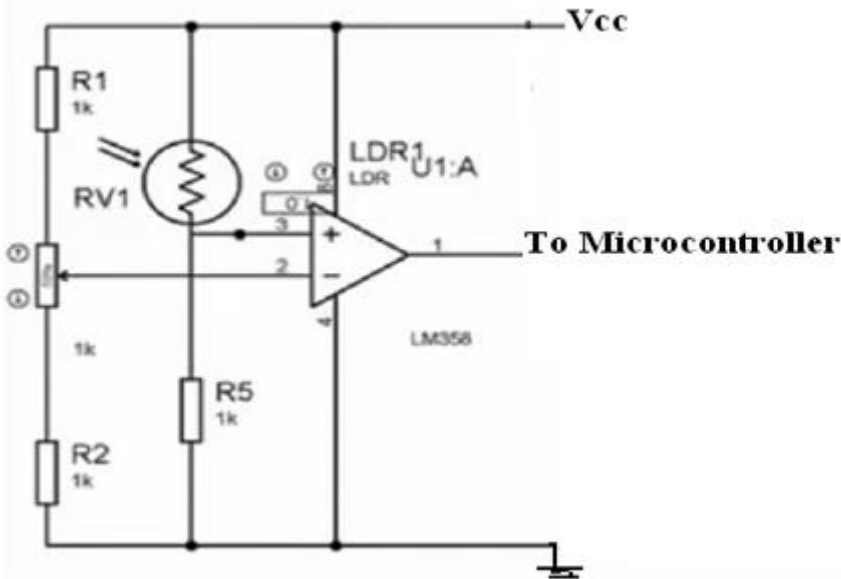


Sensors

Sensors are complicated devices are frequently used to detect and respond to electrical or optical signals. A Sensor converts the physical parameter (for example: temperature, blood pressure) into a signal measured electrically. Heart Beat Sensor senses, a person's heartbeat through the sound of the valves, heart contracting or expanding as they force blood from one region to another. The number of times the heart beats per minute (BPM), is the heart beat rate and the beat of the heart that can be felt in any artery that lies close to the skin is the pulse. Eye Blink sensor is IR based, identifies Variation of eyes continuous look of eye blink. The eye is closed; output is high or output is low. Above Sensors have connected to Micro Controller (MC), Sensor's functionality to sense and transfers data to MC.

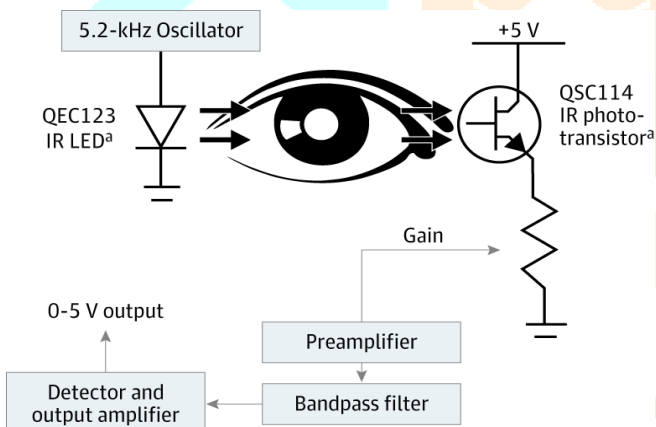
Heart Beat sensor

Figure 3;Heart beat sensor



Eye Blink Sensor

Figure 4: eye blink sensor



Micro Controller (MC)

Figure 5:Micro controller(MC)

U1	
1	MCLRn/Vpp
2	RA0/AN0
3	RA1/AN1
4	RA2/AN2/VREF-
5	RA3/AN3/VREF+
6	RA4/T0CKI
7	RA5/AN4/SSn
8	RE0/AN5/RDn
9	RE1/AN6/WRn
10	RE2/AN7/CSn
11	Vdd1
12	Vss1
13	OSC1/CLKIN
14	OSC2/CLKOUT
15	RC0/T1OSO/T1CKI
16	RC1/T1OSI/CCP2
17	RC2/CCP1
18	RC3/SCK/SCL
19	RD0/PSP0
20	RD1/PSP1
40	RB7/PGD
39	RB6/PGC
38	RB5
37	RB4
36	RB3/PGM
35	RB2
34	RB1
33	RB0/INT
32	Vdd2
31	Vss2
30	RD7/PSP7
29	RD6/PSP6
28	RD5/PSP5
27	RD4/PSP4
26	RC7/RX/DT
25	RC6/TX/CK
24	RC5/SDO
23	RC4/SDI/SDA
22	RD3/PSP3
21	RD2/PSP2

