IJAREEIE

e-ISSN: 2278-8875
p-ISSN: 2320-3765

International Journal of Advanced Research

in Electrical, Electronics and Instrumentation Engineering

Volume 11, Issue 6, June 2022

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.18

9940 572 462 6381 907 438 ijareeie@gmail.com www.ijareeie.com

| e-ISSN: 2278 – 8875, p-ISSN: 2320 – 3765| www.ijareeie.com | Impact Factor: 8.18|

||Volume 11, Issue 6, June 2022||

|DOI:10.15662/IJAREEIE.2022.1106024 |

IOT Based EGG Hatching Machine

P.Muthamilselvan[1], S.Navin[2], S.Prasanth[3], R.Praveen[4], C.Ramkumar, P. Sakthiilakkiya[6], S.Saravanan[7]

UG Scholars, Department of Electrical and Electronics Engineering, Muthayammal Engineering College, Tamil Nadu, India [1,2,3,4] ,

Assistant Professor, Department of Electrical and Electronics Engineering, Muthayammal Engineering College, Tamil Nadu, India [5,6],

Professor, Department of Electrical and Electronics Engineering, Muthayammal Engineering College, Tamil Nadu, India [7]

ABSTRACT: Poultry is one of the birds farming methods wherein the yield in the form of chicken eggs are harvested whose yield can be enhanced by integrating traditional methods (as against growing eggs in labs) and technology. The most crucial part of this is to have the right incubator to ensure the health of the eggs are fine for consumption. Natural ways of incubation could never be met until the technological aspect was integrated. As a pre-requisite, it is mandatory to maintain the right humidity, ventilation and temperature along with oscillating the eggs at regular intervals to mimic the natural incubators of hen. In order to achieve this, the incubator is connecting and controlled through a remote device by means of cloud connectivity (IoT). The sensors within the incubation chamber constantly monitors the temperature, humidity and ventilation that aids the eggs to hatch mimicking its natural incubation. One of the most important aspects along with the maintenance of humidity, temperature and ventilation is also the oscillation of the eggs to ensure the yolk and Albumen does not stick itself it its inner shell and also provide right air in the air sacks. Tilting the eggs at 45o and 55o were achieved to evaluate the percentage of success at these two tilt angles. The microcontroller obtaining the data inputs from the sensors decides on changing its temperature, humidity, tilting and ventilation to mitigate the risk of failure of hatching. The system is connected to the cloud thro Node MCU, through which the user can control and also monitor the status of the incubator. This incubator has been tested on hen and duck eggs.

KEYWORDS: Incubator, Temperature, Relative humidity, Poultry, Smart Phone control, IOT

I. INTRODUCTION

There are two main types of hatching of chicken eggs involved. They are natural & artificial. Natural hatching involves the hen warming the eggs and also manually tilts it at regular intervals. Artificial hatching involves incubating the eggs in an incubator where the temperature, egg rolling, humidity, ventilation are artificially provided by the sensors as decided by the microcontroller. The greatest advantage of this incubator is its success ratio where it is nearly equal to natural hatching. Also added with it is the bulk of eggs that could be hatched at a time across the seasons in the artificial nursery. Though incubation is a primitive activity, artificially incubation is relatively new and integrating IoT into it is a novice. The incubator explained here serves the demand for bulk qty eggs in a relatively low cost set up. Though artificial incubation in India is prevalent, the cost of the incubator and its limited capacity makes it economically unviable for commercial exploitation. The technicalities of adding egg tilting/ rotation, maintaining humidity, temperature and provision of ventilation along with heating the temperature within the incubator adds more cost, however, all of these are taken care in this incubator to make it a cost effective equipment. The delicacy of artificial incubation is quite drudgery since slight variation of incubation parameters of temperature, humidity, ventilation and titling timings are in very minute tolerance limits and a small deviation on either ends yields to unsuccessful hatching where the limits are to be precisely maintained. For the same reason, the artificial incubators are shut down in winter season fearing low yield foreseeing financial losses. Further, lack of intricate technical knowledge and financial support renders small hatchers unviable.

