

Automatic Driving Test for License Issue

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Abstract - Nowadays, we can often see the rate of road accidents is increased leading to death of many people across India due to increased number of vehicles leading to traffic and unskilled drivers who have availed their licenses through manual test by paying bribe amount to Regional Transport Office (RTO) agents. Aim of this paper is to make the clear, efficient and the transparent test for any driver seeking the driving license, by tracking his driving skills during the driving test in an automated track or on an automated vehicle. The solution is developed by customizing AVR controller based embedded system to check the status of sensors (IR Proximity and Ultra-sonic sensors) placed on the track or on a driving vehicle and exploiting IoT technology to send result of the test (pass or fail) to higher RTO officers. The proposed solution for the automation of existing manual test process enables the elimination of human intervention and improves the driving test accuracy thereby going paperless, with Driving Skill Evaluation System. As a contribution to the society this innovative solution can overcome corruption and reduce the number of road accidents due to most accidents resulting from lack of planning, anticipation and control which are highly dependent on a person's driving skills. Thus, from our proposed scheme we can implement an automatic driving test for license issue.

Key Words: Automatic Driving License, RTO, AVR Microcontroller, IoT.

1. INTRODUCTION

Despite continued efforts made by the different state governments in India, various international and national organizations continue to highlight the fatalities on the roads caused by inconsistent process of issuing driving licenses across India. The study conducted by the International Finance Corporation (IFC) indicates that the process of obtaining driving license in India is a distorted bureaucratic one. The independent survey conducted shows that close to 60 percent of license holders did not even have to take the driving license test and 54 percent of them were untrained to drive. The study conducted by IFC also shows that the driving license is in that category of public services that involves corruption of a direct demand and supply of bribes between citizens and bureaucrats. The study also indicates that the corruption is focused on agents that work as intermediaries between the officials and citizens. This practice of agent-usage promotes corruption and subsequently results in higher payment for

licenses, reduces driving test quality and this eventually results in unskilled drivers on road. Our proposed system, makes use of Internet of Things (IoT) technology coupled with sensors and embedded controllers to automate the driving test for the driving license issuing.

1.1 Motivation

In the present scenario, the candidates who have applied for driving license have to appear for a theoretical examination and a practical examination. The theoretical examination evaluates the candidate's knowledge on different traffic signs, traffic regulation and also the basic understanding of simple safety check before using a vehicle. Different ways are adopted for the conduct of theoretical examination. These are oral examination, question paper or computer-based examination. Theoretical examination is conducted before the practical examination. A pass in the theoretical examination is a prerequisite for the practical examination.

The practical examination comprises of two tests namely off-road test and on-road test. The off-road test is for examining the candidate's ability in controlling the vehicle. The on-road test is conducted in light traffic on normal road. Normally, the on-road test is carried out after completing off-road test.

This manual test procedure is subjected to multiple limitations like time constraints, costly and heavily controlled by the experience of examiner in conducting the test. This in fact leads to common human error like observation, favoritism and corruption. One or more inspectors from vehicle department has to be present long hours in the test driving fields. So, the manual process of issuing license gives less accurate results than automatic process. Hence the only solution for this problem is to implement an efficient, transparent and cost effective automatic driver testing system.

1.2 Literature Review

In day to day life many modern transportation vehicles coming in to the market. As the population increases the usage of such vehicles also increases on a broader scale. Most of the people prefer for four-wheeler transporting systems. For operating the vehicles, the license is compulsory. Normally, in driving test a candidate applied for license have to drive over a closed loop path in front of the authorities [7]. The corruption in the current system is

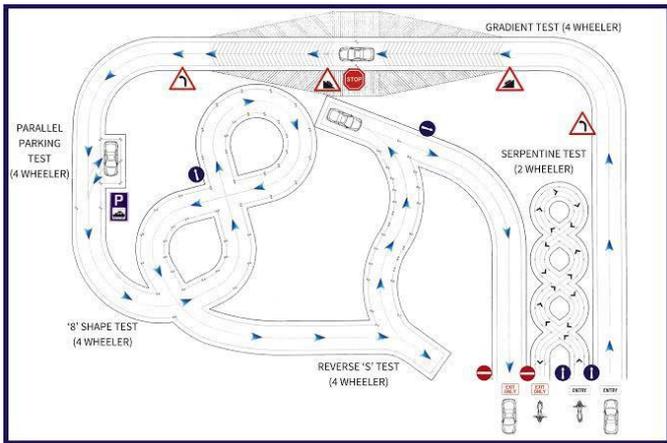


Fig -1: Layout of different types of driving test tracks.

at large scale, to tackle the corruption we have come up with this idea. As the level of transparency increases, the prevalence rate of corruption decreases in issuing of driving licenses in the Regional Transport Offices (RTOs). It does not require interaction between the officials and the citizens, negating the chances of corruption. The comparative analysis of the numbers of driving licenses issued by the Karnataka Transport Department indicates a sharp decline. Compared to 36,442 driving licenses issued during Sep 2009 to March 2010, the Department issued only 25,796 driving licenses during March 2010 to September 2010. It indicates that the process of issuing driving licenses has become stringent leaving less chances of indulging in both demand and supply side of corruption. [9].