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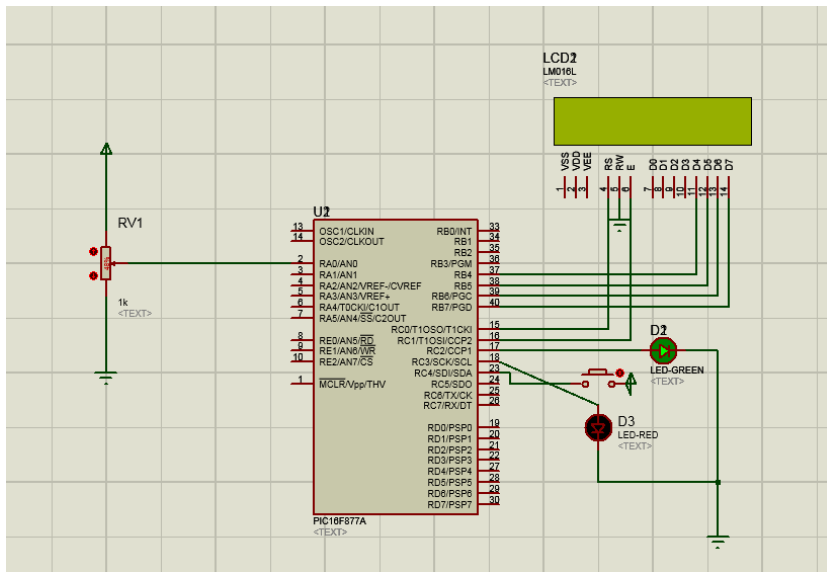
A Microcontroller is committed device to perform one task and runs a specific program and is an Integrated Circuit to execute and control devices (like Sensors and Alarms)connected to the System, and designed to works embedded with other devices.MC collects the sensed information from Sensor and checks values with its predefined and sends to LED and Alarm

LED, LCD and Buzzer

LED, LCD and Buzzer are used as alerting device which connected to MC and provides associated solution when required through MC. A Light Emitting Diode (LED) is a semiconductor device that emits visible light by electric current passes through it.LCD uses a Liquid Crystal Display to produce a visible image. Buzzer is a mechanical, electromechanical, audio signaling device. Electric buzzer driven by oscillating electronic circuit or other audio signal source, beep indicates a button when has been pressed.

Drivers Escort Methodology

figure 6:drivers escort circuit diagram



Drivers Escort is embedded in Vehicle (Car) which connects the driver and indicates his distraction (if any). The Drivers Escort is worked by Connecting Sensors (Heart-Beat and Eye Blink) to Micro Controller (MC), and connects LCD, LED and Buzzer. Normal Heart Beat Rate and Eye Blink Rate are defined in MC. Continuously, Sensors senses the Heart Beat and Eye Blink of Driver and checks with defined value, if deviates LED emits and Buzzer rises, and alerts the Driver.

Drivers Escort Advantages

Drivers Escort is tested in Vehicles with different Drivers and monitored their Heart Beat and Eye Blink values. Among the test most of Drivers Distraction has monitored, and system have sounds an Alarm and LED emits, so the Driver have come to normal position. The Distraction level is reduced using ‘Drivers Escort’ System, so it leads a way to control and keep moved out from accidents.

