Intelligent Transport Monitoring System for Educational Institutions using IoT

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***Abstract*- On reviewing the past work of college bus tracking, monitoring and alerting system, there is a possibility to categorize various methodologies and identify new trends. One among them is a challenge for vehicle tracking, monitoring and alerting system. Now-a-days with the increase in the crime rate and accidents, parents worry about their children's when they are going to college. And many students find themselves locked in a college bus in the bus parking lot after falling asleep on their way to college, miss the bus, or leave at the wrong station. This project makes use of the applicability of radio frequency identification (RFID) technology for tracking and monitoring student during their trip to and from college on college busses. And it has the advantage of efficient tracking capabilities, low cost and easy maintenance. The individual RFID tags are effective and it is used for tracking and monitoring student. Fire sensor is also used in this project to detect any fire accidents. Speed of the bus also can be calculated and send a message to the parents through GSM. The system consists of three main units, bus unit, parent unit and college unit. The bus unit is used to detect when a child enters/exits from the bus using RFID Card. This information is communicated to the parent unit and college unit that identify the presence of student [3]. The system tracks the college bus by the IOT and also gets an alert if the bus crosses the speed limit.**

***Index terms*- Global Position System, Radio Frequency Identification, Global System for Mobile Communication, PIC16F877A microcontroller, Sensors**

I.INTRODUCTION

When it comes to public transportation, time and patience are essential. In other words, many people using public transport buses have experienced time loss because of waiting at the bus stops. Millions of student needs to travel from home to college and vice versa every day. For parents, obtaining a safe transport for their children's is a critical issue. Crime against student is increasing and every parent is requesting the respective college for the security of their child while traveling from college to home and vice versa in college bus. The system will notify parents by SMS whenever student enters or leaves college bus, this will assure parents that children's are safely reached to destination. Count through IR sensor will ensure that is college bus is vacant or still any student is inside the college bus.

In this paper, smart bus tracking system has been proposed that when any student enters into bus the alert massage will send to their parents and also arrival times, buses current locations, and bus routes on a map can be easily found out with the help of IOT. GPS (Global Positioning System) and Google maps are used for navigation and display services respectively. GSM (Global System of Mobile Communication) used for sending alert message. Millions of student needs to be moved from home to college and vice versa every day. For their parents, getting a safe transport for their student is a crucial issue. At present days all are very much aware about the safety concerns. At the same time parents can send their student to college which has high reputation and all facilities.

Now-a-days all college have bus facilities, even by their child are going to college through college bus parents have some worry about their child, whether they reached safely or in a dangerous situation. This

system gives an alert message when student boards and leaves the bus using the RFID tag wore by the student by placing that tag before the RFID reader. The sensors and RFID reader are interfaced with Microcontroller. Each RFID tag has information about and individual student which was sensed by an RFID reader transmit the corresponding information to their parents using GSM. The outputs of this controller board are given to GSM module and LCD display. This GSM modem can sends the messages to authorized persons according to the received data.

The proposed system shows that the RFID tracking technology is a practical option for monitoring and tracking the child during their trip to and from college on college bus. The system tracks the college bus by the GPS Module and also gives an alert if the bus crosses the speed limit. The GPS Module is used for Live Tracking of the College Buses and alerting if fire accident occurs and send an alert message to the parents, college and also for the fire engine.

II. LITERATURE SURVEY

The project idea is to put an end to incidents like Innocent student are ending their lives for unworthy reasons. There are many systems which provide security to the college student. The use of RFIDs makes it easier to maintain and use, but could not give the certain information about the situation in the bus i.e. this system does not provide any information when student are in dangerous situations. To intimates the college management and parents about the hazardous situation in the bus. When the bus is subjected to tilt this paper devised a method to identify the students are dropped at correct locations and if they are dropped elsewhere the location is identified and alert is sent to parent.

The system monitors the student inside the bus in a safer manner. It uses the combination of RFID technologies. Each Student carries a unique RFID card embedded in each of the student's college bags. When the student enters or exits from the bus the reader records and transfer data in the database.

Radio Frequency identification is used to transmit Information of a subject using radio waves. This information consists of unique digital number which differentiates various objects. An RFID system is made up of two different parts viz. RFID tag and RFID reader. There is a microchip antenna inside tag; this chip consists of useful data in different forms. A study has showed that, the performance of reader decreases rapidly with increase in a distance. Student carries the unique RFID card. This RFID card is embedded on his own smartcard. When student in or out from college bus, reader will record a response and send an alert to parents and college.

