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DASH: A Smart Platform for New-Driver Progress with Future-Ready AI Integration

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ABSTRACT

The integration of Artificial Intelligence (AI) in mobile application development has significantly enhanced mobile computing services for end users. AI provides intelligent support and enables users to manage various mobile app functionalities automatically. In the context of assessing eligibility for obtaining a driving license, the Driving Academy - Schedule Hour (DASH) platform was developed to support key stakeholders, including the Road Transport Department (RTD) Malaysia, driving academies, and prospective drivers. DASH offers features that assist academy administrators, instructors, and students by serving as a centralized hub to track accumulated driving training hours and monitor progress toward test eligibility. Developed using the Flutter framework and Firebase and designed to run on mobile devices for end users and a web page for administrators, DASH addresses the need for real-time access to training progress for students and simplifies test management for administrators prior to official driving license issuance. Future developments of DASH will focus on integrating advanced artificial intelligence capabilities, including predictive analytics and adaptive learning models, to enhance user experience, optimize performance, and support intelligent decision-making within the mobile environment.

1. INTRODUCTION

Obtaining a driving license in Malaysia is a well-structured process regulated by the Road Transport Department (known as Jabatan Pengangkutan Jalan, JPJ). This multi-stage procedure is designed to ensure that every individual acquires the necessary theoretical knowledge and practical driving skills to become a safe and responsible road user. The journey begins with registration at a JPJ-approved driving academy,

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which acts as the central platform for both training and assessment. JPJ enforces a standardized national framework that all academies must adhere to, ensuring consistency in the training provided across the country. This framework includes two main components: (i) theoretical education, covering road laws, safety regulations, and responsible driving practices, and (ii) practical training, conducted by certified driving instructors.

The first module in the process is the Kursus Pendidikan Pemandu (KPP), a compulsory six-hour theoretical course that introduces learners to traffic laws, road safety principles, and the fundamentals of vehicle operation, which learners must attend and register via thumbprint verification, or their attendance does not count (Road Transport Department Malaysia (JPJ), 2025). Upon completing the KPP, learners are required to pass a computerized theory test, typically held at MyEG or approved centers to validate their understanding of driving regulations, where the pass mark is 42 out of 50 (Vishalini, 2025). Those who pass the theory test advance to the practical training phase, where they participate in hands-on driving lessons under professional supervision. After completing the required number of practical hours, learners must take and pass a Qualifying Test (QTI) at the driving academy or institute before they can register for the final practical driving test (Part II and Part III) administered by JPJ officers. While the licensing process is thorough and effective in preparing competent drivers, many driving academies still rely on manual, paper-based systems to manage registrations, class schedules, and student progress. This traditional approach often leads to administrative inefficiencies, highlighting the need for digital transformation within the driving education ecosystem. This study seeks to meet two research objectives:

(1) To develop DASH mobile application based on the requirements
(2) To explore the potential of AI features in DASH mobile application

1.1 Problem Background

Most driving academies face significant challenges due to their reliance on traditional, manual systems for managing class schedules and tracking student progress. As student enrollment increases, these outdated methods become increasingly strained, leading to delays, miscommunication, and difficulties in maintaining accurate records (Dayanghirang& Hernandez, 2022). In addition, the use of paper-based documentation not only raises administrative costs but also heightens the risk of data loss, damage or misplacement. These operational inefficiencies impact both students and instructors, underscoring the urgent need for a modern, digitalized system to streamline processes and improve overall efficiency. There are three main motivations for initiating DASH development:

(i) Most driving academies reliance on manual scheduling and communication processes leads to delays, miscommunication, and coordination issues among students, instructors, and administrators, ultimately reducing the overall efficiency of lesson management (Randles, 2021).

(ii) The use of paper-based systems to track driving lessons often results in errors and lost records, making it difficult for instructors to monitor student performance and for students to access their progress or determine test readiness (Menon et al., 2022).

(iii) Without a digital system, driving academies lack real-time communication, causing students to miss important updates on test dates, practice sessions, and announcements, which negatively impacts overall operational efficiency (Jones & Graham, 2020).

