International Journal of Applied Engineering Research

AUTOMATIC HAND SANITIZER DISPENSER WITH TEMPERATURE SENSING AND HEART BEAT MEASURING SYSTEM

Dr. S. Prasad Jones Christydass[1*], Dr.MLSNS .Lakshmi[2], Dr.V.Nishok[3], Dr.S.Suresh Kumar[4], Mr.V.Jaikumar[5]

[1*,2,3,4,5,]Associate Professor, Electronics and Communication Engineering, QIS College of Engineering and Technology, Ongole Andhra Pradesh.

[1*]prasadjones.ece@gmail.com

ABSTRACT

The purpose of this study is to present the design and development of a low-cost automatic hand dispenser. Infrared sensors are commonly used in automatic hand dispensers to detect the presence of a hand. This project will not necessitate direct human involvement. The IR sensor in this system detects proximity and delivers a signal to the microcontroller. This project entails measuring the temperature and heartbeat rate, which are then displayed on an LCD. This aids in the early detection of any virus symptoms, such as COVID-19, and can be detected in the early stages.

Keywords: Arduino, LCD, IR Sensor, Temperature Sensor, Heart Beat Sensor.

1.Introduction

A cluster of unusual cases of pneumonia arose from regional fears of a global outbreak in the final quarter of 2019. On December 31, 2019, Wuhan, China reported the first case of Severe Acute Respiratory Syndrome Type 2 (SARS-CoV-) 2, which the World Health Organization later named a pest on March 11, 2020. The majority of those exposed to the toxin will develop mild to severe respiratory infections. They will also recover without the need for specialised care. Some people will still have more serious ailments and will require medical attention. Severe infections can impact the elderly as well as those with health issues such as diabetes, cancer, chronic lung disease, or heart disease. COVID- 19 can make anyone sick and impact different people in different ways. The majority of infected people will develop mild to severe sickness and recover without being hospitalised.

Do the following to avoid contracting COVID-19 and to help reduce its spread once the vaccination is available. Stay at least one metre away from those who appear to be in distress. Wear a suitable mask if physical separation is not possible or in areas where there is no fresh air. Choose open, well-spoken regions over unrestrained areas. Open the window once you're outside. Wash your hands frequently with soap and water or use an alcohol-based hand massage. If you cough or sneeze, though, seal your mouth and nose. When you're unwell, stay at home and insulate yourself until you feel better.

Hands touch many different regions and can be directly defiled. Hand washing is recommended by numerous health organisations, including the World Health Organization. Hand hygiene is currently regarded as one of the most critical aspects of infection control methods. Because of the increased use of hand sanitizers, the Coronavirus spread throughout the world. When a person presses a pump, an alcohol-based detergent generally rubs the sanitizer on their hands. Because more persons will come into contact with the pump handle, the likelihood of transmission increases. As a result, many people use hand sanitizers, which contribute to the spread of infection. In this composition, we present a novel notion for a hand sanitizer dispenser. The desire for an innocent automatic affair is established after detecting the contamination contact site. The IR detector is integrated into the circuit. Hands near the outfit are detected by the detector. The machine is mounted on the wall at a height of four bases, making it accessible to everyone. .

When an Arduino-connected detector is powered on, it begins working immediately. The automatic sanitizer is the first to go, followed by the temperature and infrared sensors. Hand sanitizer dispenser infrared detectors collect infrared

radiation released by body heat. The infrared power changes rapidly when the hands are placed near the detector. Because of this rigidity, the pump operates and discharges a predetermined amount of sanitizer. When hands are placed near the detector, the infrared radiation changes quickly. The pump opens and releases the predetermined quantum of sanitizer as a result of this variation. Infrared energy is generated by the dereliction antibodies when the mortal body heat is discharged. When hands are placed near the detector, the infrared power fluctuates rapidly. The pump opens and releases the predetermined quantum of sanitizer as a result of this variation.

2. Literature Survey

The design and development of a low-cost automatic sanitizer dispenser is presented in this study. It is built in such a way that the overall cost can be decreased while maintaining stability. In general, an automatic sanitizer dispenser detects the presence of a hand using infrared sensors..

3. Existing System

Hand sanitizers are often applied by pushing the handle of the sanitizer bottle, however because so many people may come into touch with the sanitizer, there is a higher likelihood of viral transmission than avoiding it. As a result, because there is no need for each and every individual to squeeze the sanitizer's handle, this automatic hand sanitizer dispenser plays a vital role in minimising viral transmission. The automatic dispenser's hand-detection and sanitizer spraying functions prevent the spread of bacterial and viral diseases.