The track length for four-wheeler is around 30-35 meters and its width is around 8-feet. While the track for two-wheeler is around 25meters and width of 4-feet as per 'Times of India' June 18 2015 newspaper. As per from the source of website posted on February 2017 in 'motorscribes.com' Recently, in 2017 in Pune (Kasarwadi) somewhere of the old Mumbai-Pune highway there are new different types of driving test is implemented on 3 different tracks. They are

- i) **The crazy 8-8 track:-** This is where you drive the vehicle through a double 8-shaped loop. with Sensors lining the track which will indicate to the computers at the control room.
- ii) **Kill hill:-** This is 40 degree incline test evaluated manually. All you have to do is drive up the slope and stop briefly before the peak and restart the car.
- iii) **The hateful 'H':-** This is the complicated track along an H-shaped section. You enter the belt of the H and travel along the first vertical arm then slot into reverse gear and get back into belt in first, drive up the second vertical arm, then repeat.

2. PROPOSED METHODOLOGY

The proposed scheme of the solution is depicted in the Fig. 1. The sensed data from the test track are processed by the

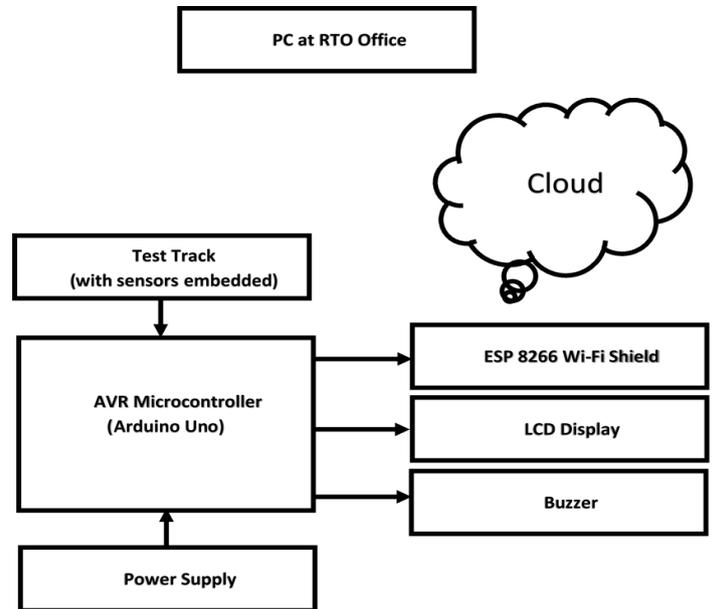


Fig -2: Proposed methodology.

AVR microcontroller at the center. If the driver undergoing test puts his feet on the ground (incase of two-wheeler) or if the vehicle touches the sidewalls of the test track (incase of two and four-wheeler) the same is sensed and processed and the status is sent to the remotely located PC at RTO office via cloud. It employs ESP 8266 Wi-Fi module to accomplish the IoT part of the solution.

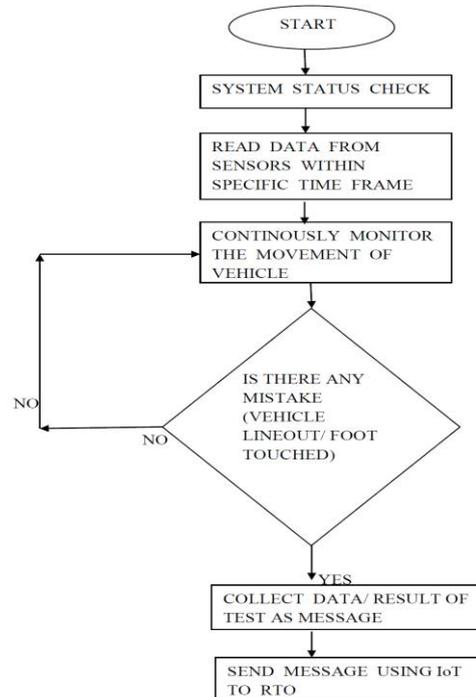


Fig - 3: Sample flow chart of automatic driving test design.

