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Smart Driving License Test

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ABSTRACT: The venture centers around mechanizing the driving permit testing framework and informing results to up-and-comers through enrolled versatile numbers. During the driving test, applicants should exhibit their abilities before prepared experts, complying to explicit guidelines. Inability to meet these necessities brings about preclusion and the requirement for retesting. The proposed Driving Inclination Evaluation Framework intends to supplant the manual testing process, lessening human mediation and expanding exactness while going paperless. Utilizing sensors and an Arduino framework, the proposed structure screens competitors' presentation and stores information in a data set. Results are conveyed somewhat through a GSM module, upgrading street wellbeing and forestalling pay off by guaranteeing a fair evaluation of driving abilities.

KEYWORDS: Driving License Testing, Arduino System, Road Safety, GSM Module, Retesting Requirement

I. INTRODUCTION

The Smart Driving License Test modernizes the traditional driving test by integrating biometric verification, IoT technology, and AI-driven assessments to ensure only qualified drivers receive licenses. Traditional tests are often subjective, inefficient, and fail to monitor critical aspects of driving, such as mirror adjustments, lane discipline, and reaction time. The Smart Driving License Test eliminates these limitations by using IoT-based sensors and AI algorithms to provide a uniform, data-driven evaluation. Real-time data on key driving actions, such as speed management, steering control, and braking patterns, is collected and processed to deliver an objective score.

The system offers instant feedback on performance, allowing candidates to identify areas for improvement. It also accommodates drivers of varying skill levels and includes accessibility features, such as multiple language options and adaptive technology for individuals with disabilities. Data privacy and security are prioritized to ensure a safe, efficient, and transparent process.

Future enhancements could include AI-driven pattern recognition, VR-based training, and integration with real vehicles for full-scale driving assessments. The Smart Driving License Test promises to revolutionize driver evaluation, reducing biases and inefficiencies, and contributing to safer roads and more responsible drivers. It is poised to become a global standard for driving license assessments.

II. LITERATURE REVIEW

The Smart Driving License Test system is theoretically grounded in the integration of IoT and automated data analysis. Traditional driving tests suffer from subjectivity and inefficiencies, leading to inconsistent evaluations and potential safety risks. In contrast, this system leverages sensor data—such as speed, braking, and steering inputs—to objectively assess driver performance in real time. By automating the scoring process through microcontrollers and AI algorithms, the system minimizes human bias, standardizes evaluations, and enhances overall road safety. This theoretical framework, as detailed in the final synopsis document, emphasizes that a data-driven, sensor-based approach can provide immediate feedback, ensure consistent grading, and ultimately help in issuing licenses only to qualified drivers.



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1. Problem Identification

A. Challenge in Traditional Driving License Test:

Several research papers highlight the issues with manual driving tests:

Subjective Assessments: Examiners may assess a candidate's performance differently depending on their perception or interpretation of road situations, leading to inconsistencies and potential biases.

Limited Testing Conditions: Traditional tests are often conducted in controlled environments, missing crucial scenarios such as extreme weather, night driving, or emergency situations that could test a driver's adaptability.

Inefficient Processes: Delays in scheduling tests, long wait times, and administrative burdens are common, particularly in areas with high demand for driving licenses.

Safety Concerns: Driving tests expose both the examiners and other road users to potential accidents or dangerous driving practices by inexperienced learners.

B. Global Road Safety Concerns:

According to the World Health Organization (WHO), traffic accidents are among the leading causes of death globally. Research suggests that many drivers lack sufficient training, and the inadequacies of the license testing process contribute to this issue. Traditional tests fail to adequately evaluate a driver's response to critical or emergency scenarios.