4. Proposed System

We made a plastic cabinet with a disinfectant dispenser. The system is comprised of an infrared proximity sensor. An infrared sensor is used by the technology to assess whether or not the hands are underneath the machine. After being designed for a water RO system, the cabinet was modified to accommodate the sanitizer dispensing function. The sanitizer storage compartment is located on the front side 22 upper portion. The water dispensing faucet and filters have both been removed. On the cabinet's bottom side, a mist nozzle has been installed. The sanitizer is drawn into the pump, which then forces it to the nozzle. The solenoid valve has also been used to control nozzle opening and make it easier to control liquid sanitizer distribution. It was simple to construct using pipes and adapters. This device also has a temperature and heartbeat sensor. Temperatures and heart rates of users are constantly monitored.

4.1 Components Used

Arduino Uno

Arduino boards can take inputs like light from a sensor, a user hitting a button, or a tweet and turn them into outputs like activating a motor, turning on an LED, or putting anything online. You can send an instruction set to your board by sending a message to it. You use the Arduino Software and the Wiring-based programming language of the Arduino Processing-based programming language for this (IDE). An Arduino board can be used as a rapid development tool. Specifically, sensors and VLSI test benches. The main advantages are quick processing and. Simple user interface

Figure 1: Arduino Uno

Temperature Sensor

Using a temperature sensor, Arduino converts voltage. After further conversions from voltage to Celsius and Celsius to Fahrenheit, the temperature is displayed on the LCD panel in Fahrenheit. A low voltage temperature sensor will be

used.

Figure 2: Temperature Sensor

LCD Display

The LCD is a type of display that uses liquid crystals (Liquid Crystal Display). We'll use the computer's serial input to upload the Arduino sketch here. The characters will be displayed on the LCD. The Liquid Crystal Library, which will be discussed further below, is the library that allows us to control the LCD display. The compatible Hitachi HD44780 chipset serves as the library's base. It is found on the vast majority of text-based LCDs. It can operate in either an 8-bit or 4-bit mode. When referring to the bit mode, the data lines are also included in the enable, rs, and rw control lines.

Figure 3: LCD Display

IR (Infrared) Proximity Sensor

An infrared sensor is a sensor that produces infrared light to detect specific properties of its surroundings. An infrared sensor can detect movement as well as monitor the heat of an object. These sensors are known as passive IR sensors since they do not emit infrared radiation but rather measure it. The foundation of this exercise is founded on both mathematics and physics. All design ideas are derived from the Kirchhoff voltage law (KVL), which is based on fundamental mathematical operations such as fractions and ratios. Infrared light is supported by optics ideas (IR).