3. RESULTS AND DISCUSSION

The system we have designed and tested can be used for the following applications with little modifications:

- (i) In RTO Driving test zones.
- (ii) Private practice zones (private driving schools for learners).

The advantages and disadvantages are discussed below:

- (i) Ensuring transparency in the system by tackling corruption.
- (ii) Promoting quality drivers.
- (iii) Unbiased results (cannot be favoritism among candidates).
- (iv) May reduce accidents (if all skillful drivers are on road then there are less chances of accidents).
- (v) Death rates may decrease due to less accidents.
- (vi) Right/Deserving candidates will get licenses who could not afford corruption money.
- (vii) Human error like observation, negligence cannot happen while driver is driving on track since the system is automatic.
- (viii) Hassle Free and robust system for the candidates who are irritated by manual test since manual process is time consuming and expensive.

Some of the disadvantages are discussed below:

- (i) Complex system design.
- (ii) Dark sensor (if the sensor has got dust on it) may give incorrect readings.
- (iii) Since IR sensor receive IR rays sometimes those are corrupted by IR rays from sun (interference) and may give faulty results.

But such interference from solar IR rays can be controlled if the test is conducted in less sunlight area or if the test is conducted in the area where complete test area is surrounded by trees (i.e., under the shadow of trees) or in shaded steel hut portion.

The snapshots of prototype design of this solution and results are added (see Fig. 4, Fig. 5 and Fig. 6). Four IR proximity sensors are interfaced with Arduino and an ultrasonic sensor is interfaced with Arduino by drawing an appropriate amount of power from power supply unit. Proper software code required for this prototype to work according to the specification. If any one sensor from the two different types of sensors used, gets activated, indicating the fault, then result is fail and if both different types of sensors used is not activated then result is pass. Result can be seen on LCD display which is later sent to cloud using IoT platform. The data from cloud can be accessed through thingspeak platform by signing in through mobile or computer in

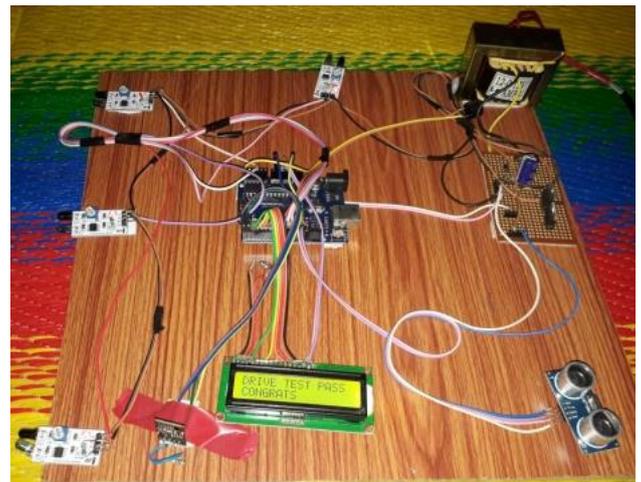


Fig - 4: Authors' prototype (indication of driving test pass).

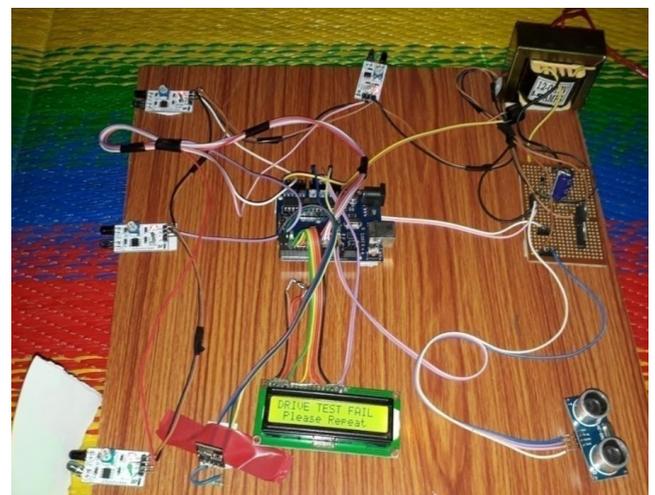


Fig - 5: Authors' prototype (indication of driving test failure).