The system shows an efficient and systematic way of using RFID tracking applications coupled with smart phone technologies to fulfill the key security and monitoring purposes. In order to optimize the proposal, this paper investigated the effects of variable localization of RFID tags from reader and power loss, inefficiency and distance constraints caused due to equal power allocations to the tags. Reducing the number of reader by using smart antenna in RFID and increasing coverage area, several other sectors will be hopefully able to leverage the benefits of RFID technology.

The RFID reader consists of an antenna, power supply, processor, transceiver and an interface for connecting it to a host computer. The RFID tag has an antenna, a transceiver, and an Integrated Circuit with memory. The performance of the RFID tag is determined by factors such as IC technology used, the read/write capability, the read range, the radio frequency, and external factors such as the environment and packaging.

III. PROPOSED SYSTEM

In this system PIC16F877A microcontroller has been used. The system consists of three units, bus unit, college unit and parent unit. Bus unit consists of RFID Reader, different sensors and GSM module to issue the alert messages to parents when their student boards or leaves the bus. Fire sensor will be placed within the bus unit to detect fire and issues alert messages by giving the location of the bus using GSM module and IOT. College unit consists of RFID Reader and GSM Module. The entire data in two units will be processed by using PIC16F877A microcontroller.

PIC16F877A microcontroller is used in this system. This processor has advantages like, total number of pins 40 and there are 30 pins for input and outputs, 368 RAM bytes, 5MIPS CPU speed, 8 channels of 10 bit ADC converter is used.

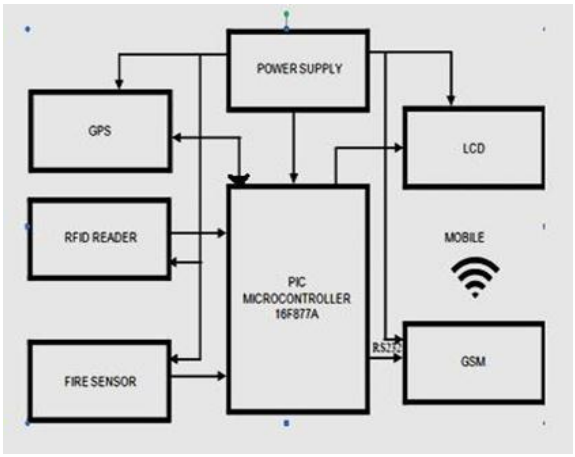

Figure 1. Block diagram

In this system fire sensor is used to detect the fire accident. If there any fire accident occurs, the sensors receive a physical signal and transmit a digital signal to a GSM module. The alert message will be send to the college unit and parents with the help of GSM and IOT. Each student consists of an individual RFID tag with the help of RFID tag, GSM, IOT. Parents and college unit can receive an alert message. The information of RFID tag is read by RFID reader. The reader transmits the corresponding information. RFID tag is used to send an alert message like the location of a person, speed of the bus to their respective parents. In this system GSM and IOT is used to send the alert message to the parents if their respective child is get in the bus or get down the bus with the help of RFID tag and reader.

LCD stands for Liquid Crystal Display is a flat panel display technology commonly used in TVs and computer monitors. It is also used in screens for mobile devices, such as laptops, tablets, and smart phones. The backlight in liquid crystal display provides an even light source behind the screen. This light is polarized, meaning only half of the light shines through to the liquid crystal layer. The liquid crystals are made up of a part solid, part liquid substance that can be "twisted" by applying electrical voltage to them. They block the polarized light when they are off, but reflect red, green, or blue light when activated.

A DC Power Supply Unit (commonly called a PSU) deriving power from the AC mains (line) supply performs a number of tasks: It changes (in most cases reduces) the level of supply to a value suitable for driving the load circuit. It produces a DC supply from the mains (or line) supply AC sine wave. It prevents any AC from appearing at the supply output. Power supplies in recent times have greatly improved in reliability but, because they have to handle considerably higher voltages and currents than any or most of the circuitry they supply, they are often the most susceptible to failure of any part of an electronic system.

GPS is a satellite navigation system used to determine the ground position of an object. Each GPS satellite broadcasts a message that includes the satellite's current position, orbit, and exact time. A GPS receiver combines the broadcasts from multiple satellites to calculate its exact position using a process called triangulation.

