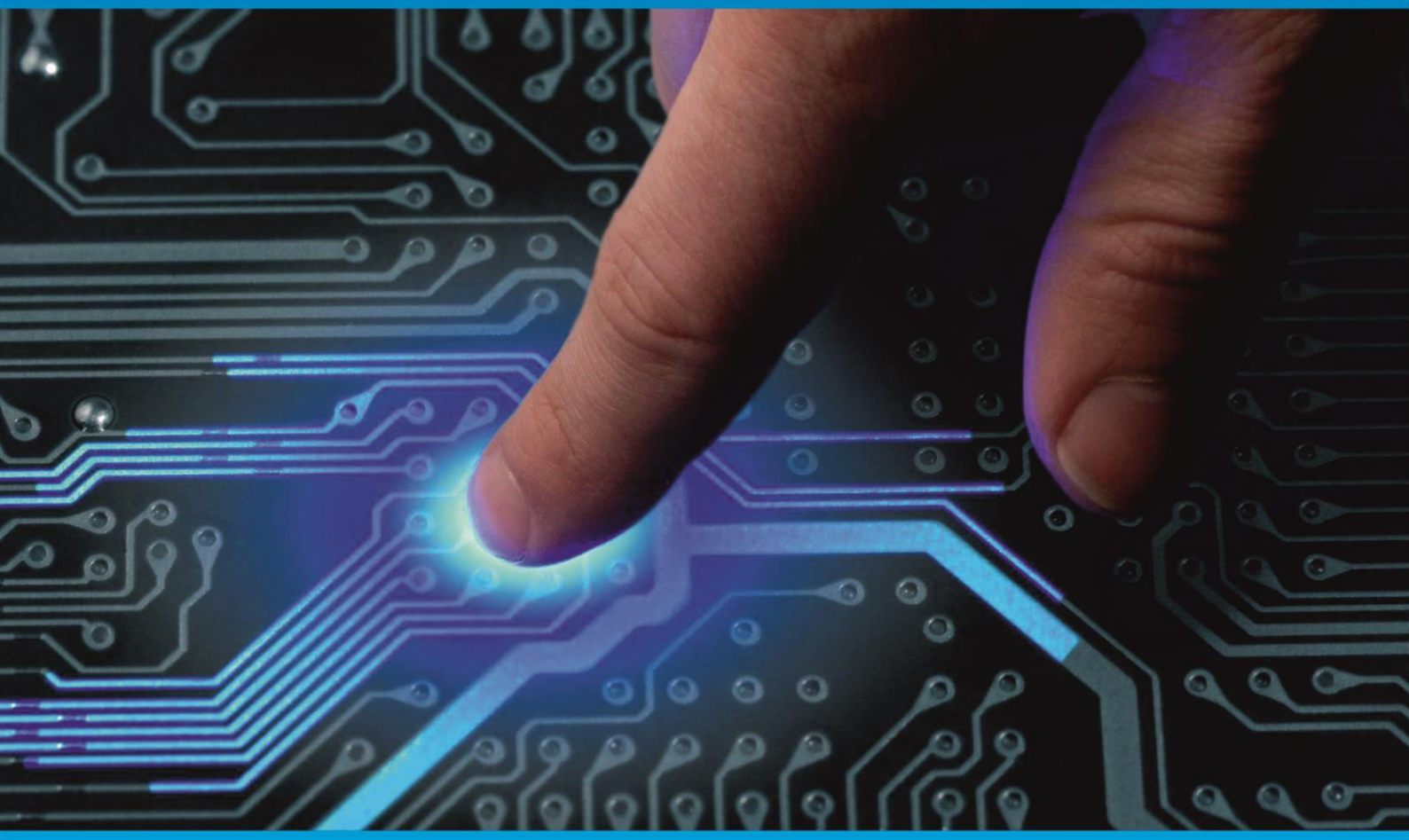
IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 9, Issue 2, February 2021

