RESEARCH ARTICLE | SEPTEMBER 05 2023

Driver drowsiness estimation using iot and image processing

Madhavi Karanam; Sai Rakesh Reddy Donti Reddy ✉;
Yaswanth Reddy Devarapalli; Nikhil Billakanti; K. Milind

+ Author & Article Information

AIP Conf. Proc. 2754, 090003 (2023)

https://doi.org/10.1063/5.0169527

Internet of Things (IoT) is a recently emerging methodology used widely in many applications for end-to-end wireless data transmission. The advancements in image processing and associated inventions in vision-based applications offer numerous processing facilities which can detect the driver's drowsiness for both safety of the driver and other people. The steady increase in the rate of road accidents is noted due to abnormal behavior of peoples and alcohol consumption etc. Detecting the driver drowsiness over a complex environment is a difficult task to accomplish which demands unique image processing and sensor set up a model which can be used to detect the drowsiness based on data processed that is sensed automatically. To meet this goal, a new drowsiness and alcohol consumption detection System is proposed using raspberry pi IoT device along with sensor information. Here camera input is used to capture the driver's static appearance and processed through eye detection and SMS notification is also forwarded to the concerned person using GSM which includes location information. To identify the location of the vehicle in case of accidents SMS notification also includes GPS values. This system uses integrated design modules which are processed using the raspberry pi. The accident prevention system introduced in this work comprises sensor-based alcohol detection, vision monitoring, and IoT device and GSM information sharing through GSM. The system is tested over highly complex working environments and certain parameters are also calculated to validate the performance metrics.

Topics

Internet of things, Data processing, Image processing

REFERENCES

1. Chowdhury, Anuva, et al, *IEEE Sensors Journal* 18.8 (2018), pp. 3055–3067.
https://doi.org/10.1109/JSEN.2018.2807245
Google Scholar Crossref

2. Forsman, Pia M., et al, *Accident Analysis & Prevention* 50 (2013), pp. 341–350.
https://doi.org/10.1016/j.aap.2012.05.005
Google Scholar Crossref

3. Rohit, Fnu, et al, *IET Intelligent Transport Systems* 11.5 (2017), pp. 255–263.
Google Scholar Crossref

4. Garg, Hitendra, "Drowsiness Detection of a Driver using Conventional Computer Vision Application," 2020 International Conference on Power Electronics & IoT Applications in Renewable Energy and its Control (PARC, IEEE, 2020).
Google Scholar Crossref

5. Uma S, and R. Eswari, *Journal of Reliable Intelligent Environments* (2021), pp.1–25.

6. Jabbar, Rateb, et al, "Real-time driver drowsiness detection for an android application using deep neural networks techniques," *Procedia computer science* 130 (2018), pp. 400–407.
https://doi.org/10.1016/j.procs.2018.04.060
Google Scholar Crossref

7. Hu, Shuyan, and Gangtie Zheng, *Expert Systems with Applications* 36.4 (2009), pp. 7651–7658.
https://doi.org/10.1016/j.eswa.2008.09.030
Google Scholar Crossref

8. Tan, Bo, Karl Woodbridge, and Kevin Chetty, *IEEE Transactions on Aerospace and Electronic Systems* 52.5 (2016), pp.2596–2603.

https://doi.org/10.1109/TAES.2016.140207
Google Scholar Crossref

9. Tangsuksant, Watcharin, et al "Directional eye movement detection system for virtual keyboard controller," The 5th 2012 Biomedical Engineering International Conference, (IEEE, 2012).
Google Scholar Crossref

10. Bala, U.K. Ceerthi, and T. V. Sarath. "Internet of things based Intelligent Drowsiness Alert System," 2020 5th International Conference on Communication and Electronics Systems (ICCES, IEEE, 2020).
Google Scholar Crossref

11. Islam, Md Motaharul, et al "An Algorithmic Approach to Driver Drowsiness Detection for Ensuring Safety in an Autonomous Car," 2020 IEEE Region 10 Symposium (TENSYMP, IEEE, 2020).
Google Scholar Crossref

12. Borulkar, Neha, et al "Drowsiness detection and monitoring the sleeping pattern using brainwaves technology and IoT," 2018 2nd International Conference on I-SMAC (IoT in Social, Mobile, Analytics, and Cloud)(I-SMAC) I-SMAC (IoT in Social, Mobile, Analytics, and Cloud)(I-SMAC, 2018 2nd International Conference on. IEEE, 2018).
Crossref

13. Hossain, Md Yousuf, and Fabian Parsia George. "IOT based real-time drowsy driving detection system for the prevention of road accidents," 2018 International Conference on Intelligent Informatics and Biomedical Sciences (ICIIBMS, Vol. 3, IEEE, 2018).
Crossref

14. Jang, Seok-Woo, and Byeongtae Ahn, *Sustainability* 12.7 (2020), 3037. https://doi.org/10.3390/su12073037
Google Scholar Crossref

15. Biswal, Anil Kumar, et al "IoT-Based Smart Alert System for Drowsy Driver Detection," *Wireless Communications and Mobile Computing* (2021).
Google Scholar

16. Razeeth, Ms. Suhail, Rkar Kariapper, and S. Sabraz Nawaz. "Accident Mitigation System with Drowsiness

Detection: A Machine Learning and IoT with Hybrid Approach," 2021 International Conference on Information Technology (ICIT, IEEE, 2021).
Google Scholar Crossref

17. Zhang, Chao, et al *IEEE Access* 7 (2019), pp. 11829–11843.
https://doi.org/10.1109/ACCESS.2019.2891971
Google Scholar Crossref

18. Kompalli, Prasanna L., et al *International Journal of Sensors Wireless Communications and Control* 11.7 (2021), pp. 725–732.
https://doi.org/10.2174/2210327910666201218162536
Google Scholar Crossref

19. Vasudevan, Shriram K., et al *Advances in Distributed Computing and Machine Learning*, (Springer, Singapore, 2021), pp. 305–316.
Google Scholar Crossref

20. Varghese, Renju Rachel, et al "An Integrated Framework for Driver Drowsiness Detection and Alcohol Intoxication using Machine Learning," 2021 International Conference on Data Analytics for Business and Industry (ICDABI, IEEE, 2021).
Google Scholar Crossref

21. Dua, Mohit, et al *Neural Computing and Applications* 33.8 (2021), pp. 3155–3168.
https://doi.org/10.1007/s00521-020-05209-7
Google Scholar Crossref

22. Jamshidi, Samaneh, et al *Multimedia Tools and Applications* 80.10 (2021), pp. 16045–16058.
https://doi.org/10.1007/s11042-021-10542-7
Google Scholar Crossref

23. Phan, Anh-Cang, et al *Applied Sciences* 11.18 (2021), 8441. https://doi.org/10.3390/app11188441
Google Scholar Crossref

This content is only available via PDF.