www.arpnjournals.com

SMART HELMET USING IoT

Jitesh K.[1], Ravi Prakash T.[1], Saiteja T.[1], Ravikumar CV[2] and Rajeev Pankaj N.[2]
[1]SENSE, VIT University, Vellore, India
[2]SENSE, DET, VIT University, Vellore, India
E-Mail: ravikumar.cv@vit.ac.in

ABSTRACT

Deaths caused by the road accidents in present day is increasing constantly and major of this are being caused because of not following the few basic traffic rules which are must and should like wearing the helmet and not drunk and drive etc. and lack of communication of accident occurred to the respective members like family, hospital, police station etc. These accidents are causing to death of the person so for this issue we proposed a smart solution with smart system which make ensures the person driving the vehicle to follow the basic traffic rules and if he is not following those rules then our system won't allow the person to drive the vehicle by stopping the ignition of the vehicle and if any accident occurs in the mid-way of the journey then our system will classify the type of accident and if the accident is major then it will start notifying the respective members with an email notification containing the GPS location of the person and cause of the accident.

Keywords: IoT, Wi-Fi, smart helmet, RF communication, GPS.

INTRODUCTION

It is a widely known proven fact that young generation prefers bikes and motorbike over hackney. The riders avoid sporting helmet with none specific reason. Moreover, over dashing and drink and drive became common problems. Because of the shortage of expertise or focus and violation of traffic rules, that results in accidents. So, with the assistance of technology we have a tendency to created certain that traffic rules are followed, issues mentioned on top of avoided and their effects are decreased. The concept of developing this work comes from our social responsibility towards society. In several accidents that occur, there's an enormous loss of life. many of us die on roads per annum that occur because of bike accidents. There are varied reasons for accidents like not having adequate ability to drive, defective 2 wheelers, rash driving, drink and drive, etc. however the most reason was the absence of helmet on the person which results in immediate death because of brain injury. Therefore, it's vital that there ought to be a facility to attenuate the when effects of those accidents. However, the most goal of our work is to form it obligatory for the rider to wear a helmet throughout the ride, to forestall drink and drive the situation and over dashing or rash riding by motorcyclists and additionally give correct medical attention once met with accident by alerting the involved person which can give solutions to different major problems for accidents

OBJECTIVE

Main objective of our system is to ensure the safety of the bike riders because a lot of deaths are causing so with the help of our smart helmet, we ensure that one has to be follow the basic rules so that we can stop the maximum damage causing to the riders so that number of deaths will be reduces and we will update every information in the app and send alerts about the persons conditions.

PROPOSED SYSTEM

We made a smart helmet using Internet of things (IoT) which make ensures that the safety of the rider by avoiding the road accidents of the bikers by ensuring the following things as a mandate to start the vehicle.

- Our system checks that whether the person is wearing the helmet or not, our system allows the riders to start the vehicle if and only the person wears the helmet.

- Our system even checks whether the person consumed alcohol or not and our system ensures that person is not had alcohol and vehicle only starts when the consumed alcohol not too heavy.

- Our system will update the location and sends the information whenever the rider meets with any sort of accidents.

Most of the normal people and younger generations prefer the two-wheelers as the vehicle for mode of transport and most of the this people are not following the traffic rules and regulations which helps for the safety of the person so for that problem we made the smart helmet using Internet of Things (IoT) which helps the person by alerting if the person is not following the basic traffic rules and regulations so that the person will makes sure himself/herself to follow the basic traffic rules which eventually leads to reduction in the number of deaths causing in the present day of world.

METHODOLOGY

Our system has 2 parts they are helmet part and bike part.

- Helmet section

- bike section. Helmet section

www.arpnjournals.com

This section consists of Alcohol sensor, accelerometer, push button, RF-transmitter, microcontroller ATMega328 which is connected to the RPS board and LCD display.

Component Description

Alcohol sensor

This sensor is used to detect the whether the person had drunk any alcohol or not it will detect alcohol by analyzing the breath of the person foe the presence of the ethanol so if the ethanol is present in person breath, then person has drunk alcohol this sensor gives the alcohol concentration of the per- son this sensor will be placed in the helmet such that it can get the breath of the person.

Accelerometer

This sensor is used to measure force acting on the person in all directions this is an electromechanical device and it will measure the vibrations of the material so that it can continuously monitor the person this will be detecting whether the person is under the correct position or whether the person is fell down. This will detect whenever the accident has happened to the person.

