Synergy: Cross-Disciplinary Journal of Digital Investigation
(ISSN 2995-4827) VOLUME 02 ISSUE 12, 2024

DEVELOPING AN APPLICATION TO TRAIN DRIVERS FOR EFFICIENT AND SAFE TRUCKING WITH THE INTEGRATION OF TRACKING TECHNOLOGY

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Abstract:

The article presents integrating GPS trackers and Amazon Relay platforms into driver training systems, enhancing fleet efficiency, freight security, and reducing risks. It highlights using AI-based virtual assistants to provide real-time driver training, behavior analysis, and route optimization.

Introduction

Freight transportation lies at the heart of the world economy and brings goods and raw materials needed for most industries to function. The delivery process is where proper management should be ensured because this will ensure cost reduction, safety, and delivery on time. One of the most important elements in modern transportation management is tracking devices, such as GPS trackers and platforms like Amazon Relay, allowing the obtaining of real-time information regarding the location, speed, route, and arrival time of a vehicle. Such tracking devices allow companies to track fleet movements, analyze various characteristics of drivers, and optimize logistics. For the driver himself, tracking technology is very important for navigation, giving the optimum routes and warning of potential traffic jams. These tools, however, require a certain knowledge and set of skills in order to be used effectively.

One of the big challenges is drivers' ignorance about the use of modern tracking devices. Misuse or inappropriate use of these technologies may cause a series of serious impacts that might result in traffic accidents, company financial losses, or fines against logistic platform violations. Much of the faulty communication includes incorrect route configuration, ignoring system alerts, and failing to respond to real-time changes.

It follows, therefore, that it is necessary to develop a driver training program that will integrate the operation of tracking devices. The errors will be reduced and driver interaction with the equipment will improve; likewise, it will considerably enhance the safety of freight transportation and its cost-effectiveness.

Literary Review

The modernization of the vehicle tracking system has been based on the development of the tracking technologies like GPS, GSM, and GIS. Such a system allows tracking not only the vehicle position but also controlling some important functions like ignition and door lock. This was reported by Mukhtar [1], describing the integration of GPS and vehicle control functions.

Active learning and real-time systems have also become important tools to improve the accuracy of vehicle recognition and tracking. One study that was conducted by Sivaraman and Trivedi [2] has demonstrated how effective active learning can be in adaptive automotive on-road recognition and tracking systems.

Integration of artificial intelligence into automotive systems, peripherals, and cloud computing allows us to build high-performance platforms. This is possible using the AI prototyping framework, as explained by Grigorescu [3]. Under this framework, autonomous vehicles were using hybrid resources for training and deploying neural networks.

This programmable platform, like the OS-ELM, has the possibility of developing bespoke driver assistance systems, which was illustrated in the work of delCampo [4]. Integration of such a system increases the vehicle adaptivity and performance through machine learning algorithms.

Recent studies have also focused on the contribution of deep learning to route planning and vehicle autonomy. Kisačanin [5] presented an overview of using supercomputers for training and deploying deep neural networks in autonomous vehicles.

Research Methodology

The purpose of the research methodology is to create an interactive application that will walk a user through how to learn and exercise some of the main freight tracking platforms' functionalities in demo mode, such as Amazon Relay, Trucker Tools, and MacroPoint. It was focused on training, coaching, and operational support for drivers, using the latest digital technologies such as artificial intelligence (AI), virtual assistants, and simulation interfaces. The research started with the analysis of current practices and challenges faced by drivers. This was done through interviews with drivers and logistics company managers to identify common challenges: lack of knowledge of how the app works, forgotten instructions after initial training, and common mistakes made when using the platform. We looked at Amazon Relay, Trucker Tools, and Macropoint to determine what should be covered in the training and support process.

Based on the information gathered, the architecture of the application was developed.