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 7.488

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.488 |

|| Volume 9, Issue 2, February 2021 ||

| DOI: 10.15680/IJIRCCE.2021.0902008 |

Driver Drowsiness Detection &Accident Prevention System using Machine Learning and IoT

Aditya Dongre[1], Akshay Kale[1], Rushabh Tantak[1], Vishal Gavali[1], Prof. Gauri Bhagat [2]

B.E. Student, Dept. of IT, K.J.E.I's Trinity College of Engineering & Research, Pune, India[1]

Professor, Dept of IT, K.J.E.I's Trinity College of Engineering & Research, Pune, India[2]

ABSTRACT: Over the last decade, there has been an exponential increase in number of automobiles. But this increase has been also directly proportional regarding driving related accidents too. Research shows a lot of these accidents are due to distracted driver or if the driver is fatigued on the longer drive duration. There have been many approaches based on image processing to detect the driver's fatigue and drowsiness status. However, those approaches are not necessarily the best as some might give false true predictions.In this paper, we are going to implement a system that will detect if the driver is feeling drowsy or not based on live video feed using EAR (Eye Aspect Ratio) Algorithm. The system will also alert the distracted driver in case of any possible collision using IoT sensor implementation.

KEYWORDS: EAR (Eye Aspect Ratio), Image Recognition, Machine Learning, IoT

I. INTRODUCTION

In this paper, driver drowsiness detection algorithm based on the state of eyes of the driver which is determined by his iris visibility has been implemented. If eyes remain in one state either open or closed longer than expected time as well as if the driver is not looking straight front, it is an indication that driver is drowsy and then the system warns the driver. System is capable of detecting the state of eyes with or without the regular glassesPreviously there has been no such system implemented in commercial vehicles which can actively prevent the driver from losing his focus while driving which ultimately prevent a possible collision or accident.

Image Recognition is a subset of Machine Learning which heavily emphasizes analysis on visual data like image and video. Real-time processing of visual data will allow the system to give quick responses and with the use of current trending technologies, the processing is faster too.

II. RELATED WORK

Some efforts have been reported in the literature on the development of the not-intrusive monitoring drowsiness systems based on the vision.

1) Belal Alshaqaqi, Abdullah Salem, Baquhaizel developed a Vision based system for Driver Drowsiness Detection. In this paper, a module for Advanced Driver Assistance System (ADAS) is presented to reduce the number of accidents due to drivers fatigue and hence increase the transportation safety; also this system deals with automatic driver drowsiness detection based on visual information and Artificial Intelligence. The methods used for these tasks are: skin color for face detection, symmetry for eye localization, also the state of eye is given by the Hough transform for circles. The driver state are measured by calculating PERCLOS (percentage of eye closure) which stands for frequency of closure of eye.

2) Mohammad Amin Assari, Mohammad Rahmati developed Driver Drowsiness Detection using Face Expression Recognition. In this proposed system, the sequence of images that have been acquired by the proposed hardware are then injected as input to the system. The facial components including eyebrow, eye and mouth is extracted on the face detected initially. It was heavily based on IR sensitive camera and IR sensors to detect the various facial structures even in low light conditions.

3) Maninder Kahlon and Subramaniam Ganesan created Driver Drowsiness Detection System Based on Binary Eyes Image Data. In this paper, driver drowsiness detection algorithm based on the state of eyes of the driver which is determined by his iris visibility has been implemented. After capturing an image rectangular eyes area was adjusted to

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.488 |

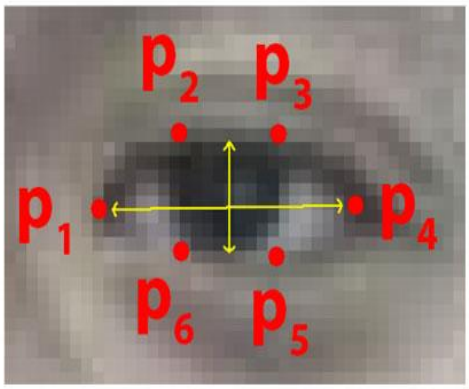
|| Volume 9, Issue 2, February 2021 ||

| DOI: 10.15680/IJIRCCE.2021.0902008 |

reduce the noise. RGB to Gray scale and finally to Binary image conversion is with a suitable threshold value. A median filter was used to reduce the noise and then the image was smoothened. The drowsiness detection is done based on the conditions like Black to White pixels ratio, number of pixels in the column greater than the threshold value and eye's shape.