Push button

This a switch which used to regulate the power flow through the circuit and this button is placed in the helmet so that when a person wears the helmet power flows and it says that the person has worn the helmet and if the person doesn't wear the helmet the power supply to that circuit is stopped which says that the person is not wearing the helmet.

RF transmitter

This RF module consists of RF transmitter and RF receiver in the helmet section we use RF transmitter this RF transmitter is used to communicate wirelessly it uses radio frequency (434 MHz) to transmit data that is received from the sensor of the helmet section to the bike sections which has RF receiver.

Arduino

This is microcontroller which is an open-source platform used to build circuits it consists of both hardware and soft- ware parts hardware consists of sensors which are connected to it and with help of the software coding we will control the hardware parts sensors of the circuit.

Bike section

Component description:

GPS

This sensor is used to track the location of the person this sensor is place in bike section so that we can get the real time location access using the global positioning system this will store the data of location in it and it will be transmitted to the controller and which is transmitted either wireless or cellular way. This will help to identify the exact location of the person whenever the accidents occur.

RF receiver

This RF receiver is used to receive the data which is collected from the helmet section which is transmitted by the RF transmitter of helmet section and the data collected is analyzed in the bike section and it will help to control the bike.

Motor

This motor is used as the bike whenever the person starts the vehicle it starts rotating whenever there is ignition the motor starts rotating whenever the certain accepts changes then this motor will be stopped automatically by cutting of the ignition so that there will less damage if any accident occurs.

LCD

This is liquid crystal display which uses liquid crystals to operate and it is used to display the information on it about the sensors it is connected to the micro controller which operates it to display the information.

Wi-Fi

Wi-Fi is used to transfer the data from the micro controller to the database where the data is analyzed and displayed this helps to keep the real time connection of the person to the other person this helps in transferring the messages to the its own IP address.
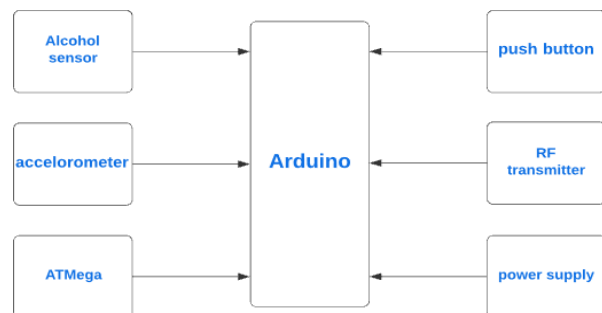

Figure-1. Block diagram of the helmet section.

Figure-2. Alcohol sensor.

www.arpnjournals.com

Figure-3. Accelerometer sensor.

Figure-4. Push button.

Figure-5. RF Transmitter.

Figure-6. Arduino.
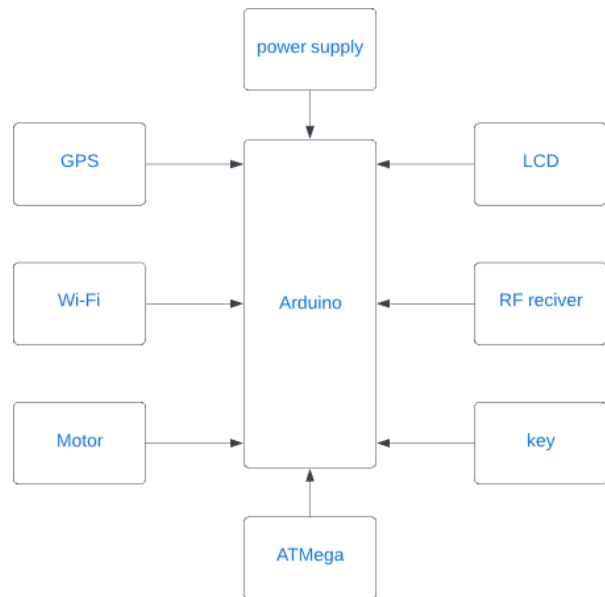
Figure-7. Block diagram of Bike section.

www.arpnjournals.com

Figure-8. GPS.