It is a training module: an interactive course, step-by-step instructions, videos, and test tasks; and a demonstration module where the user can train safely in a simulating interface. One more important part of this application is the virtual assistant developed on artificial intelligence technology. The main role of this assistant is to provide drivers with fast and personalized on-the-job support. Underpinning the virtual assistant itself is artificial intelligence, which analyzes user behavior and provides tailored suggestions, automatically correcting mistakes. If a driver has forgotten how to update the status of a delivery on the Amazon Relay platform, for example, the assistant will provide step-by-step instructions or display a video tutorial relevant to what the user is doing at that very moment. These are using machine learning algorithms, which can recognize typical situations and provide optimal solutions. The assistant also backs the function of communication and works both in text and voice interfaces. This will enable the driver to get assistance without diverting their attention from the primary task of driving.

It has the capability of processing data in real time, which is one of its key features. It includes driving behavior analysis, probable steering problem identification, and suggesting the corresponding corrections. NLP technology is used, where virtual assistants comprehend users'

questions, interpret the queries, and present answers that are accurate and understandable. Moreover, the app incorporates artificial intelligence algorithms integrated into its knowledge base, so that assistants will always learn and answer according to users' feedback.

Another important feature of AI is error diagnosis and rectification. For example, if a driver has entered wrong route data or forgotten to check a particular delivery status, the assistant is able to automatically offer rectification or, otherwise, warning of potential consequences. That way, it reduces errors that could cause disturbances in the logistics process.

It can also give preventive suggestions, for example, reminding the driver to update his or her status or suggesting a better route through which one can navigate based on an analysis of the traffic situation. Moreover, AI allows for system flexibility: an algorithm analyzes the most frequent users' queries based on their interaction, so you could expand the knowledge base in order to add new support scenarios. For example, the system captures many questions about how certain features in the Trucker Tools platform work, and as a result, the area is updated with the content being easy to understand and accessible. This, together with the artificial intelligence technologies, makes it a possibility to design applications that will not only educate users but also assist them in real time, hence making the process of working on the cargo tracking platform more convenient and fast. Moreover, in October, a quick access module was designed, including knowledge databases with step-by-step instructions and video tutorials, together with search functionalities. The application interface is user-friendly and logically structured, making it easy for users to find their way around tutorials, demos, and support.

Features of this app give us the opportunity to use demo versions of the platforms under amazon Relay, Trucker Tools, and MacroPoint in order to simulate key functionalities, including route setup, load management, route status tracking, and delivery status updates.

These functions were implemented after research concerning the interfaces and APIs of the platform, enabling us to create a simulation that would look real without actually linking a user account. Application testing was done in three stages. During pilot testing, a small sample of drivers used the app as it was being tested for interface friendliness, virtual assistant accuracy, completeness of training materials, and user-friendliness overall. A full-scale test followed with a larger sample to measure training time and driver's confidence in using the platform after completion of the course. Under closer inspection were the functionality of the virtual assistant, quality of recommendations provided and its ability to satisfactorily handle the concerns of the users. oct. The application is designed for updating on a regular basis. It allows adding new platforms, extending the knowledge base, and optimization of the virtual assistant's algorithms by analyzing interactions and feedback. Its artificial intelligence can thus act not only as a learning tool but also as a full-fledged partner of the driver in supporting and making the interaction with the digital platform intuitive and comfortable.

Conclusion

This research has developed concepts and methodologies to create interactive applications that combine training, support and demonstration of common functions of a freight tracking platform. The proposed application aims to address important challenges such as training drivers to use the logistics platform efficiently, reducing application errors and improving overall driver efficiency. One of the key elements of this concept is a virtual assistant based on artificial intelligence technology. Its task is to assist drivers in real time, provide personalized recommendations, diagnose and correct errors, and provide access to training materials in a convenient format. Artificial intelligence is the application used to analyze user behavior and automatically update the knowledge base so that the application remains relevant and effective. The proposed architecture of the application includes interactive training modules, hands-on tools to work on platforms such as Amazon Relay, Trucker Tools and MacroPoint. It includes demonstration simulations and modules

for quick access to instructions and frequently asked questions. This structure allows drivers to provide both initial training and operational support while on the job. The development of this app represents an important step towards the adoption of modern digital technologies in the transportation sector. It allows drivers to quickly adapt to complex logistics, reduces the likelihood of errors and increases efficiency. The proposed solution will also help transport companies looking to optimize employee training and support processes in a rapidly evolving digital world.