2. Existing Technological Solutions:

A. IoT in Driving License Tests:

IoT technologies provide the framework for smart driving tests by allowing the collection and transmission of real-time data about driving performance. Research has demonstrated that IoT-enabled sensors can track:

- Vehicle speed
- Lane discipline
- Obstacle detection and avoidance
- Use of signals and brakes

3. Specifications for a Smart Driving License Test:

Based on the literature review, the following are key specifications for implementing a smart driving license test:

A. Real-Time Data Collection with IoT Sensors:

IoT sensors should be installed in the vehicle used for the test to track various aspects of driving performance. These sensors can monitor:

- Speed
- Braking patterns
- Lane changing
- Steering control

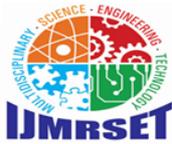
Reaction to road signs and signals The data collected should be processed in real-time, providing immediate feedback to both the system and the candidate.

B. Automated Scoring System:

The system should be able to provide an automatic and objective score based on the real-time data collected from the vehicle's sensors. AI algorithms can be developed to compare the driver's behavior against a set of pre-defined rules and best practices.

4. Challenges in Implementation:

Implementing smart driving licenses comes with challenges like poor infrastructure, data security risks, and people being slow to adopt new technology. High costs, legal changes, and making the system work with existing databases add to the difficulty. Cybersecurity risks and giving police the tools to check digital licenses are also concerns. Solving these issues needs cooperation from everyone involved.



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III. METHODOLOGY

The development of the Smart Driving License Test System will follow these steps:

- **Design and Prototyping**

Hardware Setup: Install and configure sensors to detect various driver behaviors (seatbelt, mirror adjustment, steering, etc.).

Software Development: Write the Arduino code to process sensor inputs and update the score based on driver actions.

- **System Testing**

Test the individual modules for functionality.

Run full-system tests to ensure smooth operation and that scoring works as intended.

- **Scoring and Results**

Define a clear scoring mechanism. For example:

+2 points for seatbelt fastening.

+3 points for maintaining a proper speed.

-2 points for failing to use turn signals.

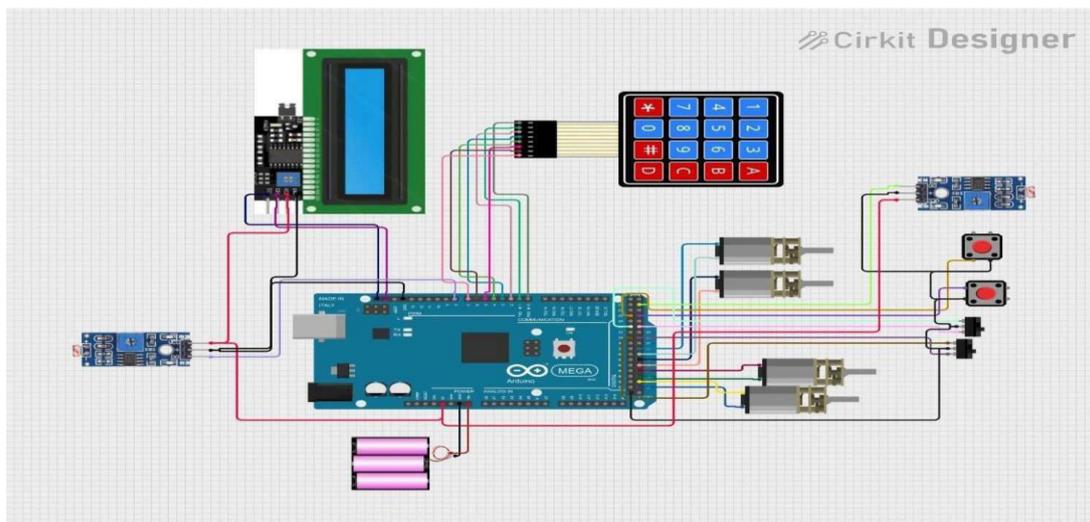
A minimum score of 7 points will be required to pass the test.

- **Integration and Final Testing**

Integrate all modules (hardware and software) into a working prototype.

Test the system with real driving scenarios (or simulated ones) and adjust any inconsistencies in the scoring system.