In many educational and training institutions, traditional manual methods have long been the foundation of daily operations. These typically involve paper-based systems for scheduling lessons, tracking student progress, and delivering notifications. Although these approaches have been used for decades, they pose considerable challenges in today's fast-paced, technology-driven environment. Research highlights that manual processes are often inefficient, leading to delays in communication, errors in

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scheduling, and difficulties in handling large volumes of data (Capstone Project et al., 2024). As a result, operations become slower, productivity declines, and overall user satisfaction is negatively affected.

1.2 Driving License Procedure

In practice, obtaining a driving license in Malaysia begins with the Kursus Pendidikan Pemandu (KPP01, a compulsory six-hour theoretical course mandated by the Road Transport Department (JPJ). This session is typically conducted at certified driving academies, such as Institut Memandu Ganda and covers essential topics including road safety, traffic rules, road signs and the responsibilities of drivers. Upon completion, participants receive a slip of attendance, which is a prerequisite for the next step, namely the computerized theory test. This test, known as JPJ Undang-Undang Test, comprises 50 multiple-choice questions designed to assess the candidate's understanding of Malaysian traffic laws and safe driving practices. A minimum of 42 to 45 correct answers is required to pass.

Upon passing the theory test, students receive their Learner's Driving License (LDL/L-license), which permits them to continue practical training. This phase includes 16 hours of practical lessons, 5.5 hours on a circuit and 10 hours on public roads for car learners and to track these completed hours, Ganda uses a physical lesson progress card, which is prone to being lost or forgotten by students. For scheduling lessons, most driving academies processes remain manual. Candidates must communicate directly with their instructors, either face-to-face or by phone, to book a suitable date for their lessons or they are required to visit the academy counter to manually book their lesson dates. This fragmented scheduling process can be inconvenient for students and difficult to manage efficiently.

1.3 Digital Solution

Web-based systems and mobile applications both offer digital solutions for managing data and streamlining operations. Web-based systems, accessible through browsers, are often seen as more suitable for desktop use and can be easily integrated into an organization's existing infrastructure (Muhamad & Ibrahim, 2016). These systems provide broad accessibility, allowing users to log in from any device with an internet connection. However, they may lack the immediacy and portability of mobile apps, which are designed for on-the-go access. Mobile applications, on the other hand, are optimized for smartphones and tablets, making them more accessible for users who need to interact with the system in real time (Hermanto et al., 2023). The rise of mobile-first development further emphasizes the importance of user experience and mobility in today's digital solutions (Zhou et al, 2021).

According to prior study, mobile applications offer significant advantages in terms of user engagement, as they allow for push notifications, offline access, and more user-friendly interfaces tailored to small screens (Jones & Graham, 2020). Moreover, mobile apps provide a more personalized experience, as they can utilize device features like location services and cameras. In the context of driving academies, mobile applications provide instructors and students with immediate access to schedules, progress updates and notifications, which can be crucial for maintaining smooth operations (Menon et al., 2022). Therefore, the application will focus on mobile technology to provide a more dynamic, real-time solution compared to a traditional web-based system.

In the context of driving academies, mobile applications offer a range of advantages over traditional methods. By providing features like real-time scheduling, progress tracking and notifications, mobile apps improve communication between students, instructors and administrators. Additionally, they allow for easier access to learning resources, such as digital guides or practice test questions, enhancing the learning experience (Jones & Graham, 2020). The mobile application aims to leverage these benefits, providing students with an interactive platform to track their progress and stay informed, while allowing administrators to manage their tasks more efficiently.

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1.4 Mobile Application Technology

Mobile application technology has transformed how users interact with services, particularly in industries like education, healthcare and transportation. Mobile apps are now widely used for their convenience, accessibility and ability to provide real-time updates. With features such as push notifications, location-based services and easy access to data, mobile apps have become an essential tool for streamlining processes and improving user experiences (Randles, 2021). Research by Zawacki-Richter et al. (2019) shows that mobile apps are particularly beneficial in reducing the environmental footprint of organizations by minimizing paper use and making data management more efficient. In the context of driving academies, mobile applications offer a range of advantages over traditional methods. By providing features like real-time scheduling, progress tracking and notifications, mobile apps improve communication between students, instructors and administrators. Additionally, they allow for easier access to learning resources, such as digital guides or practice test questions, enhancing the learning experience (Jones & Graham, 2020). The mobile application aims to leverage these benefits, providing students with an interactive platform to track their progress and stay informed, also allowing administrators to manage their tasks more efficiently.

