International Journalof Advanced Research in Education and TechnologY(IJARETY)

Volume 11, Issue 3, May-June 2024

Impact Factor: 7.394

IoT Based Waste Water Cleaning and Management Machine

T. Gowrisankar[1], M. Karthick[2], V. Lisanth[3], C.S. Satheesh [4], S. Saravanan[5]

UG Scholars, Department of Electrical and Electronics Engineering, Muthayammal Engineering College (Autonomous)

Rasipuram, Tamil Nadu, India[1,2,3]

Assistant Professor, Department of Electrical and Electronics Engineering, Muthayammal Engineering College

(Autonomous) Rasipuram, Tamil Nadu, India[4]

Professor, Department of Electrical and Electronics Engineering, Muthayammal Engineering College (Autonomous)

Rasipuram, Tamil Nadu, India[5]

ABSTRACT: Effective waste removal in the water sources such as lakes, ponds and rivers are essential for waste management and control. In Indian setting, Aquatic waste management and control is of main concern for implementing smart city and achieving clean India mission. Therefore, the proposed work, aims at developing intelligent solution towards automating the waste removal in lakes. Lake cleaning robot system for removing the surface wastes is experimented in this work. This wireless system consists of a transmitter application that runs on an android mobile app which allows the robot to follow commands given by the user through the transmitter app. The proposed solar based robot consists of Arduino UNO controller which has fourteen digital input/output pins, robotic arm with cleaning pad with a water sprayer for efficient cleaning. his tool works when the Arduino Uno microcontroller processes the gas sensor detector and a DC motor as a robot driver, then the DC motor is driven by the Motor Shield L298. The Arduino UNO, on receiving the commands from android device through WIFI module, decodes the given commands and controls the motors to achieve the desired path and direction to do the work easily we have developed the robot & it is designed in such a way that it can clean house, offices, apartments, cellars, and even streets as well. The person who is standing far gone of the cleaning area is monitoring the robot.

I.INTRODUCTION

Robotics is part of Today's communication. In today's world ROBOTICS is fast growing and interesting field. It is simplest way for latest technology modification. Now a day's communication is part of advancement of technology, so we decided to work on robotics field, and design something which will make human life simpler in day today aspect. Thus, we are supporting this cause. Robotics is the branch of technology that deals with the design, construction, operation, structural disposition, manufacture and application of robots and computer systems for their control, sensory feedback, and information processing. In the recent years, robots have been used for various cleaning purposes. Robots have various cleaning expertise like mopping, picking up the waste, wet floor cleaning, dry vacuum cleaning etc., Depending on the cleaning mechanism, these robots may have some advantages and disadvantages. Smart floor cleaning robot has been designed for home and office environments. This robot will be using water storage with anti-infection solution which is pumped with water pump motor. This robot on receiving the commands from the android device cleans an area using a cleaning pad by spraying water on the floor. After cleaning the wet floor, it can drain the dirty water into the required container as per the commands given to it. The robotic arm is used for efficient and effective wet floor cleaning purpose.

This system can also be used to pick up the objects and carry them within the Bluetooth range. The proposed system is a manual system because it is controlled by android application which is operated by human. In this project mainly whenever robot senses any obstacle automatically diverts its position to left or right and follows the path. Robot consists of two motors, which control the side pair wheels of each and help in moving forward and backward direction. Robot senses the object with help of obstacle sensor. IR pair is used for detecting the obstacle. The two basic parts for working with IR are the emitter and the detector. The emitter is typically an LED that emits near-infrared light. Infrared (IR) light is electromagnetic radiation with a wavelength longer than that of visible light, measured from the nominal edge of visible red light at 0.74 micrometers (µm), and extending conventionally to 300 µm. These wavelengths correspond to a frequency range of approximately 1 to 400 THz, and include most of the thermal radiation emitted by objects near room temperature. Microscopically, IR light is typically emitted or absorbed by molecules

when they change their rotational-vibration movements. Infrared light is used in industrial, scientific, and medical applications.

Night-vision devices using infrared illumination allow people or animals to be observed without the observer being detected. In astronomy, imaging at infrared wavelengths allows observation of objects obscured by interstellar dust. Infrared imaging cameras are used to detect heat loss in insulated systems, observe changing blood flow in the skin, and overheating of electrical apparatus. IR LED IR detectors are specially filtered for Infrared lighted are not good at detecting visible light. On the other hand, photocells are good at detecting yellow/green visible light, not well at IR light IR detectors have a demodulator inside that looks for modulated IR at 38 KHz. Photocells do not have any sort of demodulator and can detect any frequency (including DC) within the response speed of the photocell. IR detectors are digital out - either they detect 38KHz IR signal and output low (0V) or they do not detect any and output high (5V). Photocells act like resistors, the resistance changes depending on how much light they are exposed.