| e-ISSN: 2278 – 8875, p-ISSN: 2320 – 3765| www.ijareeie.com | Impact Factor: 8.18|

||Volume 11, Issue 6, June 2022||

|DOI:10.15662/IJAREEIE.2022.1106024 |

The proposed incubator leverages the technological advancements made through microcontrollers which turn out to be inexpensive, capable of handling minuscule changes that demand in its environment and possible for bulk quantities come as a boon to the farmers. In order to have a effective and successful poultry business, the foremost aspect that drives it is its fertilization. The incubation period of 21 days is required in order to hatch the eggs into chicken by means of monitoring temperature, humidity and turnover of the eggs. The natural factors such as temperature, humidity, rotating of eggs and the moisture content is to be precisely maintained in order to achieve good results, failing with it ends up with a loss. Therefore, the necessity arose to have a system that can continuously monitors and maintains these factors regularly in order to keep the eggs healthy. This is achieved by means of technology by incorporating a programmed microcontroller to activate the heat source (incandescent lamp) and keep the fan off. After exhaustive research and studies, the desired natural parameters have been arrived at and these values are fed into the threshold values.. If the temperature drops below the threshold, the heat source switches ON. If the heat source increases beyond the threshold, automatically the heat source is switched off and the exhaust is turned on which maintains the temperature. Likewise, the sources of humidity is also achieved to be precise as set by the machine.

II.EXISTING METHOD

Accurate and precise measurements of the environmental parameters within the incubator are obtained by means of highly sensitive instruments wherein sensors collect the data on temperature, humidity, angle of egg tilt, water level, and intensity of light. The system utilizes ATmega328 to control all the peripherals which are connected to the system. This controller is fast enough and also possesses the ability to run multiple programs. DHT11 digital sensor is used to obtain the temperature & humidity. Incorporating an incandescent lamp as the heat source reduces substantial power consumption as against using heater. High efficiency fans are used to circulate the heated air within the chamber to maintain required temperature. A humidifier is used to maintain the pre set humidity in the entire internal system. A standard widely available 16x2 LCD display unit is integrated to the electronic module that is used as a display unit. The outputs from all the sensors are connected to the heart of the incubator, which gives the command to power on or off the desired peripheral connected to it, as deemed fit. A battery is also employed for backup purposes. IoT and Node MCU (ESP8266) are used to integrate on the smart phone that provides the overall monitoring and configuration to the user.

III. PROPOSED METHOD

Once you have eggs to incubate, avoid damaging or contaminating them. Wash your hands frequently to remove bacteria from your hands.

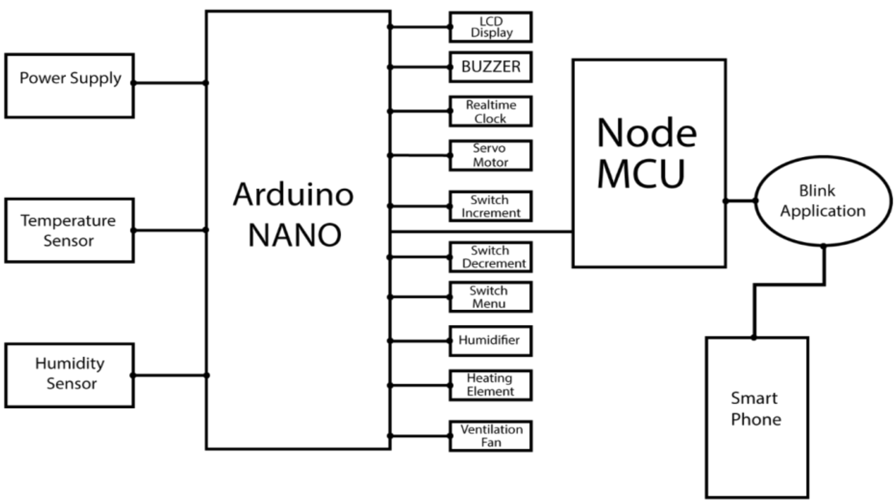


Fig 1 Block diagram

| e-ISSN: 2278 – 8875, p-ISSN: 2320 – 3765| www.ijareeie.com | Impact Factor: 8.18|

