



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJIRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 10, Issue 10, October 2021

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 7.569



Automatic Grinding System for Food Products Using Embedded System

A.Parthipan¹, S.Vijay², D.Sridhar³, M.Swathisriranjani⁴, S.Saravanan⁵, S.Thamilselvan⁶, N.Sathya⁷

UG Students, Department of Electrical and Electronics Engineering, Muthayammal Engineering College, Namakkal, India^{1,2,3}

Assistant Professor, Department of Electrical and Electronics Engineering, Muthayammal Engineering College, Namakkal, India^{4,6,7}

Professor, Department of Electrical and Electronics Engineering, Muthayammal Engineering College, Namakkal, India⁵

ABSTRACT- A number of conventional methods has been proposed till date, but the proposed model creeps in a new set of innovative notions for wet grinders incorporating technical stuff into existence. The proposed model quenches the intension to digitalize the hand operated traditional methods available for wet grinders. Grinding is a labor intensive and manpower-oriented work. This is a real time consumer electronic problem. The proposed model is designed with smart facilities like speed regulation, time regulation, temperature regulation and selection mode. This model helps to reduce the work burden of the user and any unskilled user can make use of this technology easily. The main goal of this smart wet grinder control is to improve the efficiency of grinding with continuous monitoring and extend it to the field of commercial electronics.

KEYWORDS- Motor Drive keyboard, PIC microcontroller, LCD display

I. INTRODUCTION

The wet grinder is a primary mode of grinding raw food materials. There are many types of grinders. Initially the grinding was initiated manually by user. It has been used for domestic and commercial purposes to do coarse and wet grinding. The main disadvantage of this type of grinder is, it does not have any facility for availing input from user. Wet grinder is a household appliance used for preparing batter, out of which some materials are prepared. Rice and dhal are the main raw materials used in the preparation of the batter. Before the invention of the mechanical wet grinders, hand operated grinding stones were used for making this batter. After the invention of mechanical wet grinders, the preparation of batter is in quick manner than the traditional grinding. But the energy consumption of these mechanical wet grinders is high and requires manual checking of flour every time for the grinding time and speed for rice and dhal are not same so manual checking is needed.

Variable frequency drive and quarter hp motor is one of the most important part of the system. VFD is an adaptable speed drive used in driver system to control speed of AC motor and torque by varying motor input frequency and voltage. Conventional grinders only have a mere motor and driver circuitry which can only control the grinders manually to some extent. user needs to perform complex operations to complete his/her work such as settling up of the grinding, halting the process of grinding and check out for heavy loading and consistency of batter. Here the user must continuously monitor and respond accordingly. Lack of proper inspection may turn the batter or dough into a worse one and the required consistency may not be achieved. A better care and monitoring assistant are required to get the perfect batter. Traditional methods proposed till date can only run on fixed speed and hence waste lots of valuable energy and time. We are here to implement a quality enhanced consumer electronics-based product to improvise automation and reduce man power. It uses user friendly algorithms based on user's decision. The continuous monitoring of the factors like temperature, loading, consistency of the batter, speed is highly required and based on that the corrective or required measures needs to be applied. In contrary the existing system available are not easily accessible, affordable and does not have such robust facilities. To bring in such sophisticated features into the system, a driver and sensors are employed for the purpose of an early intimation which helps to reduce the work burden of the user operating the system. In the proposed smart model, an early warning is made available to the user via an alarm provisioned in the system.

II. BLOCK DIAGRAM

A touch panel is a pointing device provisioned with a sensor along with a specialized surface that can translate the motion and position of the user's fingers to a relative hub on the system which is displayed as output on the screen. The module introduced operates based on the user's input. The grinder mainly uses touch panel to vary speed, time, menu and power input based on user's input. This grinder control mainly consists of microcontroller, touch panel, LCD display and power supply. The user inputs are converted into machine understandable values. Often there exist situations where we need to urgently change the speed of grinding and time required for grinding at any instant during grinding. In kitchen areas like hotels or hostels and other such busy locations the chef need not have to manually check in every time to find the status of grinding. Here the chef may set in the input stage through the touch panel, the message is, then transmitted and displayed on the screen. To demonstrate this concept, an LCD screen is used here to display features mentioned above. The LCD is interfaced with a PIC microcontroller to direct and regulate the sophisticated environment. A touch panel module is used to receive user inputs, send them to the microcontroller for converting them into machine understandable instruction and further into the process and execute it. The microcontroller then displays the information via the LCD screen.