A photodiode is a type of photo detector capable of converting light into either current or voltage, depending upon the mode of operation. The common, traditional solar cell used to generate electric solar power is a large area photodiode. Photodiodes are similar to regular semiconductor diodes except that they may be either exposed (to detect vacuum UV or X-rays) or packaged with a window or optical fiber connection to allow light to reach the sensitive part of the device.

II.EXISTING SYSTEM

A robot vacuum cleaner is a type of autonomous robotic vacuum cleaner that can clean the floor without requiring any human intervention. This robot vacuum cleaner has various features that make it suitable for different cleaning tasks, such as spinning brushes that sweep the dust, mopping that wipes the floor, UV sterilization that kills the germs, and security cameras that monitor the surroundings. However, this robot vacuum cleaner also has some limitations, such as colliding with obstacles and stopping at a short distance from walls and other objects, which prevent it from reaching all the corners and edges of the room and leave some areas unclean. Another type of robot that can clean the floor is an automatic floor cleaner robot, which has brushes attached to its sides to collect the dust. This robot uses ultrasonic sensors to detect and avoid obstacles and change its direction accordingly. It also has a suction unit that sucks in the dust while moving around the room freely. However, this robot cannot clean the wet floor, which is a disadvantage for some situations. A third type of robot that can perform cleaning tasks is a metallic waste collection robot, which was proposed for automating waste removal in factories. This robot is an end-to-end robotic system that uses Arduino Mega micro controller as the main controller, which is interfaced with various sensors and actuators. The robot has grippers that can pick up the metallic waste, motors that power the wheels, and chassis that support the structure. The robot also has object detection and sensing capabilities, which are done using IR and ultrasonic sensors. These sensors help the robot to navigate the environment and locate the waste.

III.PROPOSED SYSTEM

In proposed system robot is Design and Implementation of Cleaning Robot using Android App" for better understanding of the proposed work. This lake cleaning system uses Arduino along with proximity sensors for detection and DC motors for movement. When the sensor detects static obstacle, the rotating blades start and the garbage is pushed into a bin which is placed right behind the mechanism. The performance of the baseline prototype model of the proposed system tested in a real time emulated environment, justifies the use of lake cleaning robot towards control and management of aquatic waste. This block diagram consists of 12v DC motor, L293D IC, WIFI module, cleaning mechanism and Arduino UNO. The power supply is given to the Arduino UNO as well as to relay. The relay works as switch so that it controls the cleaning mechanism whenever the user receives the commands from transmitter app.

IV.HARDWARE DESCRIPTION

ARDUINO UNO R3 MICROCONTROLLER

Figure.1.Arduino UNO

Arduino Nano controls the other components Raspberry Pi, motors, motor driver module, ultrasonic sensor.
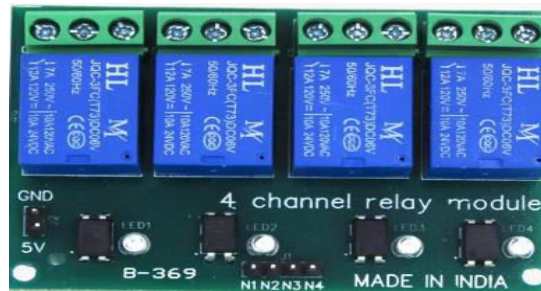
RELAY

Figure.2.Channel Relay Module

A 4-channel relay module is a device that allows you to control four high-voltage or high-current devices with low-voltage signals from a microcontroller such as Arduino, ESP32, or Raspberry Pi. You can use a 4-channel relay module to switch on or off devices like lamps, motors, solenoids, or AC loads. To use a 4-channel relay module, you need to connect the power pins (DC+ and DC-) to an external 5V power supply, and the signal pins (IN1, IN2, IN3, and IN4) to the digital output pins of your microcontroller. You also need to connect the output pins (Nc x, NOx, and COM x) to the devices you want to control, depending on whether you want them to be normally open or normally closed.