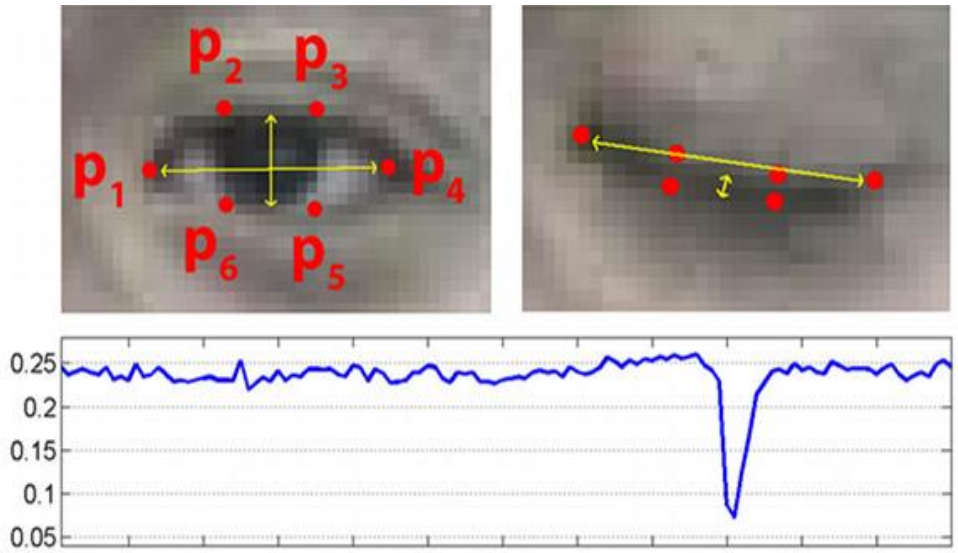
III. PROPOSED ALGORITHM

A computer vision system that can automatically detect driver's drowsiness in a real time video stream and then play an alarm if the driver appears to be drowsy. This system will work independently along with collision detection sensor and GSM module for emergency contacts and alert.



*EAR (Eye Aspect Ratio)*Fig 1.1

Each eye is represented by 6 (x, y)-coordinates, starting at the left-corner of the eye (as if you were looking at the person)and then working clockwise around the eye:
It checks 20 consecutive frames and if the Eye Aspect ratio is less than 0.25, Alert is generated.



$$\mathrm{EAR} = \frac{\|p_2 - p_6\| + \|p_3 - p_5\|}{2\|p_1 - p_4\|}$$

Fig 1.2

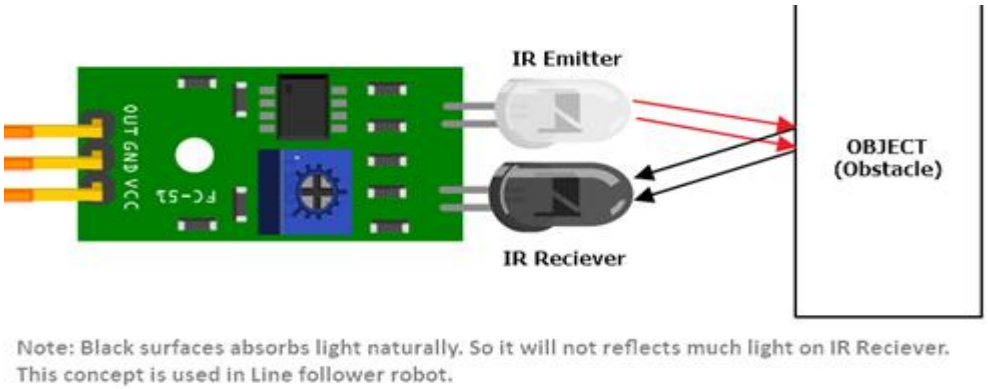
| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.488 |

