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Smart Test-Track System for RTO Using LabView and IoT

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ABSTRACT *An existing system to test candidates aspiring for driving license consists wired connections among sensors, controller and PC, so the civil construction to conceal wires becomes expensive. The proposed system is wireless system based on RF modules, zigbee modules, Arduino and gyroscope to detect the collision of vehicle with it. PC will display a GUI of test track and will remark that the candidate is fail or pass. Thus the candidates will be examined through an automated test track and the evaluation of the candidates will become easier. The proposed system will reduce the total cost of the entire system. The system will be based on IoT which will show the candidates the result of their examination on their smart phones.*

KEYWORDS : *RF modules, Zigbee, LabView, Arduino, Wireless Transmission, Gyroscope, nRF24L01*

I. INTRODUCTION

In the years passed, the corruption had been increased due to manual observation of testing for issuing driving license from RTO. Using this method the candidates were not examined well. So, the Government had decided to improve their driving test method to examine candidates in a transparent manner. The method which was deployed by RTO is totally electronic and automated. The system consist sensors, micro-controller, wires and PC to display the details of the test and the information of candidates. PC is connected with the micro-controller using wires. These wires are concealed underneath the ground. Vibration sensors are used to detect vehicle collision with it. When the vehicle strikes with the sensor, sensor detects it and sends the data to the PC using micro-controller. Data is sent to the PC using wires. If more than 3 sensors are detected then candidate will fail.

Hence, the manual observation is eliminated; the system is fully wired. By using wireless modules the system can be implemented. RF modules will be used for reception and transmission of data from the sensor. Using IoT, the candidates can see their examination result using smart phone. A graphical user interface is provided in the PC using LabVIEW.

Hike in corruption had made license holders to drive free from proper driving skill. By keeping the corruption in the center, the government decided to make the test taken by the RTO automated for testing candidates in a transparent manner. Once, I visited the RTO in my city and I found that the test taken by the RTO is smart and totally electronic. The sensors used to detect collision with the vehicles are vibration sensors placed at the test track. After observing the test track I found that the system is totally wired to make connection among PC, micro-controller and sensors. So the maintenance of the system cannot be done easily due to wires concealed under the ground. The system can be implemented using wireless connection and networks.

OBJECTIVES

A wireless system will provide an easy installation and costless maintenance for the fault in the system. RF modules makes the system totally wireless so no need of wires for connection. LabVIEW gives system to interact with a nice graphical user interface. RF modules and Zigbee is used to transmit and receive the data from sensor to PC. Gyroscope would detect if the vehicle strikes with it and would send the data to the PC via micro-controller using RF modules and zigbee. IoT will provide candidates transparent examination of driving by showing the result on their smart phones. More than one sensor connects wirelessly with the remote PC using data acquisition system.

BACKGROUND

The study of the papers shows that the system uses vibration sensors to monitor the vibration in the machines. But here, the accuracy is most important parameter for detecting vehicle collision with the sensor. The test is to examine the candidates for driving license so it needs to be very transparent and proper. A system which is deployed by the RTO is totally wired system, which leads the cost higher. All the wires are concealed using plaster under the ground. PC, microcontroller and sensors are connected by wires with each other. IoT is not used anywhere in the papers for data acquisition. IoT will provide an interaction with the candidates to provide result of the examination to candidates on android phones.

FORMAL DEFINITION

Wires are the main problem of the existing system which takes the cost of the system very high. Wires are undergrounded and sensors are on the ground in the way of the test-track. Also the vibration sensors used for detection of vehicle collision are less accurate. There is only one sensor interfaced for data acquisition but many sensors can be worked with the micro-controller with wireless technology.

II. PROPOSED TECHNIQUE

In the RTO, a fully electronic system is deployed to test candidates aspiring for a license. Proposed system is dependent on wireless technology and uses wireless modules for receiving and transmitting data. Gyroscope, nRF24L01, RFID will be interfaced with Arduino328P. Another Arduino328P is placed at some distance from the test-track which has also nRF24L01 to receive data of the sensor. Multiple sensors from the test-track will transmit the data to the remote nRF24L01. Zigbee technology will be used for receiving the data and to transmit to the remote PC. LabVIEW is used to make GUI in the PC to display sensors, test-track and poles. IoT is also used to show the result of the candidates in the android phone.