DC MOTOR

Figure.3.DC Gear Motor

The DC Gear Motor was moved to the rover forward, backward, left, and right.
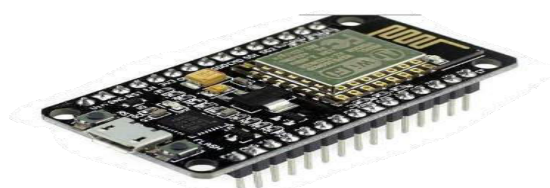
WIFI Controller

Figure.4.WI-FI NODE MCU ESP8266

WI-FI NODEMCU Esp8266 is a development board that combines the ESP8266 Wi-Fi module with a microcontroller and a USB interface. You can use it to create various Wi-Fi projects, such as web servers, web clients, IoT devices, robots, and more. You can program it using the Arduino IDE or other compatible software.   To use the WI-FI NODEMCU Esp8266, you need to install the ESP8266 board package in the Arduino IDE and select the Node MCU 1.0 (ESP-12E Module) as the board. You also need to install the appropriate drivers for your operating system to recognize the board. You can find more information on how to set up the WI-FI NODEMCU Esp8266 in this tutorial. Depending on your project, you may also need to connect some sensors, actuators, or other components to the WI-FI NODEMCU Esp8266. The board has several GPIO pins that you can use to interface with other devices.

BATTERY

Figure.5.12 V 1 AMP Battery

A 12 V 1 AMP battery is a type of rechargeable battery that can provide 12 volts of direct current and store 1 ampere-hour of electric charge. You can use a 12 V 1 AMP battery to power various devices that require 12 volts and low current, such as LED lights, small motors, sensors, or controllers.

V.SIMULATION RESULT

An embedded system is an application that contains at least one programmable computer (typically in the form of a microcontroller, a microprocessor or digital signal processor chip) and which is used by individuals who are, in the main, unaware that the system is computer-based.
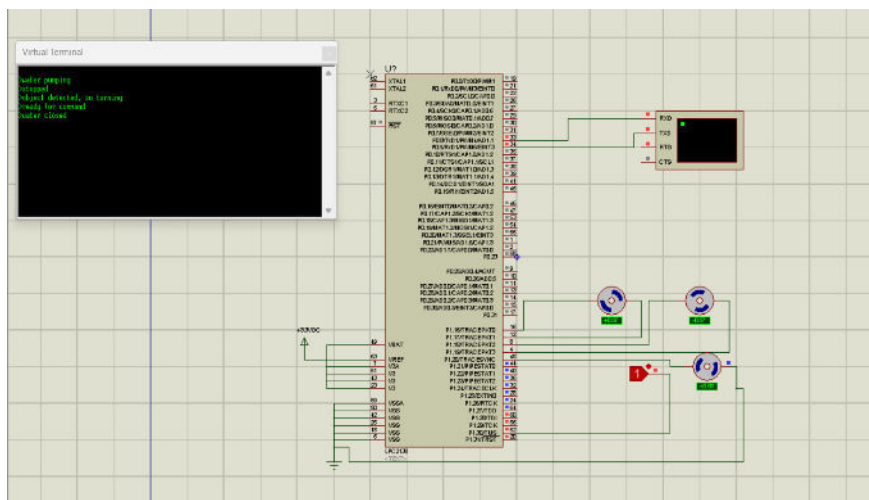
Figure.6.Simulation Result

The ISIS Intelligent Schematic Input System (Intelligent Switching input system), is the environment for the design and simulation of electronic circuits. The component library includes claims more than 10,000 circuit components with 6000 Prospect Simulations models. The VSM Virtual System Modeling provides a graphical SPICE circuit simulation and animation directly in the ISIS environment. The SPICE simulator is based on the Berkeley SPICE3F5 model.
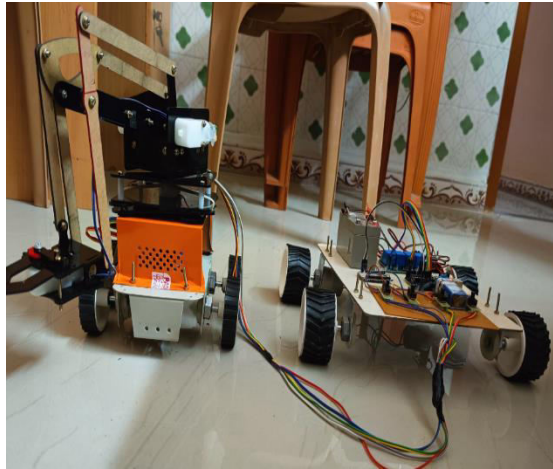
VI.HARDWARE RESULT

Figure.7.Hardware Diagram

Waste water cleaning machines play a significant role in environmental conversation efforts, ensuring cleaner public spaces and healthier aquatic ecosystems. These machines are continually evolving with advanced sensor technologies, making them more efficient and capable of addressing complex environmental challenges.