|| Volume 9, Issue 2, February 2021 ||

| DOI: 10.15680/IJIRCCE.2021.0902008 |

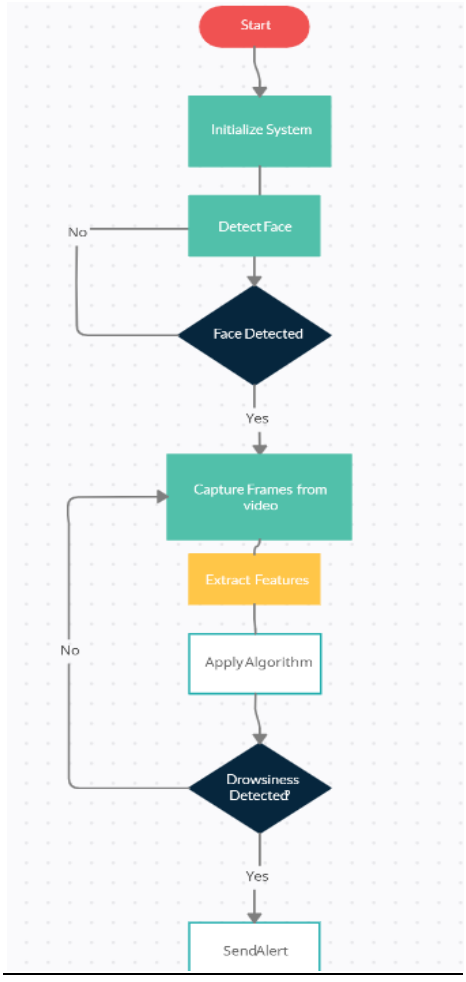
This will detect if driver is feeling drowsy and then will give an alarm to alert the driver and take necessary action.Additional features of the system include GSM module to alert the emergency contacts of driver regarding any unfortunate possibility.A distance/proximity sensor will also alert the driver in regarding any possible collision in case the driver is not paying attention.(Fig 1.2)

Fig1.3



The collision sensor will give an alert in case of any sudden obstruction in front of the vehicle while driving. This will bring the driver to an alert position and will nudge him to take necessary precautions.

System Flow Diagram



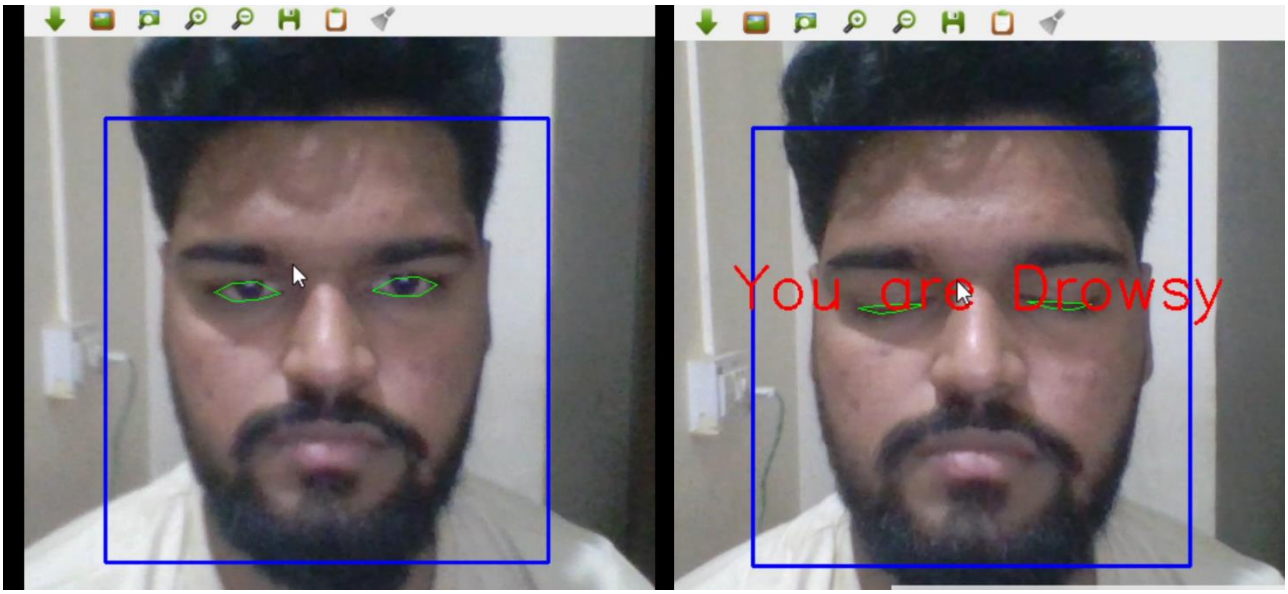
| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.488 |