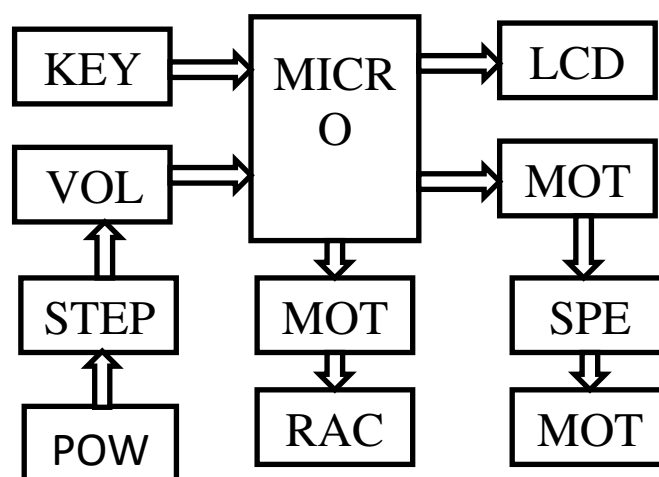


Fig.1: Block Diagram

This grinder can be used in various places including hostels, schools, colleges, offices and hotels to grind effectively. A touch panel or track panel is a pointing device featuring a tactile sensor, a specialized surface that can translate the motion and position of a user's fingers to a relative position on the operating system that is made output on the LCD display. The microcontroller then displays the message on the LCD screen. Touch panels operate in several ways, including capacitive sensing and resistive touch screen. The most common technology used in the earlier days senses the change of capacitance where a finger touches the panel. Capacitance-based touch panels will not sense the tip of a pencil or other similar ungrounded or non-conducting element. On the other hand, fingers insulated by a glove may also be problematic. While touch panels like touch screens, are able to sense absolute position, resolution is limited by their size. For common use as a pointer device, the dragging motion of a finger is translated into a finer, relative motion of the cursor on the output to the display on the operating system.

A Variable Frequency Drive is a classification of controller for motor which drives an electric motor by varying the frequency and voltage applied to the electric motor. Variable-frequency drive (VFD), is a module of adjustable-speed drive used in the grinder to control the speed and torque of motor by varying motor input frequency and voltage. The VFD controller is a conversion system consisting of three different sub-systems such as rectifier bridge converter, a direct current (DC) link, and an inverter. Speed can also be controlled remotely and locally. The operating parameters of a VFD can be programmed via dedicated programming software. VFDs are capable of blocking most programming changes while running. A temperature sensor is a device that provides temperature measurement with the help of an electrical signal. A thermocouple consists of two different metals that generate electric voltage in direct proportion to temperature variations. A Resistance Temperature Detector is a component that will change its electrical resistance in direct proportion to temperature changes.

III. METHODOLOGY

The basic methodology of the system we have proposed consists of the following modules in the user can set the parameters as per his/her choice. Here the first module consists of menu choice in which user has selector modes 0, 1 and 2 for selecting Rice, Dal and wheat for grinding. Next module is timer unit in which user selects the time input for grinding in terms of seconds after the time ends the motor speed reduce in a gradual manner to zero(0) and the device stops running. Next module is power supply in which single phase AC 230V, 50Hz supply is given to bridge rectifier to give DC supply then it is passed through filter to smooth it out. Then an inverter is used to convert the DC to AC and given as input supply to motor and the motor runs according to sets speed.

The following steps are performed to initiate the process of grinding:

Step 1: Obtaining inputs from the end user

The speed of grinding, the mode in which the grinding should happen, timer inputs and temperature threshold is set in by the user in this step.

Step 2: Converting the input into machine understandable values

The obtained speed from user is now converted into digitized values for machine inputs. The machine inputs to machine are recognized. With the help of microcontroller unit the required input for the different components in the system are precisely applied.

Step 3: Varying power consumption via user inputs during the course of grinding

According to the need of end user grinding requirements power required for the motor to run is obtained.