||Volume 11, Issue 6, June 2022||

|DOI:10.15662/IJAREEIE.2022.1106024 |

Eggs should be set as soon after you collect them as possible. Storing eggs for at least three days helps prepare them for incubation; however, fresh and stored eggs should not be set together. It is best to incubate eggs within 7 to 10 days of their being laid. Hatchability decreases rapidly when eggs are stored for more than 10 days. After 7 days, hatchability decreases 0.5 to 1.5 percent per day. Each day in storage adds one hour to the incubation time. Fertile eggs should be stored between 55 and 65°F. If fertile eggs reach temperatures above 72°F, embryos will begin to develop abnormally, weaken, and die. Embryos stored below 46°F also have high embryo mortality. Room temperature is generally too warm and the refrigerator is too cold for storing fertile eggs. If you plan to store eggs in a refrigerator, adjust it to an appropriate temperature. Fertile eggs should be stored at 70 to 80 percent relative humidity. High humidity can cause condensation to form on the eggshell. This can clog the pores on the eggshell and cause contamination the same way washing does. Clogging the pores can also suffocate the embryo. Low humidity during storage can make the egg lose internal moisture and kill the embryo. To increase the humidity, place a pan of water in the storage room. It is the surface area of the water influences humidity, not the depth of the water. Avoid drafts; these can dry the eggs out even when humidity is within the appropriate range.

Incubators come in forced air or still air versions. The temperature and humidity in a forced air incubator is more consistent. They also return to desired temperature and humidity more quickly after being opened. Still air incubators can give inaccurate humidity and temperature readings and the temperature in them can vary considerably. Whenever possible, use a forced air incubator. Regardless of incubator type, for a successful hatch you must turn the eggs and monitor the temperature, humidity, and ventilation. The incubator should be in a room that has no drafts or direct sunlight; the temperature and humidity should be controlled and stable. The incubator and hatcher should also be isolated from the growing facilities. Newly hatched chicks can be contaminated by older birds and the dust created by growing birds. Take biosecurity measures to insure the incubator area is not contaminated by older birds.

Chicks may be hatched in the incubator depending on what type it is; however, hatching creates large amounts of dust and down. Hatching in a separate unit will keep dust and down from contaminating the incubator. Temperature and humidity can also be controlled more easily if you use separate units for incubating and hatching. Regardless of method, you must properly clean and disinfect the incubator and hatcher between batches.

IV. SIMULATION PROTEUS SOFTWARE DESCRIPTION

The proposed system that is going to be described in this phase is done using the Proteus model. The simulation circuit has been designed in Proteus software using the respective components present in the Proteus to get the desired output. This simulation circuit will be described in detail below. This chapter describes the design and current implementation of the Proteus dependability manager and object factory.

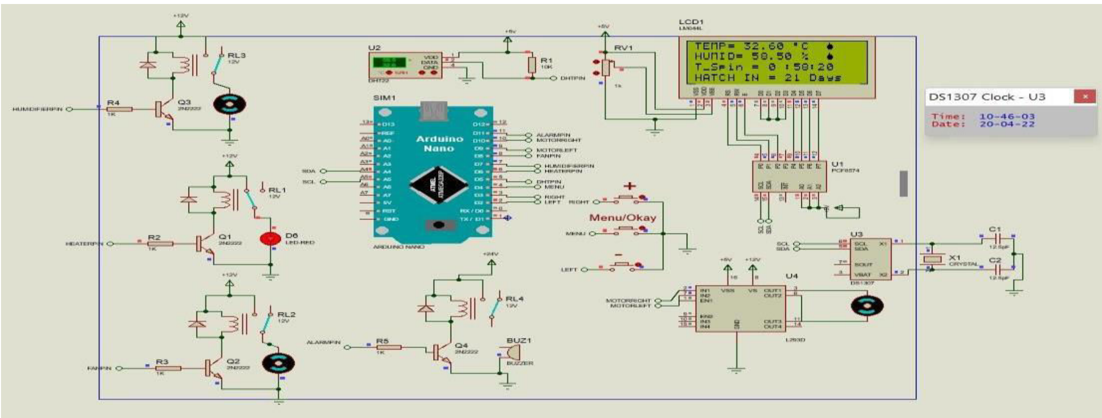


Fig 2. Simulation Output

The application requirements and the type of Aqua applications that Proteus currently supports are also described. Proteus PIC Bundle is the complete solution for developing, testing and virtually prototyping your embedded system designs based around the Microchip Technologies TM series of microcontrollers. This software allows you to perform schematic capture and simulate the circuits you design. A demonstration of the use of

| e-ISSN: 2278 – 8875, p-ISSN: 2320 – 3765| www.ijareeie.com | Impact Factor: 8.18|

||Volume 11, Issue 6, June 2022||

|DOI:10.15662/IJAREEIE.2022.1106024 |

PROTEUS will be given to you in this lab session. After that, you are encouraged to learn to use the software interactively.