IV. BLOCK DIAGRAM



V. WORKING OF BLOCK DIAGRAM

The Smart Driving License Test System is designed to automate and improve the traditional driving test process using IoT sensors, microcontrollers, and real-time data processing. This system eliminates human error, ensures fairness, and enhances road safety by objectively evaluating driving skills.

The test begins when a candidate enters a vehicle equipped with sensors that check for initial conditions such as seatbelt fastening and mirror adjustment. Once these conditions are met, the system allows the candidate to proceed with the driving test. Throughout the test, sensors continuously monitor steering control, speed regulation, lane discipline, braking patterns, and the proper use of indicators. These sensors provide real-time data to a microcontroller, such as Arduino, which processes and analyzes the candidate's performance against predefined rules and criteria.



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The system implements an automated scoring mechanism, where points are assigned based on driver behavior. Positive points are awarded for correct actions like using turn signals, maintaining proper speed, and following traffic rules. Conversely, negative points are given for errors such as overspeeding, improper lane changes, or missing stop signs. The scoring algorithm ensures a standardized, unbiased, and transparent evaluation process.

Upon completion of the test, the final score and Pass/Fail result are displayed on an LCD screen, and the data is stored in a database for future reference. Additionally, the system provides constructive feedback, highlighting mistakes and areas of improvement. If the candidate fails, they can review their errors and retake the test after necessary improvements.

By integrating IoT technology and automation, the Smart Driving License Test System enhances accuracy, efficiency, and fairness in driver evaluation. This system can be implemented in driving schools and licensing authorities to create a more reliable and safer road environment

VI. TECHNOLOGIES AND TOOLS

The development of the **Smart Driving License Test System** relies on a combination of **hardware technologies, software tools, and embedded systems** to create a fully automated and intelligent testing platform.

The core idea behind this system is to integrate **sensors, microcontrollers, and programming logic** to evaluate a driver's performance without human intervention. The technology ensures **real-time monitoring, accurate scoring, and digital result generation**.

The system uses **IoT (Internet of Things)** concepts where physical sensors interact with software to collect, process, and analyze data instantly. The chosen tools are **cost-effective, scalable, and easy to maintain**, making the setup suitable for use in **RTO testing centers or driving schools**.

1. Technologies for Hardware:-

The hardware is the foundation of the Smart Driving License Test. It includes all the **electronic components** required for sensing, processing, and displaying data.

A. Arduino Uno:

- Acts as the **main control unit (MCU)** of the entire system.
- Processes input signals from all sensors.
- Executes the scoring logic and controls output devices like the LCD display.
- Based on the **ATmega328P microcontroller**, it is simple, affordable, and highly reliable.

B. Sensors:

Used to **detect specific driving actions and behaviors** of the candidate.

Common sensors include:

- **Seatbelt Sensor:** Detects whether the driver has fastened the seatbelt before starting the test.
- **Speed Sensor:** Monitors the speed of the vehicle or simulation.
- **Steering Sensor:** Detects steering movement and turning behavior.
- **Mirror Adjustment Sensor:** Ensures mirrors are correctly positioned before starting the test.
- **Crash or Obstacle Sensor:** Detects collisions or obstacles to ensure careful driving.

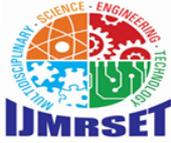
These sensors convert physical actions into **electrical signals**, which are sent to the Arduino for processing.

C. LCD Display (16x2):

- Displays test instructions, current status, and final test results (Pass/Fail).
- Provides **real-time feedback** to the driver during the test.

D. Power Source:

- Provides stable electrical power to all hardware components.
- Can be supplied via **battery, USB, or regulated adapter**.



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E. Breadboard and Jumper Wires:

- Used for **circuit prototyping and testing connections** between components.
- Enables quick assembly and modification without soldering.

2. Technologies for Software:-

The software layer defines the logic and behavior of the Smart Driving License Test System. It controls how data from sensors is collected, analyzed, and scored.

A. Arduino IDE:

- The **Integrated Development Environment** used for writing, compiling, and uploading code to the Arduino board.
- Provides a simple interface to test and debug programs in real time.