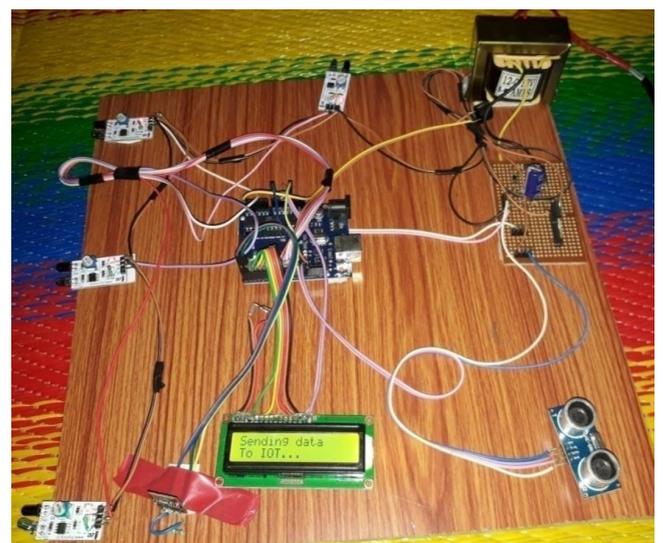


Fig - 6: Authors' prototype (indication of driving test results being sent to cloud).

thingspeak website of our created channels. If the result is fail then in thingspeak window after choosing what type of result in field charts we want (field 1 and field 2 only for this prototype). For instance, if we select column graph as result, below 7th and 8th snapshots describe result is fail (i.e., constant line extending from 0 to 100) and if the result is pass no graph is plotted in field charts. We can send this result as soft copy (in .csv format and opened through Microsoft excel) from thingspeak website in which 100 indicates result is fail and 0 indicates result is pass of respective fields.

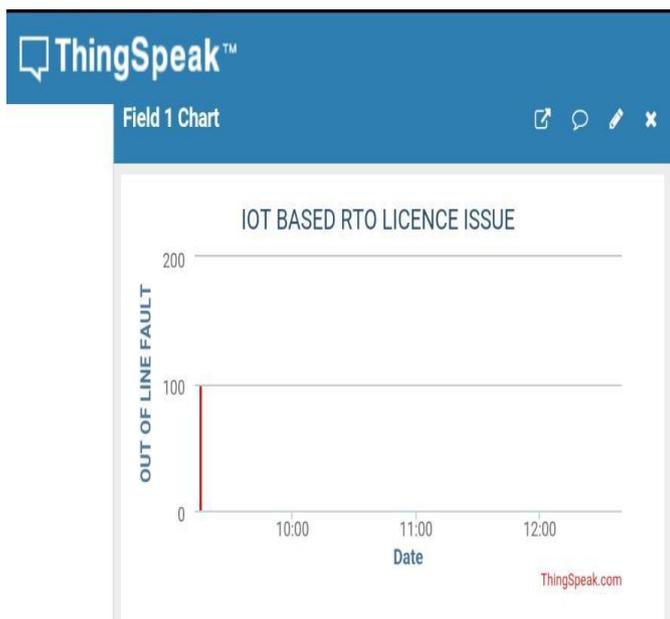


Fig - 7: Chart indicating the test results on ThingSpeak (failure of the test).

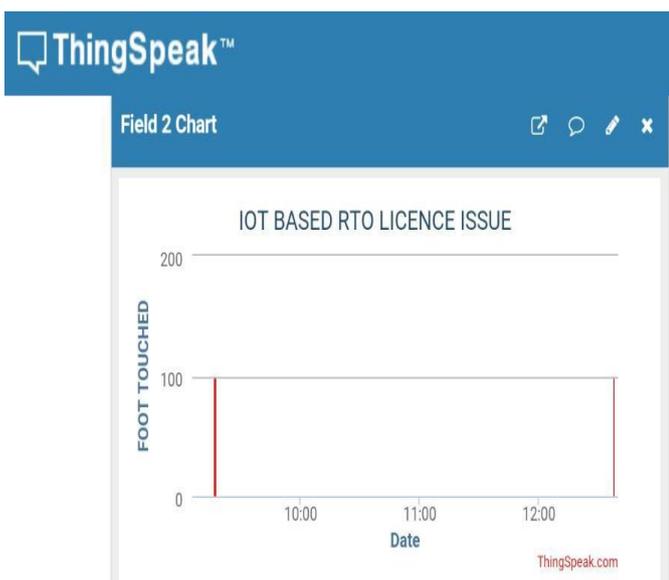


Fig - 8: Chart indicating the test results on ThingSpeak (failure of the test).

4. CONCLUSIONS

The proposed system of automated driving license issuing process is advantageous over existing manual process by monitoring the candidate's driving skills who applied for driving license based on whether the candidate is eligible for getting license or not. It will help to reduce the road accidents due to illegal licenses. This system will assure that only well-trained drivers can get the license. It can be concluded that this setup will help Regional Transport Office (RTO) officers to maintain records systematically and it will increase transparency in driving license issuing process and also speed of process and also the system is used to test driving skills on vehicle without any authorities. So that candidate will be automatically selected or rejected by the system. It will reduce the manpower and there is no chance for any illegal activity.

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