Step 4: Applying machine understandable values to motor speed inputs (VFD)

According to the user's input the frequency applied to the drive changes and accordingly its output voltage differs. The differed output voltage based on user's choices at any instant of grinding is then applied to the grinder.

Step 5: Controlling the operation via microcontroller

It acts as the heart of the entire system controlling various operations according to various time slots. It works on the priority of the available tasks. If the present task is completed it shifts to next task. The main objective here is to run the motor and to run the wet grinder for required time.

Step 6: Making user inputs active during entire duration: If user wants to change any of the parameters (in case), they are allowed to change at any moment. Change motor speed at any instant of grinding and repeat above mentioned steps.

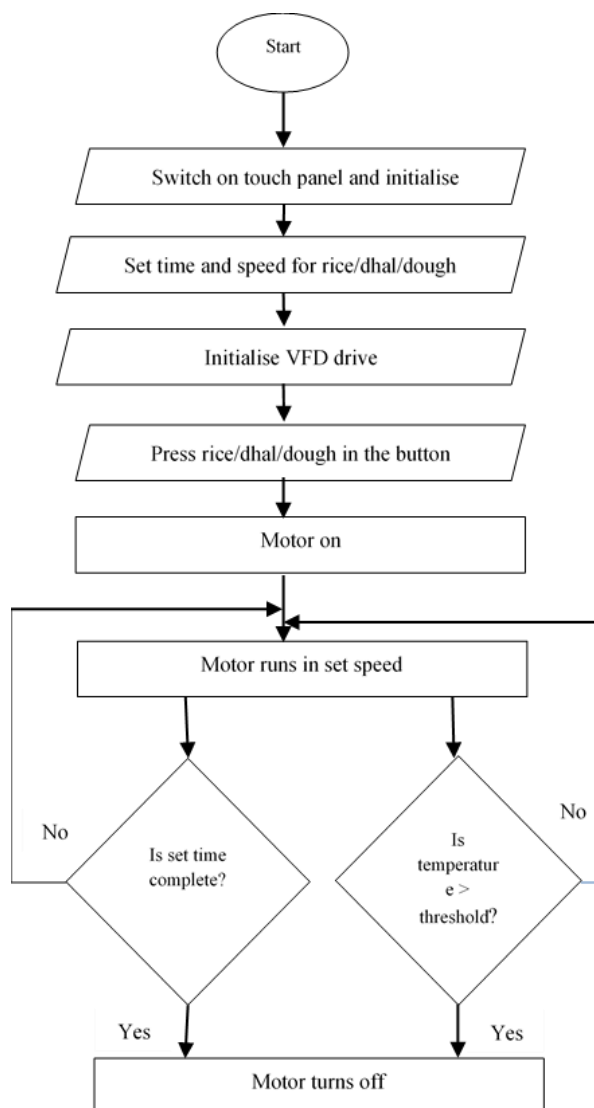


Fig 2: Flow Chart

Step 7: Miscellaneous:

During the course of grinding if any temperature hike takes place. It is indicated via a buzzer. After the time set in is completed the grinder intimates the user via the buzzer that the grinding is completed and the batter is ready to use. Followed by this the user can collect the prepared batter grinded as per the user's choice.

IV. RESULTS AND SIMULATION

The model circuit for smart control for wet grinders has been simulated and tested using Proteus software. The hardware for smart control circuit for industrial wet grinder is implemented and tested for controlling the motor. The test has been carried out for different conditions and found to be working. The grinder is tested with all the three grains, for a particular temperature threshold and for a particular set time. When the system is running under the threshold temperature, it runs for the time set by the user. If the temperature increases more than the threshold temperature set by the user, immediately the speed of the motor is gradually reduced and finally the motor is stopped.