VII.CONCLUSION

A lake cleaning robot to remove surface wastes and garbage is proposed in this work. The proposed hardware consists of an Arduino board to control the movement of the robot along with gripper, motors, ultrasonic sensor. The developed lake cleaning robot can be used in all lakes and other static water bodies to clean the plastic and other floating wastes. This helps in decreasing the water pollution and thus providing a balanced environment and ecosystem. The more developed future product can also be made to work in flowing waters.

REFERENCES

1. Landmine and Cluster Munition Monitor, Landmine Monitor Report 2012, Landmine and Cluster Munition Monitor, Geneva, Switzerland, 2012. [Online]. Available: Landmine_Monitor_2012.pdf
2. J. MacDonald and J. R. Lockwood, "Alternatives for Landmine Detection," RAND Corp., Santa Monica, CA, USA, 2003.
3. P. Torrione, C. Throckmorton, and L. Collins, "Performance of an adaptive feature-based processor for a wideband ground penetrating radar system," IEEE Trans. Aerosp. Electron. Syst., vol. 42, no. 2, pp. 644–658, Apr. 2006.
4. P. Torrione and L. Collins, "Application of texture feature classification methods to landmine/clutter discrimination in off-lane GPR data," in Proc. IEEE IGARSS, 2004, vol. 3, pp. 1621–1624.
5. Q. Zhu and L. Collins, "Application of feature extraction methods for landmine detection using the Wichmann/Niitek ground-penetrating radar," IEEE Trans. Geosci. Remote Sens., vol. 43, no. 1, pp. 81–85, Jun. 2005.
6. P. Torrione and L. Collins, "Texture features for antitank landmine detection using ground penetrating radar," IEEE Trans. Geoscie. Remote Sens., vol. 45, no. 7, pp. 2374–2382, Jul. 2007.
7. T. Savelyev, L. Van Kempen, H. Sahli, J. Sachs, and M. Sato, "Investigation of time ndash;frequency features for GPR landmine discrimination," IEEE Trans. Geosci. Remote Sens., vol. 45, no. 1, pp. 118–129, 2007.
8. V.Dhinesh, T.Premkumar, S.Saravanan and G.Vijayakumar," Online Grid Integrated Photovoltaic System with New Level Inverter System" International Research Journal of Engineering and Technology (IRJET), Vol.5, Issue 12, pp.1544-1547, 2018.
9. 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.
10. 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.

11. A.Sasipriya, T.Malathi, and S.Saravanan, "Analysis of Peak to Average Power Ratio Reduction Techniques in SFBC OFDM System" IOSR Journal of Electronics and Communication Engineering (IOSR-JECE), Vol. 7, No.5, 2013.

12. 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.

13. C.Sowmiya, N.Mohanandhini, S.Saravanan and M.Ranjitha,"Inverter Power Control Based On DC-Link Voltage Regulation for IPMSM Drives using ANN" International Research Journal of Engineering and Technology (IRJET), Vol.5, Issue 11, pp.1442-1448, 2018.

14. 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.

15. P.Manikandan, S.Karthick, S.Saravanan and T.Divya," Role of Solar Powered Automatic Traffic Light Controller for Energy Conservation" International Research Journal of Engineering and Technology (IRJET), Vol.5, Issue 12, pp.989-992, 2018.

16. R.Satheesh Kumar, D. Kanimozhi, S. Saravanan, "An Efficient Control Scheme for Wind Farm Using Back to Back Converter," International Journal of Engineering Research & Technology (IJERT), Vol. 2, No.9, pp.3282-3289, 2013.

17. K.Prakashraj, G.Vijayakumar, S.Saravanan and S.Saranraj, "IoT Based Energy Monitoring and Management System for Smart Home Using Renewable Energy Resources," International Research Journal of Engineering and Technology, Vol.7, Issue 2, pp.1790-1797, 2020.

18. J Mohammed siddi, A. Senthil kumar, S.Saravanan, M. Swathisriranjani, "Hybrid Renewable Energy Sources for Power Quality Improvement with Intelligent Controller," International Research Journal of Engineering and Technology, Vol.7, Issue 2, pp.1782-1789, 2020.

19. S. Raveendar, P.M. Manikandan, S. Saravanan, V. Dhinesh, M. Swathisriranjani, "Flyback Converter Based BLDC Motor Drives for Power Device Applications," International Research Journal of Engineering and Technology, Vol.7, Issue 2, pp.1632-1637, 2020.