2. RELATED WORKS

There are three applications that are similar, namely, Jeddah Advanced Driving School, Bin Yaber Driving Institute and Total Drive, all designed for driving lessons progress. Table 1 describes the comparison of the features found in these three applications. Jeddah Advanced Driving School (iDrive) App (see Appendix A) is a mobile application that offers a comprehensive solution for managing accounts, providing a user-friendly interface and convenient features that make it an essential tool for anyone enrolled in Jeddah driving schools (Wadi Jeddah, 2025). It emphasizes smart solutions for learners' registration, tracking, theory modules and simulation-based instruction. Although public documentation on IDrive is limited, it is known to be part of broader smart mobility and driver education initiative in Saudi Arabia, integrating advanced technologies in their training ecosystem.

Bin Yaber Driving Institute (BYDI) (see Appendix B) is a mobile application by a driving institute based in Dubai, UAE, which has many branches, and provides a seamless and efficient learning experience on the road to becoming a skilled driver with a focus on providing unparalleled convenience and support (Bin Yaber Driving Institute, 2023). This app allows learners to register, access theory courses, book tests and receive real-time notifications all in line with the UAE's licensing system. It streamlines the entire driving education process in a centralized, mobile-first platform. Total Drive (see Appendix C) is a free-to-use mobile application that manages system for driving administrators, instructors and their students at United Kingdom (UK). Instructors can access their full diary, student information, student progress tracker, free lesson reminders, reflective logs, finances and bookkeeping and more. Students have access to lesson reminders, their progress towards their practical driving test, reflective logs and the ability to pay for lessons through the app (Total Drive Software Ltd, 2025). It focuses on administrative ease for instructors while delivering a personalized, paperless learning experience for students that support over 6,500 instructors and more than 150,000 students worldwide.

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Table 1. Comparison of related works

Criteria / Application	Jeddah Advanced Driving School (iDrive)	Bin Yaber Driving Institute (BYDI)	Total Drive
Platform	Mobile (Saudi Arabia)	Mobile (UAE)	Mobile (UK)
Main Users	Students and driving academy administrators	Students and instructors	Students and instructors
Core Features	Registration, theory module, progress tracking, simulation learning	Registration, theory access, booking tests, real-time notifications	Scheduling, progress tracking, lesson reminders, payments
Focus Area	Smart mobility and digital learning integration	Centralized learning and test booking	Full management system for instructor–student workflow
Strengths	Technology-driven with smart solutions	Seamless process aligned with national licensing system	Comprehensive progress tracking and admin tools
Limitations	Limited public documentation and access	Region-specific system (UAE only)	Mainly designed for instructor management, less localization
Relevance to DASH	Offers base for integrating learning and tracking modules	Inspires mobile-first scheduling and notifications	Strong reference for progress tracking and reporting features

3. METHODOLOGY

The seven phases shown in Table 2 develop DASH following Mobile Application Development Life Cycle (MADLC). The Mobile Application Development Life Cycle (MADLC) is considered the most effective method for creating a mobile app that highlighted how mobile development requires iterative cycles to manage hardware variability and user expectations across platforms (Vithani & Kumar, 2014). This method involved seven phases including Identification, Design, Development, Prototyping, Testing, Deployment and Maintenance. In this research, the phases will cover until fifth phase to fill the need of driving academies in fulfilling the academies' operation. The last two phases will be continued once the AI features are embedded into DASH.