V. HARDWARE IMPLEMENTATION

Fig. 3 Hardware Implementation

VI. CONCLUSION

An Egg hatching machine control using smart phone was designed and constructed using locally available materials. The developed egg hatching machine was 396 mm × 609 mm × 609 mm in size with a capacity for 60 eggs. Preliminary test was also carried out on the developed Egg hatching machine control using smart phone before loading of the eggs. This study revealed that there was a strong positive linear relationship between the ambient and interior temperatures of the egg incubator which was in support of the result reported. In spite of the fact that there were differences in results obtained all were able to achieve the recommended temperature require for hatchability with the help of temperature controller. This study testifies that the ambient temperature of the egg incubator has great effect on the interior temperature making the interior temperature to be varied. The outcome of the preliminary test indicate that the Egg hatching machine control using smart phone worked effectively within the recommended temperature for successful hatchability. This indicates that the temperature control unit and the smartphone control are reliable and effective. The efficiency (hatchability) of the developed Egg hatching machine control using smart phone poultry egg incubator is 85 %.

REFERENCES

1. Jithinvmohan, MinuBalan, Sharoon Thomas, and Lynn Mariette Mendonza, “Fleet Mangement System”, B.Tech Degree Thesis, College of Engineering, Munnar, Idukki, Kerala, India, 2009.
2. Mohammad A. Al-Khedher, “Hybrid GPS-GSM Localization of Automobile Tracking System”, International Journal of Computer Science & Information Technology (IJCSIT) Vol 3, No 6, Dec 2011
3. SaedTarapiah, ShadiAtalla, and RajaaAbuHania, "Smart On-Board Transportation Management System Using GPS/GSM/GPRS Technologies to Reduce Traffic Violation in Developing Countries
4. ImaneBenkhelifa, Nadia Nouali-Taboudjemat, Samira Moussaoui, “Disaster Management projects Using Wireless Sensor Networks”, 28th International Conference on Advanced Information Networking and application Workshops, pp.605-610, 2014.
5. Chandra ShekarRamaiah, Dr.S.AsifHussain, S. ZahidHussain,andYahya Al Balushi, “Smart Vehicle Security System for defending against collaborative attacks by malware”, 3rd MEC International Conference on Big Data and smart cities (ICBDSC), pp.1-5, 2016.
6. P.Ranjitha, V.Dhinesh, M.Muruganandam, S.Saravanan, “Implementation of Soft Switching with Cascaded

| e-ISSN: 2278 – 8875, p-ISSN: 2320 – 3765| www.ijareeie.com | Impact Factor: 8.18|