20. K. Manikanth, P. Manikandan, V. Dhinesh, Dr. N. Mohananthini, Dr. S. Saravanan, "Optimal Scheduling of Solar Wind Bio-Mass Systems and Evaluating the Demand Response Impacts on Effective Load Carrying Capability," International Research Journal of Engineering and Technology, Vol.7, Issue 2, pp.1632-1637, 2020.

21. T.R. Vignesh, M.Swathisriranjani, R.Sundar, S.Saravanan, T.Thenmozhi," Controller for Charging Electric Vehicles Using Solar Energy", Journal of Engineering Research and Application, vol.10, Issue.01,pp.49-53, 2020.

22. V.Dhinesh, Dr.G.Vijayakumar, Dr.S.Saravanan," A Photovoltaic Modeling module with different Converters for Grid Operations", International Journal of Innovative Research in Technology, vol.6, Issue 8, pp.89-95, 2020.

23. V. Dhinesh, R. Raja, S. Karthick, Dr. S. Saravanan," A Dual Stage Flyback Converter using VC Method", International Research Journal of Engineering and Technology, Vol.7, Issue 1, pp.1057-1062, 2020.

24. 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, 2020.

25. C. Sowmya, N. Mohananthini, S. Saravanan, and A. Senthil kumar," Using artificial intelligence inverter power control which is based on DC link voltage regulation for IPMSM drives with electrolytic capacitor," AIP Conference Proceedings 2207, 050001 (2020); https://doi.org/10.1063/5.0000390, Published Online: 28 February 2020.

26. M.Revathi, S.Saravanan, R.Raja, P.Manikandan," A Multiport System for A Battery Storage System Based on Modified Converter with MANFIS Algorithm," International Journal of Engineering Technology Research & Management, vol.4, issue 2, pp.217-222, 2020.

27. D Boopathi, S Saravanan, Kaliannan Jagatheesan, B Anand, "Performance estimation of frequency regulation for a micro-grid power system using PSO-PID controller", International Journal of Applied Evolutionary Computation (IJAEC), Vol.12, Issue.4, pp.36-49, 2021.

28. V Deepika, S Saravanan, N Mohananthini, G Dineshkumar, S Saranraj, M Swathisriranjan, "Design and Implementation of Battery Management System for Electric Vehicle Charging Station", Annals of the Romanian Society for Cell Biology, Vol.25, Issue.6, 17769-17774, 2021.

29. A Senthilkumar, S Saravanan, N Mohananthini, M Pushparaj, "Investigation on Mitigation of Power Quality Problems in Utility and Customer side Using Unified Power Quality Conditioner", Journal of Electrical Systems, Vol.18, Issue.4, pp.434-445, 2022.

30. V Kumarakrishnan, G Vijayakumar, D Boopathi, K Jagatheesan, S Saravanan, B Anand," Frequency regulation of interconnected power generating system using ant colony optimization technique tuned PID controller", Control and Measurement Applications for Smart Grid: Select Proceedings of SGESC 2021, pp..129-141.

31. C Nagarajan, B Tharani, S Saravanan, R Prakash," Performance estimation and control analysis of AC-DC/DC-DC hybrid multi-port intelligent controllers based power flow optimizing using STEM strategy and RPFC technique", International Journal of Robotics and Control Systems", Vol.2, Issue.1, pp.124-139, 2022.

32. G Vijayakumar, M Sujith, S Saravanan, Dipesh B Pardeshi, MA Inayathullaa," An optimized MPPT method for PV system with fast convergence under rapidly changing of irradiation", 2022 International Virtual Conference on Power Engineering Computing and Control: Developments in Electric Vehicles and Energy Sector for Sustainable Future (PECCON), pp.1-4.

33. C Nagarajan, K Umadevi, S Saravanan, M Muruganandam, "Performance Analysis of PSO DFFP Based DC-DC Converter with Non Isolated CI using PV Panel", International Journal of Robotics and Control Systems' Vol.2, Issue.2, pp.408-423, 2022.

34. VM Geetha, S Saravanan, M Swathisriranjani, CS Satheesh, S Saranraj, "Partial Power Processing Based Bidirectional Converter for Electric Vehicle Fast Charging Stations", Journal of Physics: Conference Series, Vol.2325, Issue.1, pp.012028, 2022.

35. M Santhosh Kumar, G Dineshkumar, S Saravanan, M Swathisriranjani, M Selvakumari, "Converter Design and Control of Grid Connected Hybrid Renewable Energy System Using Neuro Fuzzy Logic Model", 2022 Second International Conference on Computer Science, Engineering and Applications (ICCSEA), pp.1-6, 2022.