IMPLEMENTATION

Send to microcontroller and then the microcontroller will process the raw data from the sensor and send the processed This system will produce effective results in reducing the number of road accidents which are happen because of minor mistakes this system will ensure that one doesn't commit those small mistakes which leads to huge damage to the person and their family when an accident occurs and our system is also low cost so that it can be used by everyone. Our system reduces accidents by ensuring following basic traffic rules.

a) Our system will check the status of the person before starting vehicle that the person has worn the helmet or not.

b) Our system will even monitor that one who is driving the vehicle has consumed the alcohol or not.

c) Our system will even monitor the posture of the person who is driving the vehicle so that in case if any accidents occur then our system will alert the respective members with the notification and also with the accurate location of the person so that one can reach the person as early as possible.

Helmet Section
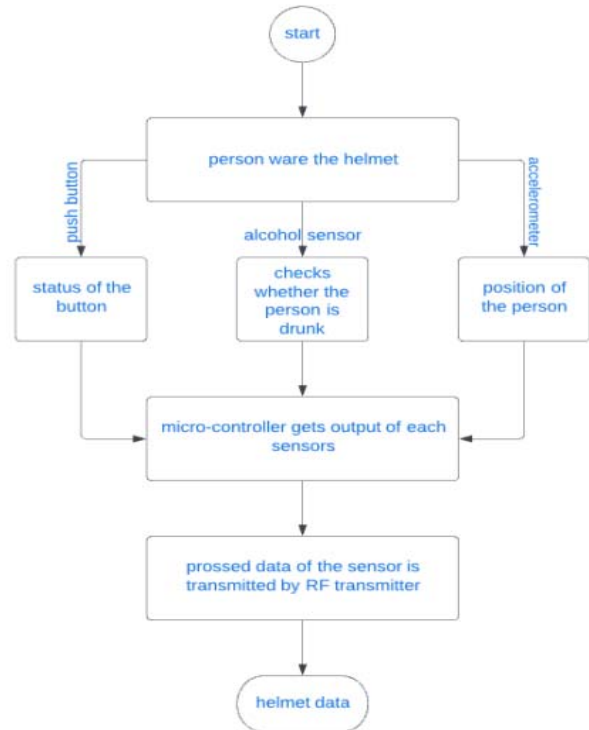
When the person wants to start the vehicle then our system at first check for the push button status whenever the person wears the helmet then the push button is pressed then it will check for the other main things like the alcohol sensor is placed such that it can be easily able to sense that whether the person has been drunk the alcohol or not by analyzing the breath of the person then our system will get the tilt of to know the position of the person our system will collect all this data and data to the bike section which is being collected by the helmet section with help of the RF transmitter which is being placed in the helmet section and RF receiver which is been placed in bike section.

Bike section:

www.arpnjournals.com
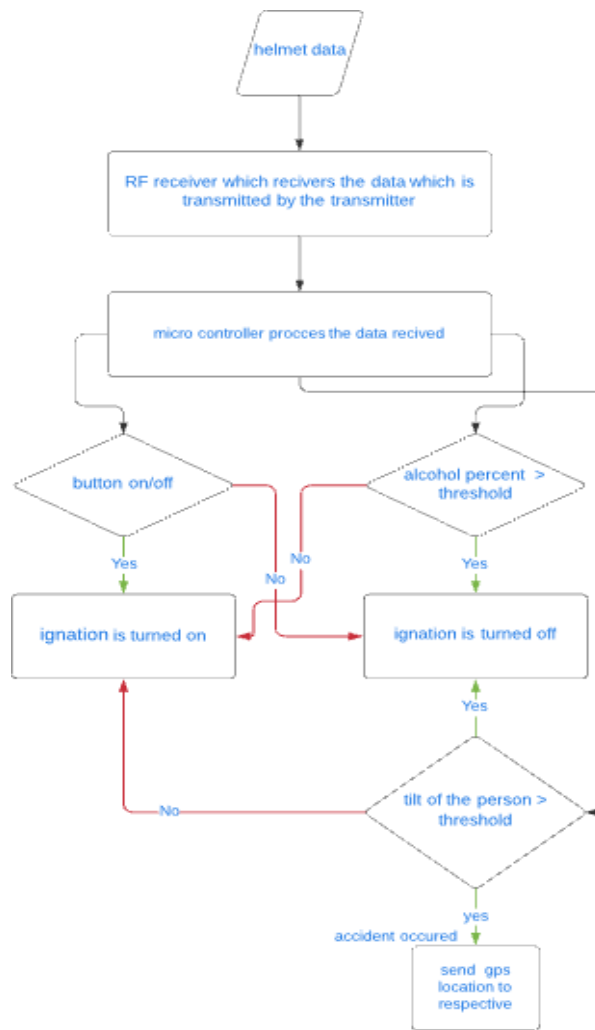
RF receiver which is placed in the bike section receives the data which is being transmitted by the RF transmitter from the helmet section and this data is transmitted to the micro controller so that the micro controller will analyze the data which we got from the sensor which is placed in the helmet section and now micro controller will take the decisions based on the information which is got and analyzed here our system will not let to start the vehicle if the person fails to ware helmet i.e. when the data from the helmet sections shows that push button is off (not pressed) then our system will not allow the person to start the vehicle unless the push button is pressed i.e. unless person wares the helmet and now our system will take the decision based on the readings of the alcohol sensor from the helmet section our system doesn't allow person to start the vehicle until the person alcohol level is not above the threshold value i.e. if person has drunk alcohol then our system will stop the vehicle now our system will allow the person to start the vehicle only when this two conditions are satisfied and now our keep on monitoring the persons position with help of accelerometer so that whenever the till is greater than the threshold value our system will stops the vehicle and send