PROPOSED MATHODOLOGY OF EVALUATION

To eliminate wire from old system wireless modules will be used in the proposed system. There will be many poles placed at the sides of the test-track. Each poles consists gyroscope, nRF24L01 interfaced with arduino nano. Another adruino with nRF24L01 is placed at some distance from the test-track. To get all the data in the PC, zigbee module is interfaced with the PC which receives the information coming from the remote circuit inside the pole. At the begging of the test-track, RFID is place. RFID will detect the RFID tag stricken on the vehicle. As the RFID tag is detected the test will be started. Vehicle will go through the test-track. If the vehicle strikes with the pole, gyroscope sensor will change its axis and the data of movement will be transmitted to another RF module from the pole

side. PC will display the information in the form of a GUI. GUI will be made using LabVIEW. In the GUI, poles, test-track and other details will be shown.

PROPOSED TOOLS TO BE USED

Proposed system will need Gyroscope, RF module, RFID, Arduino nano, zigbee module and LabVIEW software. Wireless Sensor Network is used for IoT.

III. BLOCK DIAGRAM

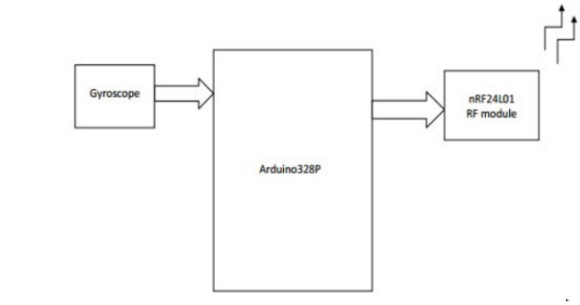

Figure 1. Transmitter section from test-track(number of transmitter will be used)

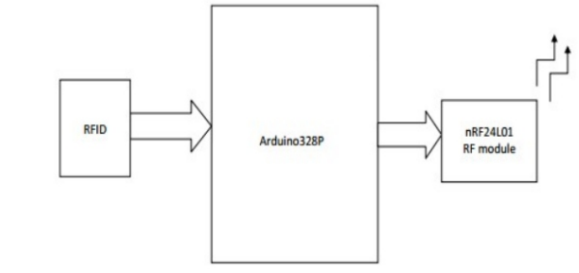

Figure 2. RFID for starting the test

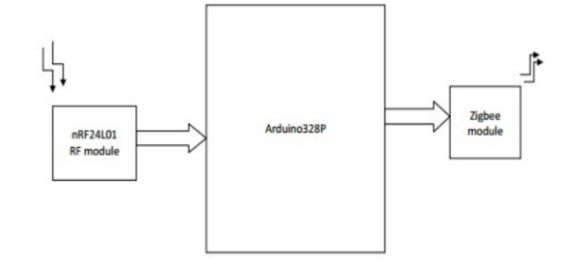

Figure 3. Reciever section(repeater)

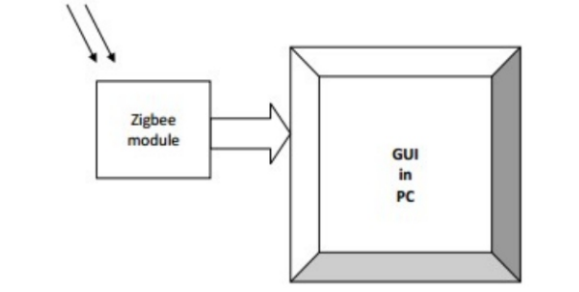

Figure 4. GUI using LabVIEW

PROPOSED EXPERIMENTAL SET UP

The main set-up is only the sensors, arduino and RF module containing poles at the test-track. The poles are placed at each sides of the track to detect whether the vehicle strike with it. A circuit which will be used as a repeater will be kept at little distance from the test-track. PC will be in the office or in a room at quiet distance from test-track. All the details of component is shown above. The block diagram shows the position of the circuitry.

IV. EXPECTED OBSERVATION

After completing all the set-up, from starting of the test to the end of the test all the sensors working and data transmission will be observed. These sensors's data reaches to the GUI in the PC that will be checked. RFID will notice the time from starting until the end which will be considered for the test because there will be a time limitation to complete the test.

V. CONCLUSION

After studying research papers it can be conclude that data received on the Zigbee can be displayed on the PC With a GUI. Data acquisition becomes easy with sensors and wireless modules using LabVIEW and PC. Gyroscope gives bit higher accuracy than vibration sensor. Cost can be decreased if wireless modules are used.

Interfacing the RF modules with Arduino and testing of it for transmitting and receiving the proper data of the sensors. Gyroscope will be configured for getting the information about 3-axis at the remote PC. Transmission and reception of all the wireless modules will be tested after interfacing for minimum interferecne. Connection of LabVIEW and arduino will take place using National Instrument. A GUI will be provided for data acquisition.

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