36. C Gnanavel, A Johny Renoald, S Saravanan, K Vanchinathan, P Sathishkhanna, "An Experimental Investigation of Fuzzy-Based Voltage-Lift Multilevel Inverter Using Solar Photovoltaic Application", Smart Grids and Green Energy Systems, pp.59-74, 2022.

37. C Nagarajan, K Umadevi, S Saravanan, M Muruganandam, "Performance investigation of ANFIS and PSO DFFP based boost converter with NICI using solar panel", International Journal of Engineering, Science and Technology, Vol.14, Issue.2, pp.11-21,2022.

38. K Priyanka, N Mohananthini, S Saravanan, S Saranraj, R Manikandan, "Renewable operated electrical vehicle battery charging based on fuzzy logic control system", AIP Conference Proceedings, Vol.2452, Issue.1, pp.030007, 2022.

39. V Kumarakrishnan, G Vijayakumar, D Boopathi, K Jagatheesan, S Saravanan, B Anand, "Optimized PSO technique based PID controller for load frequency control of single area power system", Solid State Technology, Vol.63. Issue.5, pp.7979-7990, 2020.

40. G. Poovarasan, S. Susikumar, S. Naveen, N. Mohananthini, S. Saravanan, "Implementation of IoT Based Poultry Feeder Box", International Journal of Innovative Research In Technology, Vol.6, Issue.2, pp.33-38, 2020.

41. N.Gokulnath, B.Jasim Khan, S.Kumaravel, Dr.A.Senthil Kumar and Dr.S.Saravanan, "Soldier Health and Position Tracking System", International Journal of Innovative Research In Technology (IJIRT)), Vol-6 Issues 12, pp.39-45, 2020.

42. P.Navaneetha, R.Ramiya Devi, S.Vennila, P.Manikandan and Dr.S.Saravanan , " IOT Based Crop Protection System against Birds and Wild Animal Attacks", International Journal of Innovative Research In Technology (IJIRT)), Vol-6 Issues 11, pp.133-143, 2020.

43. V. Dhinesh, D. Prasad, G. Jeevitha, V. Silambarasan, Dr. S. Saravanan, " A Zero Voltage Switching Pulse Width Modulated Multilevel Buck Converter", International Research Journal of Engineering and Technology (IRJET), Vol 7 Issue 3, pp.1764,2020.

44. K. Punitha, M. Rajkumar, S. Karthick and Dr. S. Saravanan, " Impact of Solar And Wind Integration on Frequency Control System", International Research Journal of Engineering and Technology (IRJET), Vol 7 Issue 3, pp.1357-1362,2020.

45. A.Arulkumar, S.Balaji, M.Balakrishnan, G.Dineshkumar and S.Saravanan, "Design And Implementation of Low Cost Automatic Wall Painting Machine" International Journal of Engineering Technology Research & Management (IJETRM), Vol-4 Issues 03, pp.170-176, 2020.

46. V.Periyasamy, S.Surya, K. Vasanth, Dr.G.Vijayakumar and Dr.S.Saravanan, "Design And Implementation of Iot Based Modern Weaving Loom Monitoring System" International Journal of Engineering Technology Research & Management (IJETRM), Vol-4 Issues 04, pp.11-18, 2020.

47. M.Yogheshwaran, D.Praveenkumar,S.Pravin,P.M.Manikandan and Dr.S.Saravanan, "IoT Based Intelligent Traffic Control System" International Journal of Engineering Technology Research & Management (IJETRM), Vol-4 Issues 04, pp.59-63, 2020.

48. R.Pradhap, R.Radhakrishnan, P.Vijayakumar, R.Raja and Dr.S.Saravanan, "Solar Powered Hybrid Charging Station For Electrical Vehicle" International Journal of Engineering Technology Research & Management (IJETRM), Vol-4 Issues 04, pp.19-27, 2020

49. S.Shenbagavalli, T.Priyadharshini, S.Sowntharya, P.Manikandan and Dr.S.Saravanan, "Design and Implementation of Smart Traffic Controlling System" International Journal of Engineering Technology Research & Management (IJETRM), Vol-4 Issues 04, pp.28-36, 2020.

50. M.Pavithra, S.Pavithra, R.Rama Priya, M.Vaishnavee, M.Ranjitha and S.Saravanan, "Fingerprint Based Medical Information System Using IoT" International Journal of Engineering Technology Research & Management (IJETRM), Vol-4 Issues 04, pp.45-51, 2020.