Table 2. Research design

Phases	Phases Name	Objectives	Deliverables
1	Identification	To clarify the app's purpose, gather user requirements and understand the current system's challenges and technical needs.	Comprehensive requirements document. Key user requirements identified (personalized schedules, progress tracking, notifications).
2	Design	To plan the app's structure, interface and user experience, ensuring usability and functionality.	Design prototypes created with Figma. User interaction flowcharts (Admin, Instructor, Student), Data Flow Diagram (DFD) and Entity-Relationship Diagram (ERD) via Draw.io. Firabase database schema designed.
3	Development	To implement the app's functionality, including user authentication, schedule management, progress tracking and notifications.	Initial codebase developed using Visual Studio Code. Functional modules (authentication and scheduling). Firebase database integration with back-end code.
4	Prototyping	To create and refine prototypes to test functionality and user interaction.	Mid-fidelity prototype in Flutter. Evaluate prototype with feedback incorporated. High-fidelity prototype with a refined user interface and additional functionality.
5	Testing	To ensure the app is bug-free, user-friendly and compatible with various devices and operating systems.	Bug and usability testing reports. Verified app functionality across devices.

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6	Deployment	To release the app to its intended users and provide an onboarding guide.	App available on distribution platforms (Play Store, App Store) – FUTURE PLANNING
7	Maintenance	To keep the app up to date, improve features and address post-launch.	Regular updates and bug fixes. User feedback analysis reports. Enhanced features based on user needs – FUTURE PLANNING

4. RESULTS AND DISCUSSION

DASH is designed to cater to three main user roles: Admin, Instructor and Student. In the student section's dashboard, five fragment screens are used: Home, Schedule, Progress, Booking and Profile. The home page as shown in Fig. 1 allows students to book available driving sessions based on the instructor's schedule, view their personalized calendar, monitor their progress based on total hours completed and receive important notifications through the app. Fig. 2 demonstrated the instructor's dashboard with the total number of students assigned. Instructors can also see which students have sessions today, including a summary of today's attendance or an all-time attendance tracking in terms of pending, present or absent sessions.

Fig. 3 shows the administrator dashboard with five accessible pages; Dashboard, Students, Instructors, Notes and Calendar. A Log Out button is also available in that section. In the dashboard page, the admin can view the total data of students and instructors in the form of numbers or pie charts and can view the latest notes or information. A calendar is also provided to make it easier for the administrator to access important dates.

Fig. 1. Student dashboard

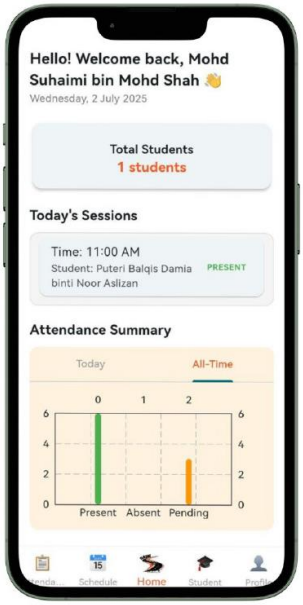

Fig. 2. Instructor dashboard

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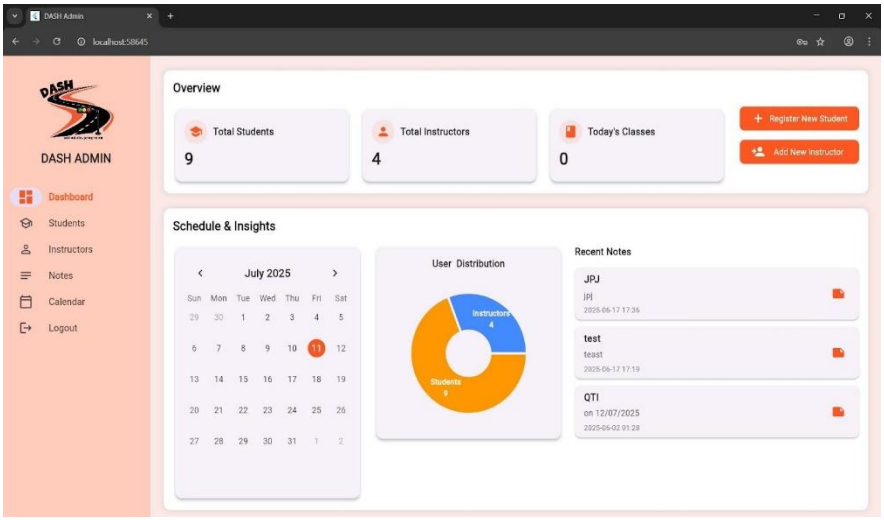