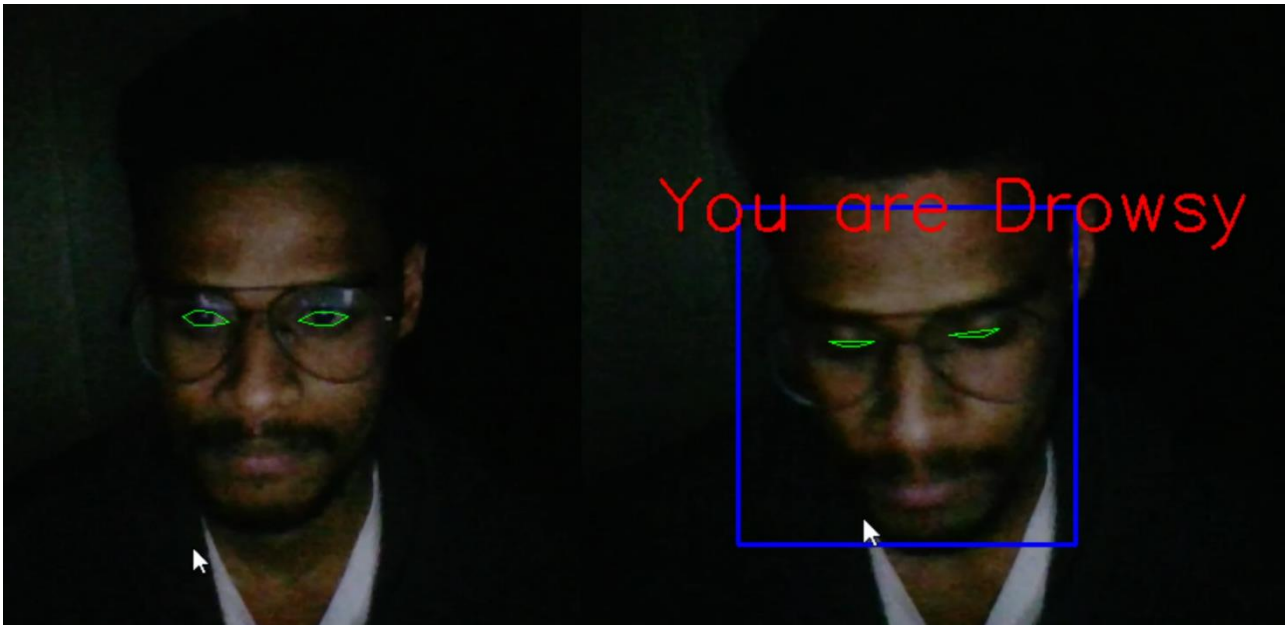
|| Volume 9, Issue 2, February 2021 ||

| DOI: 10.15680/IJIRCCE.2021.0902008 |

IV. SIMULATION AND RESULTS

The simulation studies involve testing the system in both day light and low light conditions.
As shown below the face of the driver is accurately detected and the drowsiness is identified.





From the above test results it is clear that the system will be highly accurate even if the driver is wearing glasses and even work in low light conditions.