the present location of the person to the respective members i.e. whenever the person met with any accident then our system will turns off vehicle so that the damage caused to the person will be reduced and our system with the help of GPS will send the location alert to respective members. So that the person can be taken to the hospital in safe time so that person is not dead… our system is connected with the help of Wi-Fi so that even the family member can monitor the situation of the person everything about the person who is driving the vehicle will be updated to the respective IP address of the Wi-Fi like whether the person has worn the helmet or not and whether the person has been drunk or not everything is being updated to the respective IP address so that each one can be able to monitor and everyone is being connected to each other such that if any issue occurs then others can reach them and can rectify the issue which occurred.

Now with the help of IFTTT we will connect our system to the cloud so that we can send email notification so that when an accident occurs then an alert will be sent to all helpful people like family, hospital, and police station so that they can rescue the person who met with an accident and we place a safety button in the bike so that if any minor accidents or to stop the mis accidents which can be detected by the system when the accident is detected then our system will give 100 seconds time to rider so if the rider press that button then notification to the respective members will be terminated because the person is in a position to ride the vehicle and accident detected is the minor accident which didn't caused any damage to the person who is riding the vehicle and if when any accident occurred and if the person is unable to press the safety button within 100 seconds then our system will take this accident as major accident and our system will start notifying family, hospital and police station so that the person can be saved from the major damage caused to him.
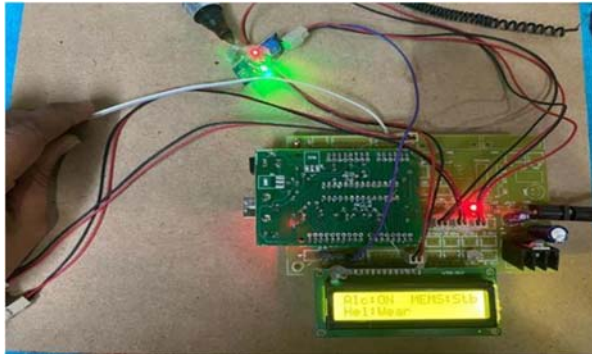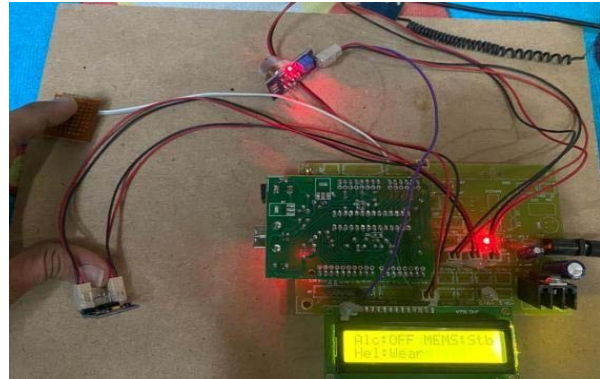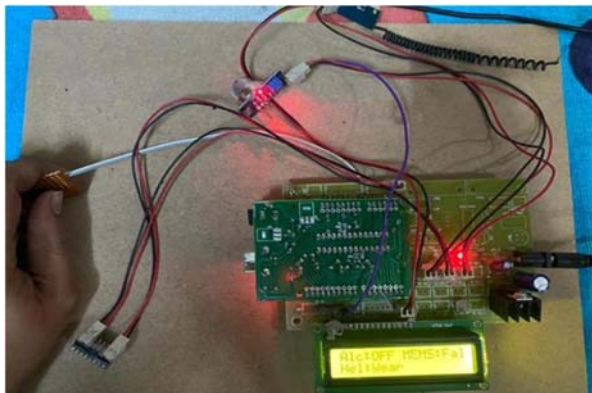
RESULTS