IV. IMPLEMENTATION

In this paper, college bus tracking and monitoring has been proposed. RFID is used for the identification of the student. Each student has their individual RFID tag with the help of the RFID tag the student can monitored by their parents and also by college. When the student enters or exits from the bus the reader records and transfer data in the database.

For every entry and exit RFID tag is sensed by the RFID reader. The number of students can be counted in the bus. The front door is considered as the entry door and rear door is considered as the exit door. Sensor is fixed on both the doors and the sensor counts the exit and entry of the student. Only one person can entry or exit at a time. The RFID reader read the tag and sends an alert message to their respective parents through GPS and GSM module. The front door sensor increases the count. The rear door sensor decreases the count and both the sensor calculates the total number of students present. Fire sensor is used to detect if any fire accident occurs, it will send an alert message to parents, college, and fire engine. The tracking system details will be sent to the server at the college side for storage and on the mobile device to the parents. The information of students is stored in a database at a college side.

The proposed system is used to detect the speed of the vehicle and send an alert to the parents, if the bus crosses the speed limit. Parents use the Google map in android to track the bus. If the parents open the Google map the speed of the bus and the current location of the bus can display in the android. The GSM and GPS module is used to send the alert

message to the parents and also to the college unit. The LCD display is fixed in the college bus to display the identification of the student to the driver.
Each student has the unique key at the college side to display the student details not only at the entry and exit of the student at any time. If the first key is pressed the respective student details displayed in the android mobile in college unit. A key is fixed in a bus unit at a driver side to send an alert message to parents which overcomes the problem faced by the parents of waiting on the bus stop for long duration. Driver press the key for every 5 minutes for that GSM module sends an alert message for the nearby stops which fixed in a database.

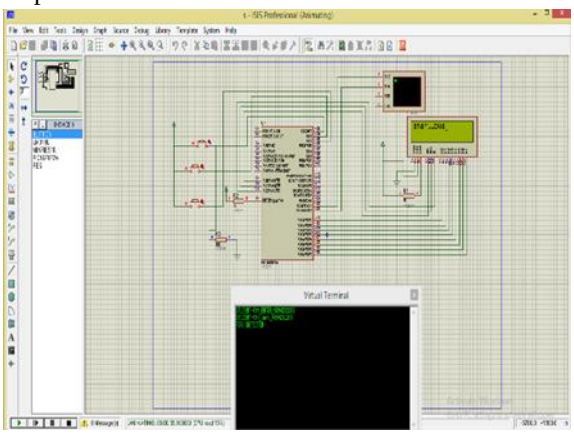

Figure 2. Simulation result

The Proposed System consists of hardware parts and android and web based application as shown in the Figure 2. The proposed system is divided into 4 main units.

A. Bus unit
B. Parent unit
C. College unit
D. College database server

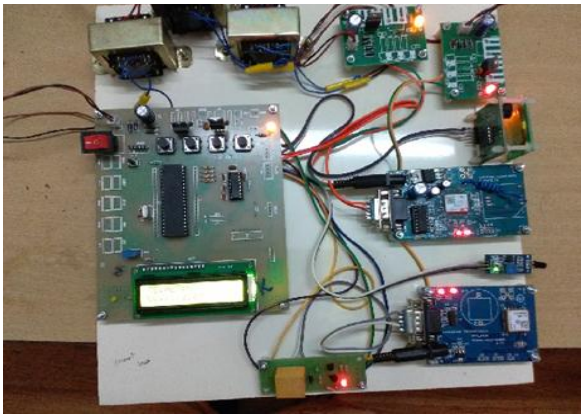

Figure 3. Overall view of 4 modules

V. CONCLUSION

This proposed system aims at enhancing the safety of student during the daily transportation to and from college. RFID Reader located inside the bus detects the RFID tags of the child. It sends instant notification with the relevant data from the college database server via internet. The parents can log into the Application and monitor the details of their student and track the location of the bus. The admin can add stops, and generate an optimized route and can have a live tracking of the bus. Further this system can be enhanced by Parking Management System, having VANET for bus to bus communication. This system can be extended for full-time monitoring of student that will be helpful for parents and guardians at minimum cost.