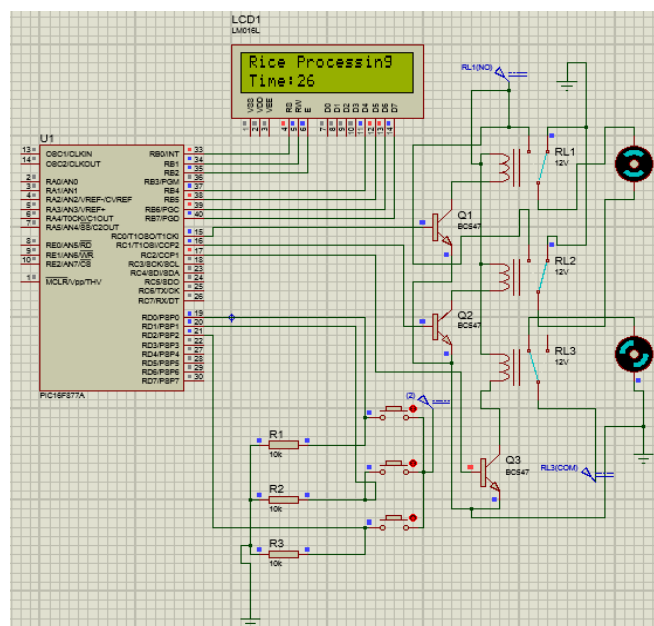


Fig.3. Simulation result

Under menu choice rice is selected by user under this mode. According to the user's choice the speed is set in via a VFD drive. The temperature threshold is set in by the user and from the system the temperature is continuously observed. As shown in Fig.3 if the system temperature is below the threshold set the system run still the end of set time and stops gradually. When the system temperature is above threshold, the grinder ceases to run before the grinding time set by the user as shown. The system stops in a gradual manner via the circuit breaker.

V. HARDWARE SETUP

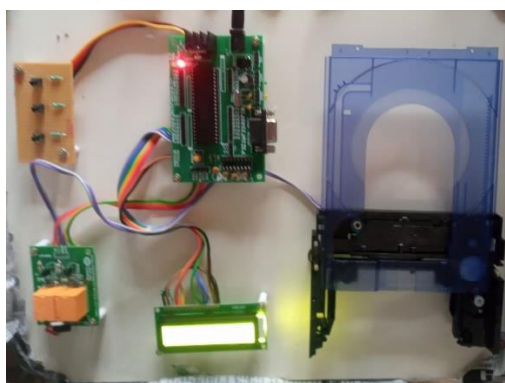


Fig.4. Hardware Setup

In this project we are using keyboard for selection process and led for showing selection driver circuits to control rack and pinion and finally PIC microcontrollers for monitoring and work all instructions.

VI. CONCLUSION

In this paper the smart control for industrial wet grinder has been developed to ease out the work burden of user. This will continuously monitor the parameters of grinding such as speed and temperature. Once the temperature level reaches the threshold value it will give alert to the user through the buzzer and LCD display. The temperature hike and time left to grind will be displayed in LCD. It is implemented to improve the manpower-oriented and time



consuming job of the users. This system is flexible and cost effective and monitors all the parameters in a contiguous manner. This system is found to be compact, user friendly and less complex which can be readily used in order to perform the grinding operation. This can be implemented and used in hotels, hostels, canteens and mess.

REFERENCES

1. 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.
2. C.Sowmiya, N.Mohananthini, 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.
3. S Prasanth, G Praveenkumar, V Sridhar, S Saranraj, Dr.S Saravanan, "Paddy Harvesting Using Vacuum Inhalation Mechanism", International Journal of Innovative Research in Technology (IJIRT), ISSN: 2349-6002, Volume 6, Issue 11, April 2020.
4. 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.
5. 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.
6. 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.
7. 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.
8. 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.
9. 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.
10. 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.
11. 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.
12. 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.
13. Dr.S.Saravanan, S.Karthick, K.Rajeshkumar,S.Sriramachandran, P.Surjeethkumar," Fishermen Border Alert System," International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol.9, Issue, 03, pp.236-241, 2020.
14. A.Ananthan, A.M.Dhanesh, J.Gowtham, R.Dhinesh, G.Jeevitha, Dr.S.Saravanan," IoT Based Clean Water Supply", International Journal of Engineering Technology Research & Management, Vol.4, Issue.3, pp.154-162, 2020.
15. S.Karthikeyan, A.Krishnaraj, P.Magendran, T.Divya, Dr.S.Saravanan," The Dairy Data Acquisition System", International Journal of Engineering Technology Research & Management, Vol.4, Issue.3, pp.163-169, 2020.