Figure 4: IR (Infrared) Proximity Sensor

4.2 Block Diagram

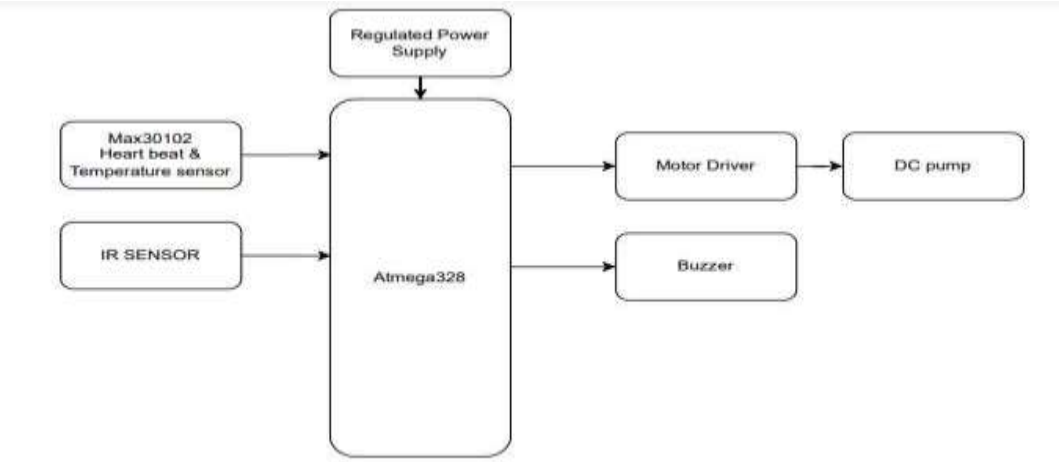
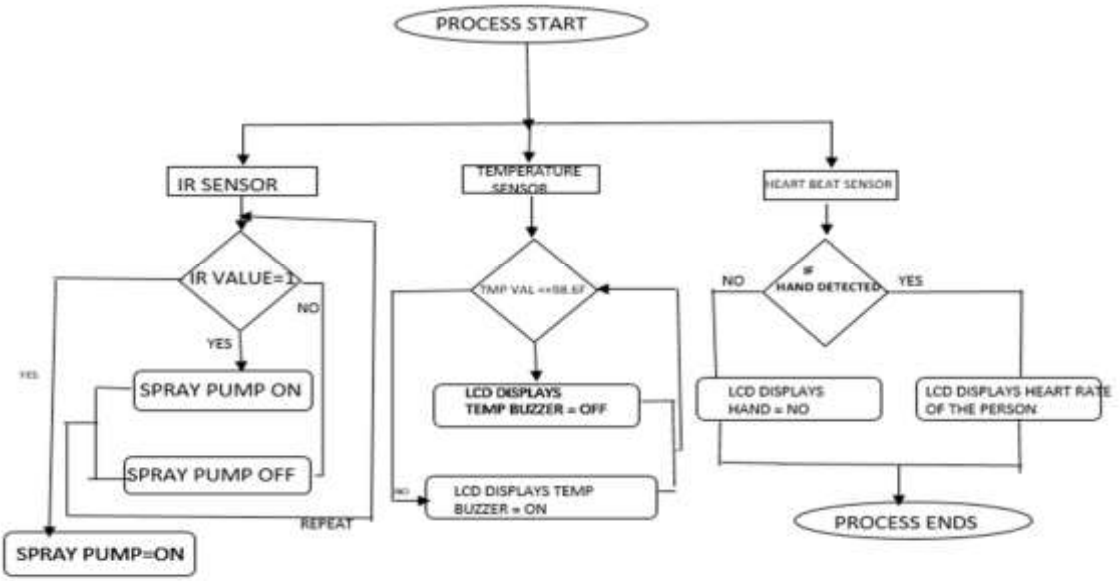


Figure 5: Block Diagram

4.3 Algorithm

Step 1: Connect and solder all of the components on the circuit board.
Step 2: Connect the last two pins of the LCD hold ring (16*2) to ground. Following that, we must connect both end pins.
Step 3.: Connect the Temperature sensor (MAX 30102), the Temperature sensor, and the IR sensor to the Circuit Board
Step 4: Connect the motor in order for it to work; we cannot run the ATmega328 microprocessor directly.
Step 5: We're going to attach the heartbeat sensor and buzzer. The goal of utilising a buzzer is to make a sound if the temperature rises above 99 degrees Fahrenheit.
Step 6: In the LCD display, connect pins 2, 3, 5, 6, 7, and 8 to the ATmega328 Microcontroller.
Step 7: We use the reset button to programme the ATmega328 microcontroller.
Step 8: After connecting all of these, we will provide power and output.
Step 9: The first output we'll look at is hand sanitization. If it detects a hand, it will show a yes in the LCD display.
Step 10: After keeping our hand on the temperature sensor, the LCD display will show us our body temperature.
Step 11: Next, we must check for a heartbeat by placing our hand on the heartbeat Sensor, which will display the person's heartbeat on the LCD display.
Step 12: On the LCD Display, we can see the sanitization, temperature, and heartbeat all at once.

4.4 Flow Chart



The ravels
thro e than
whe
The sity is
hig minal,
whi

When the sensor is active, a little green LED will illuminate for this function. Only the target metal can be detected by the inductive proximity sensor. This is due to the sensor's reliance on an electromagnetic field. When a metal target enters the electromagnetic field, the changing properties of the metal cause the platform's structure to change, alerting the nearby sensor to the metal target's presence. The target can be found from a long or short distance depending on how easy the metal makes it.

Step 1: As shown in the diagram, connect the components. We need to gather the necessary components for connections. Arduino UNO, Buzzer, Heart Beat Sensor, Temperature Sensor, Motor, Water Pump, LCD, Sanitizer, and Arduino IDE are essential components. These are the components needed for our Automatic Hand Sanitizer project. Then connect everything as shown in the diagram below. Please exercise caution when soldering and inspect for any loose or false connections.

Step 2: We must solder the LCD (16*2) to the circuit board. The final two pins are connected to ground.