51. A.Ananthan, A.M.Dhanesh, J.Gowtham, R.Dhinesh, G.Jeevitha and Dr.S.Saravanan, "IoT Based Clean Water Supply" International Journal of Engineering Technology Research & Management (IJETRM), Vol-4 Issues 03, pp.154-162, 2020.

52. R.Anbarsan, A.Arsathparvez, K.S.Arunachalam, M.Swathisriranjani and Dr.S.Saravanan, "Automatic Class Room Light Controlling Using Arduino" International Journal of Engineering Technology Research & Management (IJETRM), Vol-4 Issues 03, pp.192-201, 2020.

53. S.Karthikeyan, A.Krishnaraj, P.Magendran, T.Divya and Dr.S.Saravanan , "The Dairy Data Acquisition System" International Journal of Engineering Technology Research & Management (IJETRM), Vol-4 Issues 03, pp.163-169, 2020.

54. M.Amaran, S.Mannar Mannan, M.Madhu, Dr.R.Sagayaraj and Dr. S.Saravanan, "Design And Implementation of Low Cost Solar Based Meat Cutting Machine" International Journal of Engineering Technology Research & Management (IJETRM), Vol-4 Issues 03, pp.202-208, 2020.

55. N.Harish, R.Jayakumar, P.Kalaiyarasan, G.Vijayakumar and S. Saravanan, "IoT Based Smart Home Energy Meter" International Journal of Engineering Technology Research & Management (IJETRM), Vol-4 Issues 03, pp.177-183, 2020.

56. K.Subashchandrabose, G.Moulieshwaran, M.Raghul, V.Dhinesh and S.Saravanan, "Design of Portable Sanitary Napkin Vending Machine", International Journal of Engineering Technology Research & Management (IJETRM), Vol-4 Issues 03, pp.52-58, 2020.

57. R.Gopi, K.Gowdhaman, M.Ashok, S.Divith, S.Saravanan and G.Dineshkumar, "An Online Method of Estimating State of Health of A Li-Ion Battery", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.31-36, 2023.

58. S.Azhaganandham, P.Elangovan, M.S.Kayalkanan, M.Dineshkumar and S.Saravanan, "Automatic Direct Torque Control System For 3 Phase Induction Motor", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.1-3, 2023.

59. K. Ranjith Kumar, A.Naveen, R.Ragupathi, S. Savitha and S. Saravanan, "Automatic Industrial-Based Air Pollution Avoidance System Using Iot", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.100-105, 2023.

60. G.T.Nandhini, V.Megasri, T.Jeevitha, S.Sandhiya and S. Saravanan, "Automatic Pick And Drop Helping Robot", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.72-76, 2023.

61. K.Deepika, S.Divya, A.Hema, R.Meena, V.Deepika and S.Saravanan, "Automatic Solar Panel Cleaning System", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.62-66, 2023.

62. A.Balaji, K.Harikiruthik, A.Mohamed Hassan, S.Saravanan and S.Saranraj, "Design and Implementation of A Single Stage Multi-Pulse Flexible Topology Thyristor Rectifier for Battery Charging in Electric Vehicles", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.37-42, 2023.

63. D.Hemalatha, S.Indhumathi, V.Myvizhi and S.Saravanan, "Design and Implementation of Intelligent Controller for Domestic Applications", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.4-7, 2023.

64. N.Priyadharshini, S.Saraswathi, T.Swetha, K.Sivaranjani, K.Umadevi and S.Saravanan, "Fuel Monitoring System using IoT", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.126-130, 2023.

65. S. Divyasri, E. Indhu, M. P. Keerthana, M. Selvakumari and S. Saravanan, "Gas Cylinder Monitoring System using IoT", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.67-71, 2023.

66. J.Arul, R.Balaji, S.Jeyamoorthy, M.Manipathra, R.Sundar and S.Saravanan, "IoT based Air Conditioner Control using ESP32", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.48-52, 2023.

67. Vundel Munireddy, J.Prahathesvaran, C.R.Thirunavukarasu, M.Santhosh Kumar and S.Saravanan, "IoT Based Charge Controller for Direct Fast Charging of Electric Vehicles Using Solar Panel", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.77-81, 2023.

68. D.Monish Kumaar, K.Akash, S.Aswinkumar, S.Saravanan and R. Sagayaraj, "IoT based Industry Surveillance and Air Pollution Monitoring using Drones", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.14-18, 2023.

69. T.Silambarasan, R.Surya, J.Pravinkumar, R.Sundar and S Saravanan, "IoT based Monitoring System For Sewage Sweeper", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.88-93, 2023.