Case-1

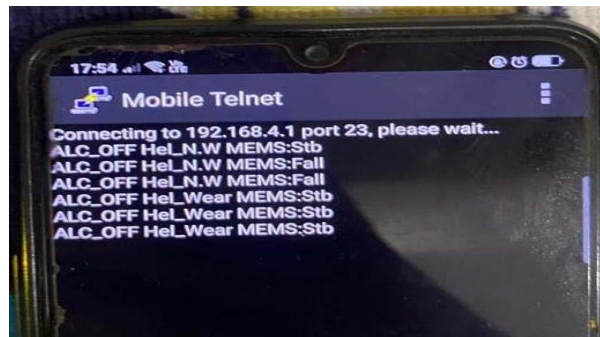Checking for helmet
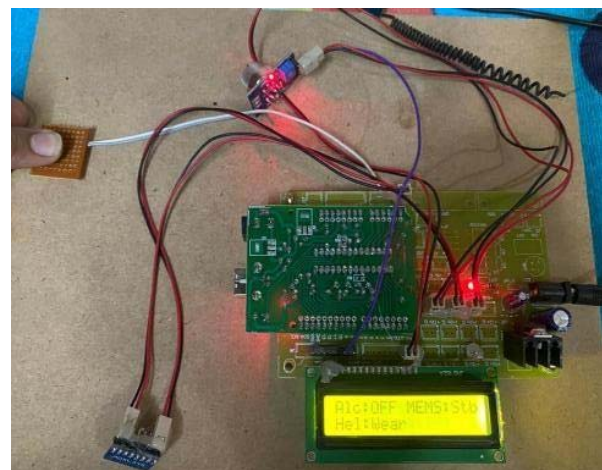
Case-2

Checking for alcohol

Case -3

Checking for stability of the person

Case-4

Checking whether our system is able to detect the changes occurred

Case-5

Checking for accidents

Case-6

Checking for the notification in the application
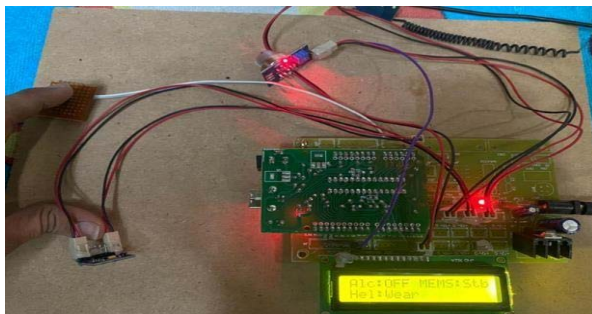
CONCLUSIONS

Our system is able to make the driver to follow the basic rules so that whenever an accident occurs the damage caused is reduced and in case if any major accidents occur then our system will send an email notification to the respective members with GPS location so that they can reach the place of accident occurred and can rescue the person from death.

FURTHER WORK

We can keep a small camera in the bike or helmet so that with the help of the neural network and deep learning we can make our system even more smart with the help of cam we can detect the traffic signal on the road side like speed limit, turns, any accident zone, or school zone and we can display it to the person who is driving so that he can move accordingly we can make this with help of CNN deep learning algorithm in which we have to train our system with the data set containing the traffic signal at first and then we can use it the helmet or bike which helps person to see traffic signals even in the night time which even more reduce the cause of accidents.

REFERENCES

[1] Iqbal Anees, *et al*. 2021. Fall Detection of Riders using Inertial Sensors: A Smart Helmet. 2021 International

Bhurban Conference on Applied Sciences and Technologies (IBCAST). IEEE.

[2] Muneshwara, M. S., *et al*. 2021. Advanced Wireless techniques to avoid accidents on roads through wearing Smart helmet. 20215th International Conference on Intelligent Computing and Control Systems (ICICCS). IEEE.