V. CONCLUSION AND FUTURE WORK

This research project proposes a new system for driver drowsiness detection. Also there is a feature that alerts the driver in case of possible collision. The algorithm that has been used gives high accuracy and is faster than other complex algorithms that have been implemented before. Prior techniques used were able to take decisions based on attributes like eye closure and eye blink rate. While we have considered Eye Aspect Ratio for classifying the subject as drowsy or non-drowsy. The proximity sensor will alert the driver in case of possibility of accident.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.488 |

|| Volume 9, Issue 2, February 2021 ||

| DOI: 10.15680/IJIRCCE.2021.0902008 |

Although the proposed system is good enough to give sufficient results, still there is a lot of room for innovations and improvements in this system with newer technological innovations

REFERENCES

1. A. Malla, P. Davidson, P. Bones, R. Green and R. Jones, "Automated Video-based Measurement of Eye Closure for Detecting Behavioral Microsleep", in 32nd Annual International Conference of the IEEE, Buenos Aires, Argentina, 2010.
2. P. Viola and M. Jones, "Rapid Object Detection using a Boosted Cascade of Simple Features", in Proceedings of the IEEE Computer Society Conference on Computer Vision and Pattern Recognition, 2001.
3. R. Lienhartand J. Maydt, "An Extended Set of Haar-like Features for Rapid Object Detection", in Proceedings of the IEEE International Conference on Image Processing, 2002.
4. S. Lawoyin, X. Liu, D.-Y. Fei, and O. Bai, "Detection Methods for a Low-Cost Accelerometer-Based Approach for Driver Drowsiness Detection," *IEEE International Conference on Systems, Man, and Cybernetics*, San Diego, CA, USA, October 2014.
5. A.G. Correa, L. Orosco, and E. Laciar, "Automatic detection of drowsiness in EEG records based on multimodal analysis," *Med. Eng. Phys.*, 36, 244–249, 2014.
6. S. Lawoyin, X. Liu, D.-Y.Fei, and O. Bai, "Detection Methods for a Low-Cost Accelerometer-Based Approach for Driver Drowsiness Detection," *IEEE International Conference on Systems, Man, and Cybernetics*, San Diego, CA, USA, October 2014.
7. P. Wang, L. Shen "A Method of Detecting Driver Drowsiness Stateased on Multi-features of Face," *5th International Congress on Image and Signal Processing (CISP)*, 2012..
8. C. Papadelis, Z. Chen, C.K. Papadeli, "Monitoring Sleepiness with Onboard Electrophysiological Recordings for Preventing Sleepdeprived Traffic Accidents," *Clinical Neurophysiology*, 118 (9):1906-1922, 2007.
9. Y. Takei, and Y. Furukawa, "Estimate of driver's fatigue through steering motion," *IEEE International Conference on Systems, Man and Cybernetics*., vol. 2, pp. 1765–1770, 2005.
10. J.C. McCall, M.M. Trivedi, D. Wipf, and B. Rao, "Lane change intent analysis using robust operators and sparse bayesian learning," in *CVPR: Proceedings of the IEEE Computer Society Conference on Computer Vision and Pattern Recognition (CVPR) - Workshops*, p.59, Washington, DC, USA: IEEE Computer Society, 2005.
11. A. Azman, Q. Meng, and E. Edirisinghe, "Non intrusive physiological measurement for driver cognitive distraction detection: Eye and mouth movements," *3rd International Conference on Advanced Computer Theory and Engineering (ICACTE)*, 2010.
12. R. Pooneh. And R. Tabrizi, and A. Zoroofi, "Drowsiness Detection Based on Brightness and Numeral Features of Eye Image," Fifth International Conference on Intelligent information Hiding and Multimedia Signal Processing, 2009.

INNO SPACE

SJIF Scientific Journal Impact Factor

Impact Factor:
7.488

ISSN INTERNATIONAL STANDARD SERIAL NUMBER INDIA

निस्केयर NISCAIR

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

9940 572 462 6381 907 438 ijircce@gmail.com

www.ijircce.com

Scan to save the contact details