Result and Discussion

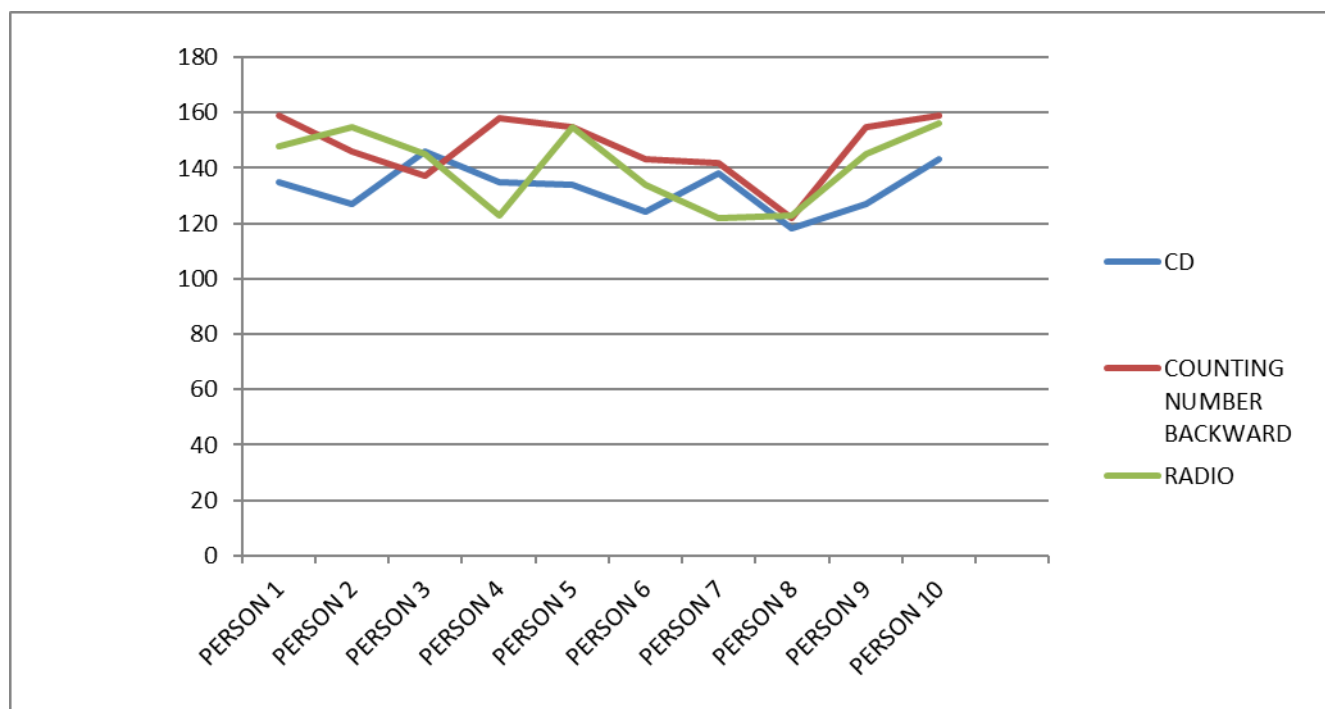
Table 1:heart beat calculation

S.NO	PARTICIPANTS	NORMAL HEARTBEAT RATE	HEARTRATE DISTRACTION TESTING			DISRTACTION HEART RATE
			CD	NUMBER COUNTING	RADIO	
1	Amal	73	135	159	148	159
2	Alagu	74	127	146	155	15
3	Arjun	73	146	137	145	146

4	Praveen	75	135	158	123	158
5	Suresh	72	134	155	155	155
6	Senthil	76	124	143	134	143
7	sethu	78	138	142	122	142
8	Rajesh	72	118	122	123	123
9	Midhun	74	127	155	145	155
10	Sivanesha	75	143	159	156	159

HEART RATE VARIATION:

Chart 1:heart beat rate Variation



Using that graph to identified the variation of heartbeat rate. This graph shows 10 persons heartbeat rate variations through which listening the cd, Radio and counting the numbers in backward.

Conclusion:

Drivers Escort is a methodology developed to reduce the misfortune due to distraction of Drivers and created using Sensors (Heart Beat Sensor and Eye Blink Sensor) with Micro Controller and connected with alarm. System detects the distraction of Driver when his position is modified and alerts the Driver so, come to normal position. The System reduces the accidents due to Drivers Distraction.