REFERENCES

[1] Sumit S. Dukare Department of E&TC GF's Godavari collage of Engg. Jalgoan (India), Dattatray A. Patil Department of E&TC GF's Godavari collage of Engg. Jalgoan (India), Kantilal P. Rane Department of E&TC GF's Godavari collage of Engg. Jalgoan (India)," Vehicle Tracking, Monitoring and Alerting System", International Journal of Computer Applications (0975 – 8887) Volume 119 – No.10, June 2015.

[2] Abdelmoula Bekkali, Elyes Ben Hamida, and Abdullah Kadri Qatar Mobility Innovations Center,Doha, Qatar Email: abdelmoulab, elyesb, " Smart Tracking System for Collegs Buses Using Passive RFID Technology to Enhance Child Safety", Journal of Traffic and Logistics Engineering, Vol, 1, No. 2 December 2013.

[3] S.N.L Priyanka, D.Srirama Murthy, K.Vamsi Krishna, M.Sharmila Rani, T.S.S.K.Mohan, M.Kishore Students, Department of Electronics and Communication Engineering, DMS SVH College of Engineering, Andhra Pradesh, India. Associate Professor, Department of Electronics and Communication Engineering, DMS SVH College of Engineering, Andhra Pradesh, India," International Journal of Innovative Research in Computer and Communication Engineering ", Vol. 5, Issue 2, February 2017.

[4] J.Saranya, J.Selvakumar "Implementation of Student Tracking System on Android Mobile Terminals" International conference on communication and signal processing, April 3-5 2013, India.

[5] Chen et al. (2010). Toward Real-Time Precise Point Positioning: Differential GPS Based on IGS Ultra Rapid Product, SICE Annual Conference, The Grand Hotel, Taipei, Taiwan August 18-21.

[6] Zonar, 2013. Zpass: Student RidershipTracking. International research. 4(1), 20-25. Available Online: http://www. zonarsystems.com/products/zpassstudent-tracking/.

[7] 13-year-old loses arm after collegs bus carrying 40 turns turtle in Greater Noida. Available at:- http://indianexpress.com/article/cities/delhi/13year-old-loses-arm-after-collegs-bus-carrying-40-turns-turtle-in-greater-noida/ [Dated: May 13 2014].

[8] D.Kanimozhi, S. Saravanan, R.Satheesh Kumar, "Analysis of Doubly Fed Induction Generator Connected Matrix Converter in Wind Farm," International Journal of Engineering Research & Technology (IJERT), Vol. 2, No.11, pp.3981-3988, 2013.

[9] T.Malathi, A.Sasipriya, S.Saravanan, "Analysis of Peak to Average Power Ratio Reduction Techniques in Sfbc Ofdm System"' IOSR Journal of Electronics and Communication Engineering, Vol.7. Issue.5,pp.47-52, 2013

[10] R. Anand, S. Saravanan "Solar PV System for Energy Conservation Incorporating an MPPT Based on Computational Intelligent Techniques Supplying Brushless DC Motor Drive," International Journal of Circuits and Systems, 2016, vol.7, pp 1635-1652.

[11] R. Anand, S. Saravanan "A Correlative Study of Perturb and Observe Technique and GA-RBF-NN Method Supplying a Brushless DC Motor," International Journal of Circuits and Systems, 2016, vol.7, pp 1653-1664.

[12] M.Vijayaraghavan, K. Madumathi, K. Porkodi and S.Saravanan, "Implementation of PID Temperature Control Using LABVIEW, "International Journal of Engineering Research in Advent Technology, Vol. 2, No.11, pp.115-120, 2014.

[13] A.Lakshmipriya, R.K Raghav, M. Muruganandam, S.Saravanan, "A Simple and Efficient Interleaved Buck Converter for Battery Charging Application", International Journal of Innovative Research in Science, Engineering and Technology, Vol. 4, Special Issue 6, pp. 1419-1426, May 2015.

[14] P.Arivazhagan, B.Deepan, M.Muruganandam, S.Saravanan, "Power Sharing Optimization between Grid and Microgrid with Multiple Distributed Generators", International Journal of Innovative Research in Science, Engineering and Technology, Vol. 4, Special Issue 6, pp. 1462-1470, May 2015.

[15] S.Lal, K.Madumathi, M.Muruganandam, S.Saravanan, "Battery Energy Storage Station (BESS) Based Smoothing Control of Photovoltaic (PV) and Wind Power Generation Fluctuations", International Journal of Innovative Research in Science, Engineering and Technology, Vol. 4, Special Issue 6, pp. 1352-1359, May 2015.