B. Programming Language – C/C++:

- The entire system is programmed using **C language**, known for its speed and hardware-level control.
- Code is written to perform tasks such as reading sensor data, calculating scores, displaying results, and managing logic conditions.

C. Embedded System Programming Concepts:

- Used for **real-time data processing**.
- Ensures that the system reacts immediately to driver actions.
- Uses interrupt handling and conditional checks to ensure accuracy.

3. Development Tools and Supporting Equipment:-

These tools and components support the design, testing, and integration of the system.

- **Breadboard:** For quick assembly and testing of the circuit.
- **Jumper Wires:** For connecting sensors and modules to the Arduino board.
- **LCD Display (16x2):** For output display and real-time feedback.
- **Resistors, LEDs, and Switches:** For simulating vehicle functions and signals.
- **Power Adapter / Battery Pack:** To power all components during operation.
- **Computer/Laptop:** To write and upload Arduino programs via the Arduino IDE.

4. Importance of the Technologies Used:-

Each technology plays a vital role in ensuring that the **Smart Driving License Test System** functions smoothly and efficiently:

- **Arduino Uno** acts as the system's brain, ensuring precise control.
- **Sensors** serve as eyes and ears, capturing all driver actions.
- **Arduino IDE and C language** bring the system to life through logical coding.
- **LCD display and power units** provide the interface and operational reliability.

Together, these technologies form a **smart, automated, and scalable solution** that bridges the gap between manual and digital driving tests.

VII. RESULT DISCUSSION

• Exact and Fair Assessment:

Uses sensor information and predefined models to dispose of human predisposition, guaranteeing reliable pass/fail choices.

• Quick Warnings:

Sends constant outcomes to competitors through SMS, giving brief input and lessening stand by times.

• Execution Experiences:

Offers point by point criticism on unambiguous driving abilities, supporting up-and-comers in designated improvement for retests.



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- **Upgraded Street Security:**

Guarantees just qualified drivers are authorized, adding to more secure streets by limiting the gamble of mishaps brought about by deficient driving abilities.

- **Functional Effectiveness:**

Smooths out the testing system via mechanizing information assortment and result age, decreasing regulatory responsibility and advancing a paperless climate.

VIII. FUTURE SCOPE

The future scope of the Pre-Assessment Smart Driving Test focuses on improving accuracy, accessibility, and transparency. Sensor-based evaluation will enhance the assessment of key driving behaviors like speed control, lane discipline, and braking efficiency. Cloud-based data management will securely store candidate records, allowing for long-term tracking of progress. Remote pre-assessment at authorized locations will reduce congestion at test centers and make the process more accessible. Collaboration with driving schools will help learners practice and improve their skills before the final test. Lastly, a paperless and corruption-free system will ensure transparency and fairness in driver evaluation.

- **Integration with Real Vehicles:**

Future versions of the system could be integrated into real cars for full-scale driving tests.

- **Mobile Application:**

A mobile app could be developed to store and analyze test results for future use.

- **AI Integration:**

AI could be used to assess driving patterns more deeply and offer personalized feedback to improve driving skills.

IX. CONCLUSION

The smart driving license test assesses your knowledge of traffic laws and driving skills using modern tools. Passing the test proves you are qualified and responsible, allowing you to obtain a license and drive legally. The **Smart Driving License Test System** is an innovative solution that uses modern technology to make the driving test process more efficient, transparent, and reliable. By combining **IoT sensors** and **Arduino-based automation**, this system eliminates human error and ensures that every candidate is tested fairly based on real performance.

It records important actions such as **seatbelt fastening, mirror adjustment, speed control, and indicator use**, and then automatically calculates a score using predefined rules. This ensures that only capable and responsible drivers are issued licenses, thereby improving **road safety** and reducing accidents. Overall, the Smart Driving License Test demonstrates how technology can replace outdated manual systems with smarter, faster, and more accurate solutions. In the future, this system can be upgraded using **AI** and **mobile applications** to further enhance the user experience and efficiency of the licensing process.

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