16. A.Arulkumar, S.Balaji, M.Balakrishnan, G.Dineshkumar, S.Saravanan," Design and Implementation of Low Cost Automatic Wall Painting Machine", International Journal of Engineering Technology Research & Management, Vol.4, Issue.3, pp.170-176, 2020.
17. N.Harish, R.Jayakumar, P.Kalaiyaran, G.Vijayakumar, S.Saravanan," IoT Based Smart Home Energy Meter", International Journal of Engineering Technology Research & Management, Vol.4, Issue.3, pp.177-183, 2020.
18. M.Amaran, S.Mannar Mannan, M.Madhu, Dr.R.Sagayaraj, Dr.S.Saravanan," Design and Implementation of Low Cost Solar Based Meat Cutting Machine", International Journal of Engineering Technology Research & Management, Vol.4, Issue.3, pp.184-190, 2020.
19. R.Anbarsan, A.Arsathparvez, K.S.Arunachalam, M.Swathisriranjani, Dr.S.Saravanan," Automatic Class Room Light Controlling Using Arduino", International Journal of Engineering Technology Research & Management, Vol.4, Issue.3, pp.192-201, 2020.
20. 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.
21. 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.
22. M.Yogheshwaran, D.Praveenkumar, S.Pravin, P.M.Manikandan, Dr.S.Saravanan," IoT Based Intelligent Traffic Control System", International Journal of Engineering Technology Research & Management", Vol.4, Issue.4, Pp.59-63, 2020.
23. S.Shenbagavalli, T.Priyadharshini, S.Sowntharya, P.Manikandan, Dr.S.Saravanan," Design and Implementation of Smart Traffic Controlling System", International Journal of Engineering Technology Research & Management, Vol.4, Issue.4, Pp.28-36, 2020.
24. R.Pradhap, R.Radhakrishnan, P.Vijayakumar, R.Raja, Dr.S.Saravanan," Solar Powered Hybrid Charging Station For Electrical Vehicle", International Journal of Engineering Technology Research & Management, Vol.4, Issue.4, Pp.19-27, 2020.
25. M.Pavithra, S.Pavithra, R.Rama Priya, M.Vaishnav, M.Ranjitha, Dr.S.Saravanan" Fingerprint Based Medical Information System Using IoT", International Journal of Engineering Technology Research & Management, Vol.4, Issue.4, Pp.45-51, 2020.
26. S.Umamaheswari, M.Thilagavathi, S.Sivaranjani, N.Mohananthini, M.Selvakumari, S.Saravanan," A Study Of Renewable Energy In Smart Grid Technology", International Journal of Engineering Technology Research & Management, Vol.05, Issue.09, Pp.94-101, 2021.
27. D.Ajithkumar, J.S.Akilan, K.Dileep, R.Lokesh, E.Viswanathan S.Tamilselvan S.Saravanan," Design and Development of Electric Two Wheeler With Fast Charging", International Journal of Engineering Technology Research & Management, Vol.05, Issue.09, Pp.94-101, 2021.
28. V.Annamalai P.S.Isaiyalagan T.Manikandan T.Premkumar N.Sathya R.Prakash S.Saravanan," Design and Implementation of Automatic Rope Robot for Supplying Poultry Feeds", International Journal of Engineering Technology Research & Management, Vol.05, Issue.09, Pp.94-101, 2021.
29. S.Arvinthraj, M.Arun, S.Inbhakumar, R.Sagayaraj, S.Saravanan," Multipurpose Hybrid Electric Vehicle for Agricultural Applications", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol.10, Issue.10, Pp.7366-7371, 2021.
30. G.Boopathi raja, K.Dhinesh, S.Gobi, G.Nandakumar, G.Nagarajan, G.Vijayakumar, S.Saravanan," Cotton Harvesting Machine", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol.10, Issue.10, Pp.7372-7377, 2021
31. S.Anbarasu, K.Hariharan, S.Hariharan, R.Vinoth, T.Divya, N.Mohananthini, S.Saravanan," Battery Monitoring for E-Scooter Using Internet of Things", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol.10, Issue.10, Pp.7384-7389, 2021
32. S.Mangalraj, L.Manimaran, C.Kumaresan, R.Manikandan, G.Srinivasan, A.Gokulraj, S.Saravanan," IoT Based Smart Energy Meter", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol.10, Issue.10, Pp.7390-7395, 2021