||Volume 11, Issue 6, June 2022||

|DOI:10.15662/IJAREEIE.2022.1106024 |

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.
7. 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.
8. V. Priyadharshini, V. Vijayalakshmi , S. Vidhyashri , G.Nandakumar, G.Nagarajan, S.Saravanan ," Design and Development of Garbage Collector Robot", International Journal of Innovative Research in Science, Engineering and Technology, Vol.10, Issue.10, Pp.13855- 13862, 2021
9. R.Thiruvarasu, V.Vallarasu, V.Vignesh, R.Sundar, R.Vinoth, T.Divya, S.Saravanan," Smart Safety Monitoring System for Sewage Workers using Arduino", International Journal of Innovative Research in Science, Engineering and Technology, Vol.10, Issue.10, Pp.13863-13868, 2021
10. K.Perumal, M.Venkatesh, R.Parthasarathi, G.Srinivasan, A.Gukulraj, S.Saravanan," International Journal of Innovative Research in Science, Engineering and Technology, Vol.10, Issue.10, Pp.13884-13889, 2021
11. A.Ramana Kishor, S.Saravanan, G.Sasikumar, C.Ramkumar, P.Sakthiilakkiya, A.Senthilkumar, S.Saravanan," Smart Pollution Monitoring in Vehicle Using Arduino", International Journal of Innovative Research in Science, Engineering and Technology, Vol.10, Issue.10, Pp.13890-13896, 2021
12. P.Selvappriya, V.Shalini, M.Uma Maheswari, R.Punitha, S.Saravanan," Cultivation of Cash Crops under Automated Greenhouse using Internet of Things", International Journal of Innovative Research in Science, Engineering and Technology, Vol.10, Issue.10, Pp.13897-13905, 2021
13. A.C.KVigneshkumar, N.Tamilselvan, S.Vishva, C.S.Satheesh, G.Dineshkumar, S.Saravanan, "Wireless Power Transmission Using Class C Power Amplifier from Solar Input", International Journal of Innovative Research in Science, Engineering and Technology, Vol.10, Issue.10, Pp.13906-13912, 2021
14. 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
15. 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
16. K.Karan, M.Nirmal Kumar, S. Pugalenthi, 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
17. 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
18. 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
19. 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
20. 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
21. 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
22. 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
23. 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
24. S.Satham Hussian, T.Surya, G.Vignesh, R.Manikandan, S.Saravanan," Smart Communicative Covid-19

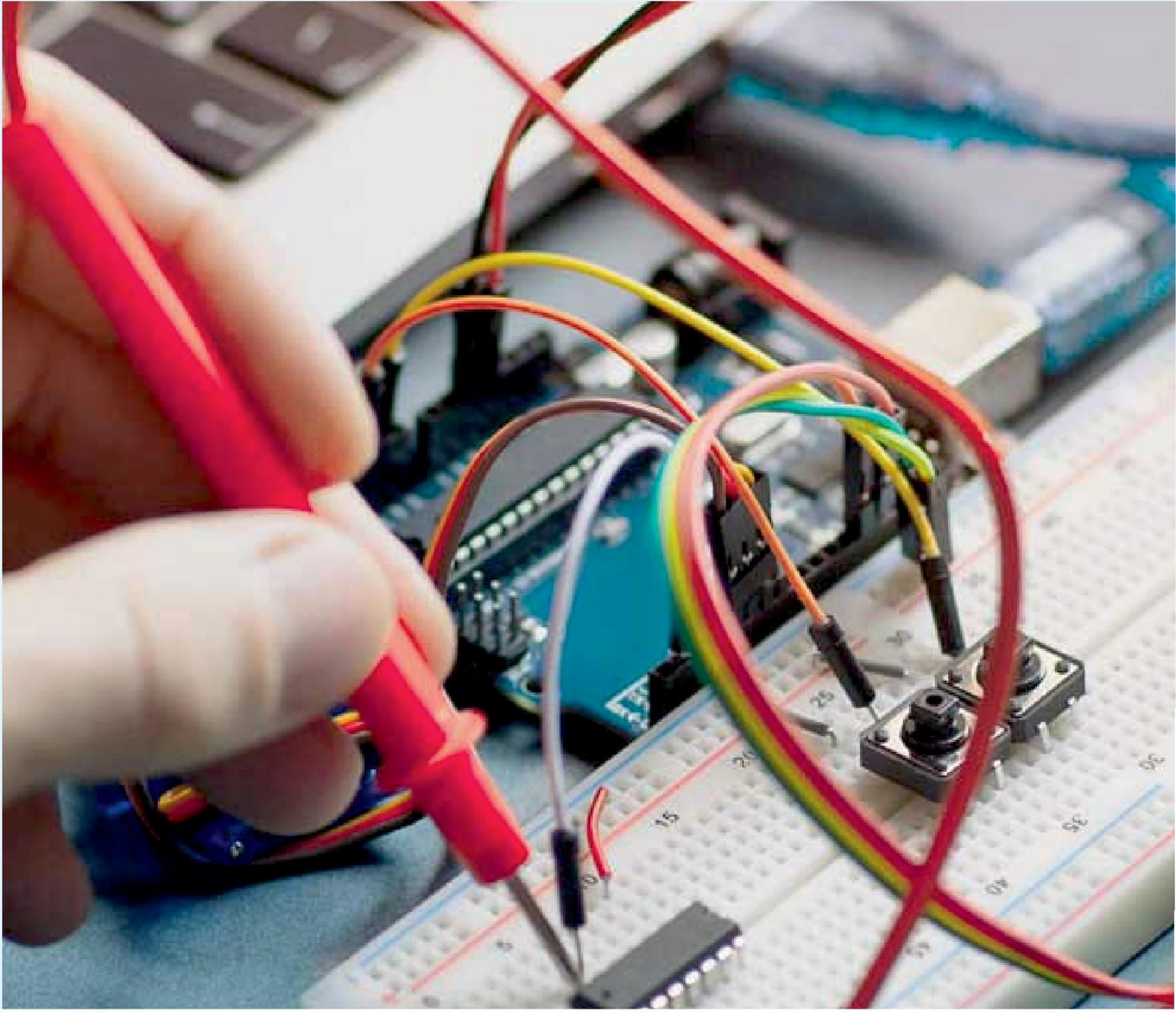
| e-ISSN: 2278 – 8875, p-ISSN: 2320 – 3765| www.ijareeie.com | Impact Factor: 8.18|