[3] Rahman, Md Atiqur, *et al.* 2020. IoT Based Smart Helmet and Accident Identification System. 2020 IEEE Region 10 Symposium (TENSYMP). IEEE.

[4] Alim, Mohammad Ehsanul, *et al*. 2020. Design & Implementation of IoT Based Smart Helmet for Road Accident Detection. 2020 11th IEEE Annual Information Technology, Electronics and Mobile Communication Conference (IEMCON). IEEE.

[5] B. Kalapraveen, Mohammad Alibakhshikenari. 2022. Detection of signals in MC-CDMA using a Novel Iterative IBDFE. IEEE Access, Vol. 10, DOI: 10.1109/ACCESS.2022.3211392.

[6] Gupta Shikha, *et al*. 2019. Implementation of Alcohol and Collision Sensors in a Smart helmet. 2019International Conference on Nascent Technologies in Engineering (ICNTE). IEEE.

[7] Navabharat Reddy, G., Rajesh A.: Literature Review and Research directions towards channel estimations and hybrid pre-coding in mm wave massive MIMO communication systems. J Reliable Intell Environ (2022). https://doi.org/10.1007/s40860-022-00174-5.

[8] Uniyal Manish, *et al*. 2018. IOT based Smart Helmet System with Data Log System. 2018 International Conference on Advances in Computing, Communication Control and Networking (ICACCCN). IEEE.

[9] Sathish Rajesh. 2022. Underwater Wireless Sensor Network Performance Analysis Using Diverse Routing Protocols. J. Sens. Actuator Netw. 11(4): 64; https://doi.org/10.3390/jsan11040064.

[10] C.V. Ravikumar, Kala Praveen Bagadi. 2017. Receiver design using artificial Neural Network for signal detection in MC- CDMA system. International Journal of Intelligent Engineering & Systems.

[11] C.V. Ravikumar, Kala Praveen Bagadi. 2016. Performance analysis of HSRP in provisioning Layer-3 Gateway Redundancy for Corporate Networks. Indian Journal of Science and Technology. 9(20): 89851.

[12] C.V. Ravikumar, Kala Praveen Bagadi. 2016. Robust Neural network based multiuser detector in MC-CDMA mMAI mitigation. Indian Journalof Science and Technology. 9(30): 95994.

[13] C.V. Ravikumar, Kala Praveen Bagadi. 2017. Receiver design using ANN for signal detection in MC-system. International journal of Intelligent Engineering and systems. Apr.

[14] Md. Imaudin, Ravi Kumar, C.V. and Kalapraveen B. 2020. Signal detection in MC-CDMA system using ELM receiver to mitigate MAI and non-linear distrortion. Asian Research Publishing Network (ARPN).

[15] Ravikumar C.V. and Venugopal P., 2018. Adaptive Cruise Control and cooperative cruise control in real life traffic situation. International Journal of Mechanical Engineering and Technology. 9(13): 578-585.

[16] Yash, Ravi Kumar, C.V. Venugopal P., 2020. A smart wheelchair for healthcare monitoring system. 11(4): 22-29. International Journal of Electrical Engineering and Technology.

[17] Jayaprabath, Ravi Kumar, C.V. and Rahul Varma C. 2019. Performance analysis of interior and exterior routing protocols. Asian Research Publishing Network (ARPN).

[18] Jitish, Ravi Kumar, C.V. Kalapraveeen B., 2020. LPWAN technologies for Io Tdeployment. 11(3): 285-296. International Journal of Electrical Engineering and Technology.

[19] Ravikumar C.V., Saranya K. C. 2016. Implementing Mobile ad-hoc networks with AODV Protocol. International Journal of Applied Engineering and Research. 11(9).

[20] Ravikumar C. V., Saranya K. C. 2016. Improoving Interference alignment of Gaussian MIMO x channel and Gaussian MIMO z channel. International Journal of Applied Engineering and Research. 11(9).

[21] Kalapraveen. 2016. Ravikumar CV-Performance analysis of ipv4 to ipv6 transition methods. Indian Journal of Science & Technology. 9(20).

ARPN Journal of Engineering and Applied Sciences

www.arpnjournals.com

[22] Ravi Kumar C.V. and Kalapraveen B. 2019. Design of Multilayer Perceptron Receiver for MC-CDMA system to Mitigate Multiple Access Interference and Non-linear Distortion. Neural Computing & Applications. 31(S-2): 1263-1273.