[16] R.Bashkaran, M.Vijayaraghavan, M. Muruganandam, S.Saravanan, "Improving the Stability of DFIG-Based Offshore Wind Farm Using a STATCOM", International Journal of Innovative Research in Science, Engineering and Technology, Vol. 4, Special Issue 6, pp. 1338-1343, May 2015.

[17] S.Sindhuja, K.Madumathi, M.Muruganandam, S.Saravanan, "Improving the Stability of a Two Bus System Using Shunt Active Filter", International Journal of Innovative Research in Science, Engineering and Technology, Vol. 4, Special Issue 6, pp. 1344- 1351, May 2015.

[18] J.Vinoth, T.Muthukumar, M.Murugagndam and S.Saravanan,‖ Efficiency Improvement of Partially Shaded PV System, International Journal of Innovative Research in Science, Engineering and Technology, Vol.4, Special issue 6, pp.1502-1510, 2015

[19] M.Vanathi, P.M.Manikandan, S.Saravanan, "A Modified Seven Level Inverter for Dynamic Varying Solar Power Generation System", International Journal of Innovative Research in Science, Engineering and Technology, Vol. 4, Special Issue 6, pp. 1182-1191, May 2015.

[20] T.Divya, M.Iswarya, P.Sankar, M.Murganandam, S.Saravanan, "Hardware

Implementation for Stability Enhancement of Microgrid Using Hybrid Controlled Storage System", International Journal of Innovative Research in Science, Engineering and Technology, Vol. 4, Special Issue 6, pp. 1173-1181, May 2015.

[21] S.Arunvijay, M.Praveen Santhoshkumar, M.Muruganandam, S.Saravanan, "Design and Implementation of Three Phase AC-DC Converter for DC Drives", International Journal of Innovative Research in Science, Engineering and Technology, Vol. 4, Special Issue 6, pp. 1134-1139, May 2015.

[22] R.Meenakshi, C.V.Venkatesan, M.Muruganandam, S.Saravanan, "Implementation of Three Phase Interleaved Converter for Renew able Energy System", International Journal of Innovative Research in Science, Engineering and Technology, Vol. 4, Special Issue 6, pp. 1120-1126, May 2015.

[23] M.B.Malayandi, Dr.S.Saravanan, Dr. M.Muruganandam, "A Single Phase Bridgeless Boost Converter for Power Factor Correction on Three State Switching Cells", International Journal of Innovative Research in Science, Engineering and Technology, Vol. 4, Special Issue 6, pp. 1560-1566, May 2015.

[24] N.Yuvaraj, B.Deepan, M.Muruganandam, S.Saravanan, "STATCOM Based of Adaptive Control Technique to Enhance Voltage Stability on Power Grid", International Journal of Innovative Research in Science, Engineering and Technology, Vol. 4, Special Issue 6, pp. 1454-1461, May 2015.

[25] P.Ranjitha, V.Dhinesh, M.Muruganandam, S.Saravanan, "Implementation of Soft Switching with Cascaded Transformers to drive the PMDC Motor", International Journal of Innovative Research in Science, Engineering and Technology, Vol. 4, Special Issue 6, pp. 1411-1418, May 2015.

[26] K.Shek Dhauth, P.Praveen Kumar, C.Rajmohan, Dr.R.Prakash, Dr.S.Saravanan," Implementation of Automatic Poultry Feeding and Egg Collecting System", International Journal of Innovative Research In Technology, Vol.6, issue 11, pp.132-137, 2000.

[27] P.Navaneetha, R.Ramiya Devi, S.Vennila, P.Manikandan, Dr.S.Saravanan," IOT Based Crop Protection System against Birds and Wild Animal Attacks", International Journal of Innovative Research In Technology, Vol.6, issue 11, pp.138-143, 2000.

[28] S.Deva, M.Harikrishnan, R.S.Karthickumar, C.Hariharan, A.Senthilkumar, Dr.S.Saravanan," IOT Based Class Room Attendance Management System", International Journal of Innovative Research In Technology, Vol.6, issue 11, pp.194-199, 2000.