||Volume 11, Issue 6, June 2022||

|DOI:10.15662/IJAREEIE.2022.1106024 |

Informative and Scanning BOT", International Journal of Innovative Research in Science, Engineering and Technology, Vol.10, Issue.10, Pp.6880-6885, 2021

25. AVR.Vimalkanth, S.Vimal, NM.Santhoshkumar, G.Dineshkumar, S.Thamilselvan, N.Sathya, S.Saravanan," An Intelligent Fire Fighting Robot using WSN ", International Journal of Innovative Research in Science, Engineering and Technology, Vol.10, Issue.10, Pp.13840-13846, 2021
26. A.Parthipan, S.Vijay, D.Sridhar, M.Swathisriranjani, S.Saravanan, S.Thamilselvan, N.Sathya," Automatic Grinding System for Food Products Using Embedded System", International Journal of Innovative Research in Science, Engineering and Technology, Vol.10, Issue.10, Pp.13847-13854, 2021
27. V. Priyadharshini, V. Vijayalakshmi , S. Vidhyashri , G.Nandakumar, G.Nagarajan, S.Saravanan ," Design and Development of Garbage Collector Robot", International Journal of Innovative Research in Science, Engineering and Technology, Vol.10, Issue.10, Pp.13855- 13862, 2021
28. R.Thiruvarasu, V.Vallarasu, V.Vignesh, R.Sundar, R.Vinoth, T.Divya, S.Saravanan," Smart Safety Monitoring System for Sewage Workers using Arduino", International Journal of Innovative Research in Science, Engineering and Technology, Vol.10, Issue.10, Pp.13863-13868, 2021
29. K.Perumal, M.Venkatesh, R.Parthasarathi, G.Srinivasan, A.Gukulraj, S.Saravanan," Water Pipe Leakage Management System for Domestic Applications Using GSM", International Journal of Innovative Research in Science, Engineering and Technology, Vol.10, Issue.10, Pp.13884-13889, 2021
30. A.Ramana Kishor, S.Saravanan, G.Sasikumar, C.Ramkumar, P.Sakthiilakkiya, A.Senthilkumar, S.Saravanan," Smart Pollution Monitoring in Vehicle Using Arduino", International Journal of Innovative Research in Science, Engineering and Technology, Vol.10, Issue.10, Pp.13890-13896, 2021
31. P.Selvappriya, V.Shalini, M.Uma Maheswari, R.Punitha, S.Saravanan," Cultivation of Cash Crops under Automated Greenhouse using Internet of Things", International Journal of Innovative Research in Science, Engineering and Technology, Vol.10, Issue.10, Pp.13897-13905, 2021
32. A.C.K.Vigneshkumar, N.Tamilselvan, S.Vishva, C.S.Satheesh, G.Dineshkumar, S.Saravanan," Wireless Power Transmission Using Class C Power Amplifier from Solar Input", International Journal of Innovative Research in Science, Engineering and Technology, Vol.10, Issue.10, Pp.13906-13912, 2021



International Journal of Advanced Research

in Electrical, Electronics and Instrumentation Engineering

9940 572 462 6381 907 438 ijareeie@gmail.com

www.ijareeie.com

Scan to save the contact details