70. R.Aravinthan, Alwin.Augustin, P.Divagaran, S.Saravanan and P.Manikandan, "IoT Based Power Consumption and Monitoring System", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.43-47, 2023.

71. S.Partheeban, S.Sundaravel, S.Umapathi, R.Sagayaraj and S.Saravanan, "IoT based Safety Helmet for Mining Workers", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.116-120, 2023.

72. D.K.Vignesh, K.Sabarishwaran, S.Yuvaraj, P.Manikandan and S Saravanan, "IoT based Smart Dustbin", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.82-87, 2023.

73. P Muthukrishnan, P Poovarasan, S Vasanth, R Raja and S Saravanan, "Smart Borewell Child Rescue System", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.121-125, 2023.

74. S. Gokul, B. Gokulnath, P. Manikandan, S.Saravanan and N. Mohananthini, "Smart Crop Protection From Animals And Birds Using Arduino", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.19-25, 2023.

75. M.Abinesan, S.Jawahar, S.A.Gopi, A.Gokulraj and S.Saravanan, "Smart EV Charging Hub Integrated with Renewable Energy for Highway Utility", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.58-61, 2023.

76. K.Eswaramoorthi, R.Manikandan, R.Balamurugan, C.Ramkumar and S.Saravanan, "Smart Parking System using IoT", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.53-57, 2023.

77. S.Nirmalraj, C.Pranavan, M.Prem and S.Saravanan, "Smart Trolley With IoT Based Billing System", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.111-115, 2023.

78. S. NithyaSri, S.S.Sabitha, M.Thilagavathi, S.Umamageshwari, C.Nithya and S.Saravanan, "Smart Wireless Notice Board using IoT", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.106-110, 2023.

79. V.Gunasekaran, M.Gowtham , S. Anbubalaji, S.Saravanan and R.Prakash, "Solar based Electric Wheel Chair", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.8-13, 2023.

80. S.Naveenkumar, S.Prakash, A.P.Shrikirishnaa, C.Ramkumar and S.Saravanan, "Two to Three Phase 5HP Digital Panel", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.94-99, 2023.

81. Harivignesh K, Jaisankar.A, Chandru.J, Saravanan.S and Raja.R, "Voice Controlled Automatic Writer", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.26-30, 2023.

82. N.Sakthiselvam, S.Srinivasan,S.Raajkumar, M.Selvakumari, S.Saravanan, "An Integrated Fault Isolation and Prognosis Method for Electric Drive Systems of Battery Electric Vehicles", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.166-171, 2023.

83. P Thava Prakash, P.Venketesan, D.Vignesh, S.Prakash, S.Saravanan, "Design of Low Cost E-Bicycle using Brushless DC Motor with Speed Regulator", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.148-153, 2023.

84. D.Tamilarasan, V.S.Vairamuthu, Y.Vasanth, K.Umadevi, S.Saravanan, "GSM based Agricultural Motor Control", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.172-177, 2023.

85. P. Vimal, S.Veerasigamani, R.Srihari, C.S.Satheesh, S.Saravanan, "IoT Based Optimal Power Management System For Smart Grid", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.160-165, 2023.

86. S.Abimanyu, P.Jagadheeswaran, S.Jaganath, K.Sanjay, R.Sivapranesh, K.Velmurugan, N.Mohananthini, C.S.Satheesh, S.Saravanan, "Portable Solar Tree", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.154-159, 2023.

87. J.Sriboopathi, G.Sridhar, R.Sharunesh, S.Tamilarasan, S.Saranraj and S.Saravanan, "A Dual Stage Power Electronic Converter for Electric Vehicle Charger", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.197-202, 2023.

88. M.Karthikeyan, S.Bilalahamad, V.A.Chandru, V.Deepika and S.Saravanan, "Design and Development of IoT based Motor Starter", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.178-183, 2023.

89. S.Yokesh, M.Manoj Kumar, M.Sankar, G.Dineshkumar and S.Saravanan, "Estimation of Maximum Power in Lithium Ion Batteries using IoT", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.191-196, 2023.

90. P.Preedeepa, S.Sivaranjani, M.Nandhini, M.Swathisriranjani and S.Saravanan, "Optimization of Power Quality Issues in EV Charging Station", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.203-209, 2023.

91. R. GokulRaj, N. Kannan, S. Karthick, M.Swathisriranjani and S.Saravanan, "Power Quality Enhancement in Smart Grids for Electric Vehicles Charging Station", International Journal of New Innovations in Engineering and Technology, Vol.22, Issue.3, pp.184-190, 2023.

IJARETY