[29] M.Bharathi, M.Kausalya, S.Aishwarya, A.Cibi, V.Dhinesh, Dr.S.Saravanan," Design and Implementation of Intelligent Water Distribution System for Apartments", International Journal of Innovative Research In Technology, Vol.6, issue 11, pp.205-210, 2000.

[30] M.Meena, R.Keerthika, M.Gowri, C.Deepalakshmi, S.Karthick, Dr.S.Sravanan," Implementation of IOT Based Vehicle Entry Registering System", International Journal of Innovative Research In Technology, Vol.6, issue 11, pp.236-241, 2000.

[31] P.Sakthieswaran, P.Sanothkumar, R.Rajesh, P.Sathish, Dr.N.Mohananthini, Dr.S.Saravanan," Voice Based Digital Notice Board Using WI-FI", International Journal of Innovative Research In Technology, Vol.6, issue 11, pp.229-235, 2000.

[32] S.Moulieshwaran, S.Myarasan, S.Seeni, Dr. R.Sagayaraj, Dr.S.Saravanan," Implementation of Induction Water Heating System for Domestic Application", International Journal of Innovative Research In Technology, Vol.6, issue 11, pp.223-228, 2000.

[33] M.Rajkumar, G.Dineshkumar, Dr.S.Saravanan, Dr.R.Prakash," Analysis of Voltage Regulation in SEPIC Converter Based Hybrid Solar and Wind Energy System", International Journal of Innovative Research In Technology, Vol.6, issue 11, pp.438-442, 2000.

[34] S Prasanth, G Praveenkumar, V Sridhar, S Saranraj, Dr.S Saravanan," Paddy Harvesting System Using Vacuum Inhalation Mechanism", International Journal of Innovative Research In Technology, Vol.6, issue 11, pp.454-459, 2000.

[35] S.Prem Kumar, S.Ravi Shankar, K.Santhosh Kumar, J.Selvakumar, Dr.R.Prakash, Dr.S.Saravanan," Design and Implementation of Automatic Low Cost Organic Fertilizer and

Insecticides Making Machine", International Journal of Innovative Research In Technology, Vol.6, issue 11, pp.460-465, 2000.

[36] K.Sarathkumar, N.Tamilarasan, S.Vasanth, G.Dineshkumar, Dr.S.Saravanan, "Design and Implementation of IOT Based Smart Trolley for Supermarket", International Journal of Innovative Research In Technology, Vol.6, issue 11, pp.637-642, 2000.

[37] R Aravindhan, S Arunprasath, M.Mathi, S Saranraj, Dr.S.S.Saravanan," Implementation of Solar Powered Intelligent Grass Cutter", International Journal of Innovative Research In Technology, Vol.6, issue 11, pp.643-648, 2000.

[38] N.Gokulnath, B.Jasim Khan, S.Kumaravel, Dr.A.Senthil Kumar, Dr.S.Saravanan, "Soldier Health and Position Tracking System", International Journal of Innovative Research In Technology, Vol.6, issue 12, pp.39-45, 2000.

[39] G. Poovarasan, S. Susikumar, S. Naveen, Dr.N. Mohananthini, Dr.S. Saravanan, " Implementation of IoT Based Poultry Feeder Box", International Journal of Innovative Research In Technology, Vol.6, issue 12, pp.33-38, 2000.

[40] M.Swathisriranjani, S.Saravanan, "Modelling, Simulation And Optimization Design of PCB Planar", International Journal of Advanced Science and Engineering Research, Vol.4, Issue 1, pp.127-132, 2019.

[41] S.Monika, M.Priyadharshini, R.Rajalakshmi, T.Rajeshwari, C.Ramkumar, Dr.S.Saravanan, "Design and Implementation of Electrochemical Etching Machine", International Journal of Engineering Technology Research & Management, Vol.4, Issue.4, pp.37-44, 2020.

[42] V.Periyasamy, S.Surya, K. Vasanth, Dr.G.Vijayakumar, Dr.S.Saravanan, "Design and Implementation of IoT Based Modern Weaving Loom Monitoring System, International Journal of Engineering Technology Research & Management, Vol.4, Issue.4, pp.11-18, 2020.

[43] G. Poovarasan, S. Susikumar, S. Naveen, N. Mohananthini, S. Saravanan, "Study of Poultry Fodder Passing Through Trolley in Feeder Box", International Journal of Engineering Technology Research & Management, Vol.4, Issue.1, pp.76-83.