33. M.Dhanarasan, T.Jothimurali, S.U.Manishkumar,, G.Dineshkumar,P.Sakthilakkia, A.Senthilkumar, S.Saravanan,," Gas Booking Using IoT", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol.10, Issue.10, Pp.7396-7400, 2021
34. D.Manoj kumar, C.Kavinkumar, S.Kesavan, S.Saranraj, M.Selvakumari, P.Dhivyabharathi, S.Saravanan,," Intelligent Water Level Management for Domestic Application Using GSM", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol.10, Issue.10, Pp.7401-7404, 2021
35. Jaladi Kishan Kanna, S.Muniyappan, A.Ajay, M.Swathisriranjani, N.Balaji , K.Prakasam , S.Saravanan ,," IOT Based Multi Functional Robot", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol.10, Issue.10, Pp.7405-7413, 2021
36. G.Naveen, S.Guna, P.Praveen Kumar, P.Manikandan, S.Sandhiya, M.Dineshkumar, S.Saravanan ,," Smart Agriculture Using IoT", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol.10, Issue.10, Pp.7414-7419, 2021
37. K.Karan, M.Nirmal Kumar, S. Pugalenth, R.Suresh V.Deepika, Dr.S.Saravanan ,," Design and Development of E-Vehicle Based on Roller", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol.10, Issue.10, Pp.7420-7426, 2021
38. S.Priyadharshini, D.Sivaranjani, S.Sowbaranika, S.Saravanan, N.Mohananthini,," Automatic Solar Panel Tracker Using Artificial Intelligence and Data Science", International Journal of Innovative Research in Science, Engineering and Technology, Vol.10, Issue.10, Pp.13729-13735, 2021
39. S.Ashok, R.Mohanraj, K.Nandhini, P.Prakash, S.Saranraj, M.Swathisriranjani, N.Mohananthini, S.Saravanan,," Solar Powered Highway Dust Cleaner", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol.10, Issue.10, Pp.7427-7426, 2021
40. S.Tirumal, T.Suresh, S.Vignesh Kumar, R.Sagayaraj, S.Saravanan,," A Novel Pesticide Spraying for Agriculture Crops Using Drones", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol.10, Issue.10, Pp.13797-13801, 2021
41. V.Srikumar, V.Senthil Raja, Y.Sathish, R.Prakash, S.Saravanan,," BLDC Motor Driven Solar PV Array Fed Water Pumping System Employing Zeta Converter", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol.10, Issue.10, Pp.13790-13796, 2021
42. S.Siva, V.Venkatesh, R.Vigneshwaran, C.S.Satheesh, S Saravanan,," Automatic Solar Tracking System using MPPT with Mirror Booster", International Journal of Innovative Research in Science, Engineering and Technology, Vol.10, Issue.10, Pp.6859-6865, 2021
43. S.Prem Kumar, M.Rubeshan, V.Surya Prakash, N.Mohananthini, S.Saravanan,," Wireless Communication System based Automatic EB Billing and Disconnection Schemes", International Journal of Innovative Research in Science, Engineering and Technology, Vol.10, Issue.10, Pp.6866-6871, 2021
44. R.Vijay, V.Vignesh, M.Nithyanantham, R.Raja , S.Saravanan, T.Premkumar, E.Viswanathan,," Design of Electric Vehicle Drive Using Regenerative Power", International Journal of Innovative Research in Science, Engineering and Technology, Vol.10, Issue.10, Pp.6872-6879, 2021
45. S.Satham Hussian, T.Surya, G.Vignesh, R.Manikandan, S.Saravanan,," Smart Communicative Covid-19 Informative and Scanning BOT", International Journal of Innovative Research in Science, Engineering and Technology, Vol.10, Issue.10, Pp.6880-6885, 2021



**Impact Factor:
7.569**



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 **9940 572 462**  **6381 907 438**  **ijirset@gmail.com**



www.ijirset.com

Scan to save the contact details