List of references

1. Mukhtar, M. (2015). GPS based Advanced Vehicle Tracking and Vehicle Control System.
2. Sivaraman, S., & Trivedi, M. (2010). A General Active-Learning Framework for On-Road Vehicle Recognition and Tracking.
3. Grigorescu, S., et al. (2020). Cloud2Edge Elastic AI Framework for Prototyping and Deployment of AI Inference Engines in Autonomous Vehicles.
4. del Campo, I., et al. (2019). A versatile hardware/software platform for personalized driver assistance.
5. Kisačanin, B. (2017). Deep Learning for Autonomous Vehicles.
6. Khaydarova M.Y., Khaydarov M.M. DEVELOPMENT OF SOFTWARE FOR MONITORING CARGO DURING TRANSPORTATION // Universum: Technical Sciences : electronic scientific journal. 2024. 1(118). URL: https://7universum.com/ru/tech/archive/item/16632
7. Atazhanov M.Ch., Sayliev M.I., Farmonov Sh.Sh. Automated control systems in urban passenger transport Achievements of science and education. 2020. No. 3 (57).
8. Markelov V.M. Creation of cartographic logistics models for logistics Earth Sciences. 2012. No. 3. P.54-58
9. Gagarina L.G., Kiselev D.V., Fedotova E.L.. Development and operation of automated information systems. - M.: Forum, Infra-M, 2015. - 384 p.
10. Abasxanova X.Yu., Amirsaidov U.B. Mikgoroesessorlar. Oliy o'quv yurtlari uchun o'quv qo'llanma. "Fan va texnologiyalar" . Toshkent -2016. - 272b.
11. Abasxanova, X.Yu. 5.55.01.01- Telekommunikatsiya texnologiyalar (telekommunikatsiya,teleradioeshittirish.mobil aloqa) ta'lim oluvchi talabalar uchun darslik. "Muhr-press", Toshkent -2022. -284b.
12. Abaskhanova, X.Yu, Juraev l.N., Khoshimova F.R. 5.55.01.01- Telekommunikatsiya texnologiyalar yo'nalishida ta'lim oluvchi talabalar uchun o'quv qo'llanma. "Muhr-press", Toshkent -2022. -200b.
13. Abasxanova X., Abdullaev U. Acmeological approach as the development of educational process. International Scientific Journal "Universum: Technical Sciences". 2022, Issue: 12(105), Part 6, -P.58-61 DOI - 10.32743/UniTech.2022.105.12
14. Abaskhanova, H.Y. "Applying infocommunication technologies to agriculture." Current problems of modern science. Xalqaro Conference. Chicago USA-2022.
15. Abasxanova, X. Yu. "Modeling digital devices with the help of vhdl programming language. Current problems of modern science." International conference. Chicago USA. 2022.
16. Abaskhanova X. Applying infocommunication technologies to agriculture. International scientific and current research conferences, 2022., 27-29. Retrieved from https://orientalpublication.com/index.php/iscrc/article/view/615

17. Khalima Abaskhanova. Analysis of information and communication technologies in green environment monitoring. ICISCT 2022. https://www.icisct2022.org(Scopus)
18. X.Yu.Abasxanova, J.B. Baltayev, N.V. Yaronova O‘zbekiston Respublikasi Transport vazirligi tomonidan oliy o‘quv yurtlarining 5350700 - "Radioelektron qurilmalar va tizimlar" (temir yo‘l transporti) ta‘lim yo‘nalishi talabalari uchun darslik. №332-005.Toshkent-2023.-400b.
19. Abasxanova X.Yu Application of information technologies for remote monitoring of greenhouse land plots. International Scientific Journal "Universum: Technical Sciences". 2023, Issue: 1(106), part 4, - P. 31-35 // Universum: Technical Sciences : electronic scientific journal. 2023. 1(106). URL:https://7universum.com/ru/tech/ar-chive/item/14878