Fig. 3. Admin Dashboard Page

Fig. 1, 2 and 3 met first objective of DASH mobile application development, which is to solve several problems faced by the most driving academies. In future planning for the AI features, DASH is planning to have (i) AI Chat Assistant (see Fig. 4) (ii) Attendance Prediction (see Fig. 5) and (iii) AI-Powered Learning Module (see Fig. 6). In (i) and (ii), DASH considers having integration of an AI Chat Assistant in the learning platform allows students to ask questions and receive instant responses, enhancing their understanding and engagement outside of class hours. In addition, the system includes an AI-based attendance prediction feature that analyzes historical data such as weather conditions, weekends, and session timings to identify sessions at risk of low attendance. This helps instructors plan proactively and reduce absenteeism. Meanwhile in (iii), DASH offer students can complete computer-based quizzes directly through the app as part of their training modules. The AI will analyze their answers and identify specific topics where the student may need further revision. This personalized feedback supports targeted learning and helps students focus on areas that require improvement, ultimately increasing their chances of success.

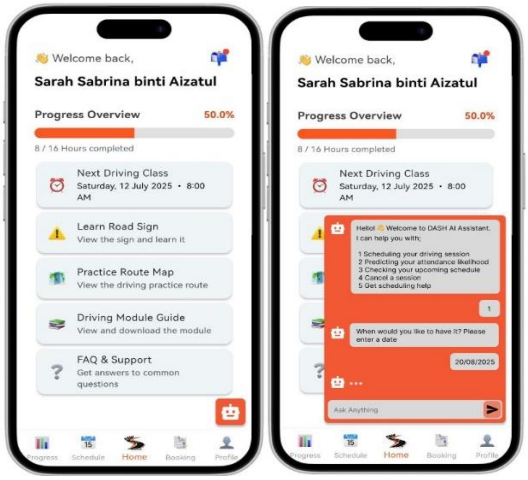

Fig. 4. AI chat assistant

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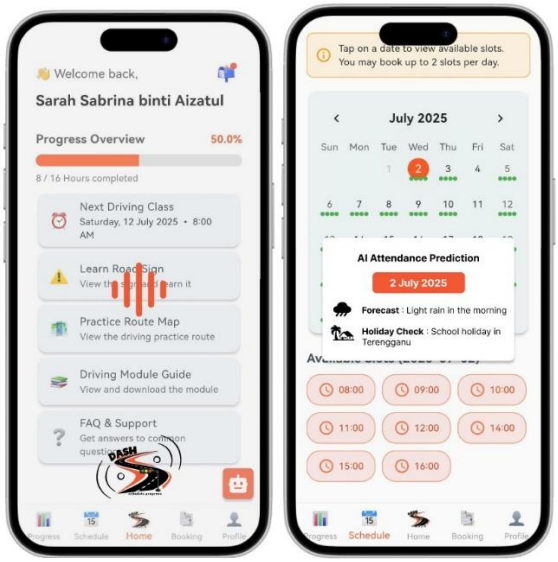

Fig. 5. Attendance prediction

Fig. 6. AI powered learning module

5. CONCLUSION AND FUTURE WORKS

The DASH mobile application was developed to address these challenges by digitizing and automating key processes. The app enables students to book driving sessions, view their progress based on completed hours and receive important notifications. Instructors can manage their schedules, approve bookings and update student training progress in real time. Administrators can oversee both students and instructor through a centralized dashboard. By introducing this system, DASH enhances communication, improves efficiency, reduces paperwork and offers a more systematic and environmentally friendly approach to managing driver training. This chapter will elaborate on the outcomes and benefits observed through the implementation and use of the DASH Mobile App. The integration of Artificial Intelligence (AI) in mobile application has revolutionized the way users interact with technology, enhancing automation, personalization and efficiency (Kumar et al., 2015). For the DASH application, incorporating AI in future updates can significantly elevate the platform's capabilities, especially in streamlining driving lesson management and improving the overall user experience for students, instructors and administrators.

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The successful development and implementation of the DASH (Driving Academy – Student Hour) Mobile App mark a significant achievement in fulfilling the research objectives and lay the groundwork for future AI driven interactive features. The DASH app delivers a centralized mobile solution for managing driving lesson schedules and tracking student progress. Developed specifically for driving academies and based on the case study of driving academy in Malaysia, the app offers role-based access for students, instructors and admins. It replaces manual scheduling and paper-based tracking systems with a streamlined, digital platform that improves efficiency, reduces administrative burden and minimizes the risk of data loss. By enabling real-time access to schedules, notifications and lesson progress, DASH has enhanced the overall performance and organization of driving academy operations.

6. ACKNOWLEDGEMENTS/FUNDING

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7. CONFLICT OF INTEREST STATEMENT

The authors agree that this research was conducted in the absence of any self-benefits, commercial or financial conflicts and declare the absence of conflicting interests with the funders.

8. AUTHORS' CONTRIBUTIONS

Nur Syauqina conducted the research, drafted the manuscript, and contributed to its revisions. Izzah Inani conceptualized the central research idea and provided the theoretical framework. Both Nur Syauqina and Izzah Inani designed the study and oversaw the research progress. Izzah Inani led the review process, guided the revisions, and approved the final submission of the article.

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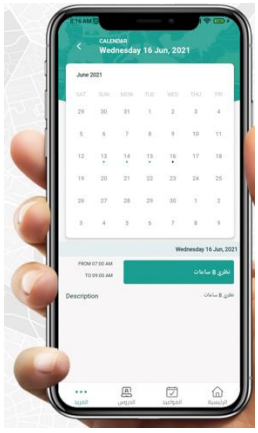
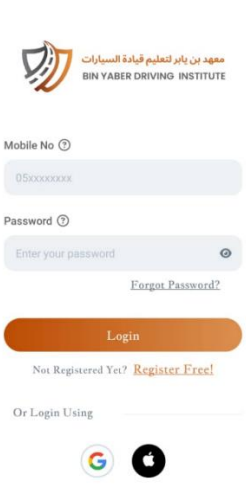
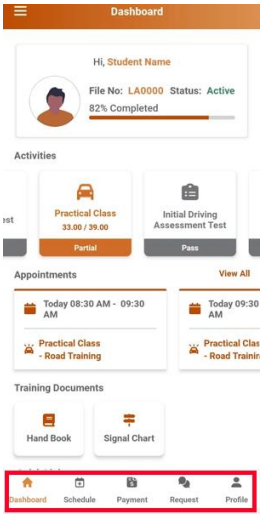
APPENDIX

A. Jeddah Advanced Driving School (iDrive) App



B. Bin Yaber Driving Institute (BYDI)





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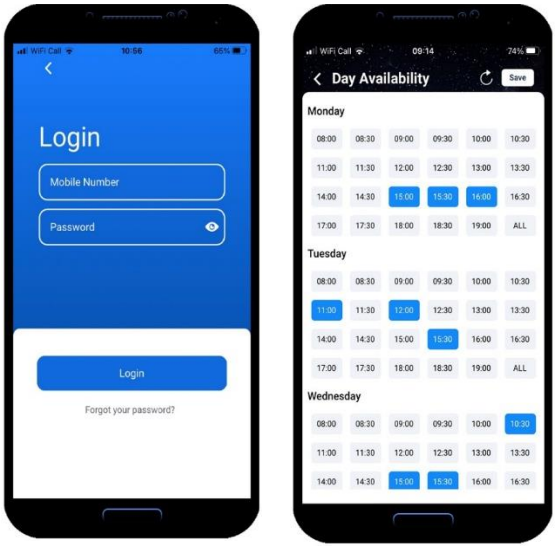
C. Total Drive



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