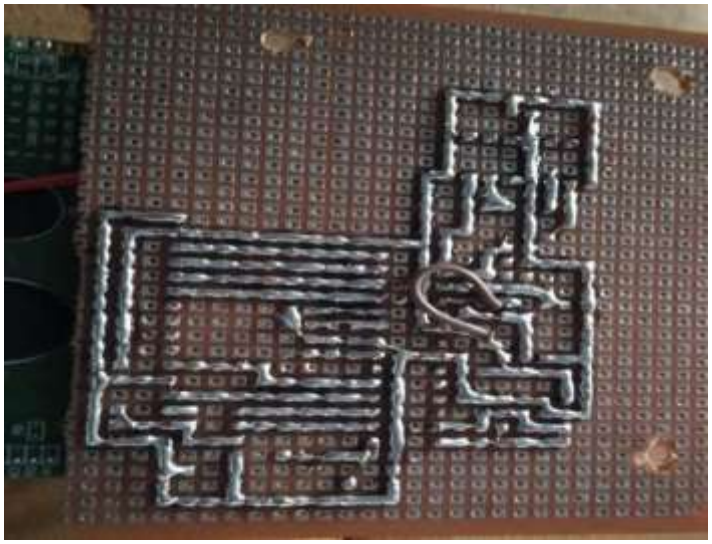


Figure 7: Circuit Board Soldering

Step 3: Connect the temperature sensor (MAX 30102) to the mega328 microcontroller.
Step 4: Connect the Motor amplifier buzzer after connecting the temperature sensor.
Step 5: After making all of these connections, we must provide power via the cable.
Step 6: Turn on the power supply.
Step 7: After providing power, place your hand as depicted in the drawings below. This is an experimental setup of an automatic hand sanitizer dispenser with temperature and heart rate detection.

When we turn on the gadget, the sensors connected to the Arduino are triggered. The automated sanitizer comes first, followed by the temperature detection and infrared sensor. When the spray pump detects a human hand, the automated sanitizer dispenser activates and sanitises the surrounding area.

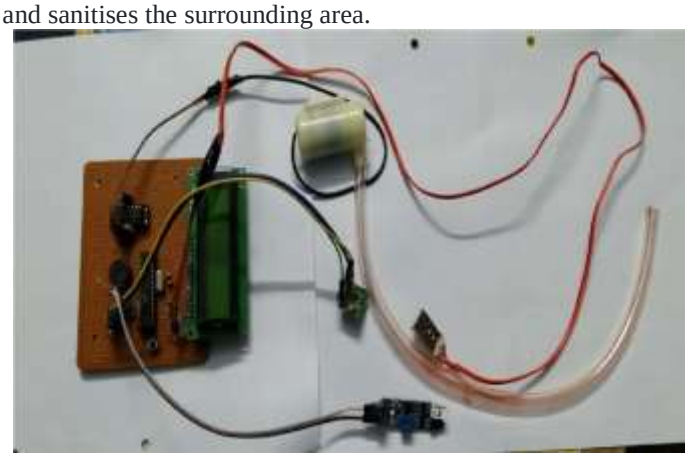


Figure 8: Total Hardware View

Now, the temperature sensor detects the person's body temperature and displays it on the LCD display. If the temperature rises above 98.6 degrees Fahrenheit, the buzzer sounds an alarm and the RGB LED connected turns red. If the sensor's

sensed value is equal to or less than 98.6 degrees Fahrenheit, the buzzer turns off and the RGB LED turns green, displaying a safety symbol.

6. Results

The below shows the working of IR Sensor

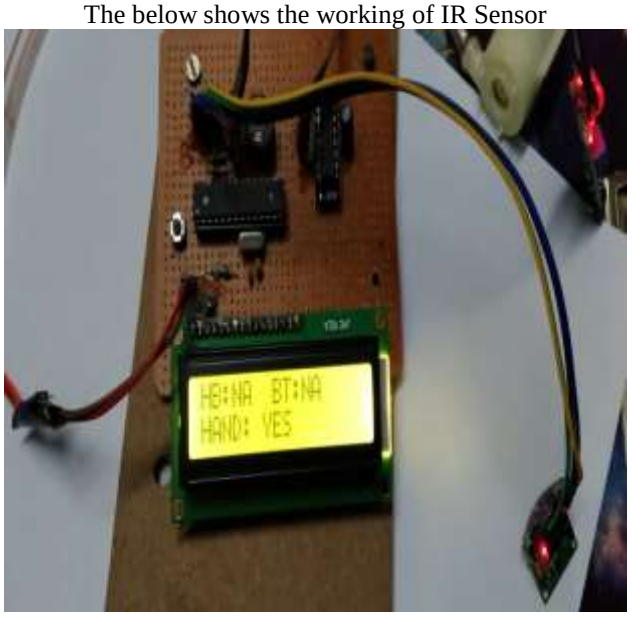


Figure 9: IR Sensor working

The working of LCD display can be shown in below figure

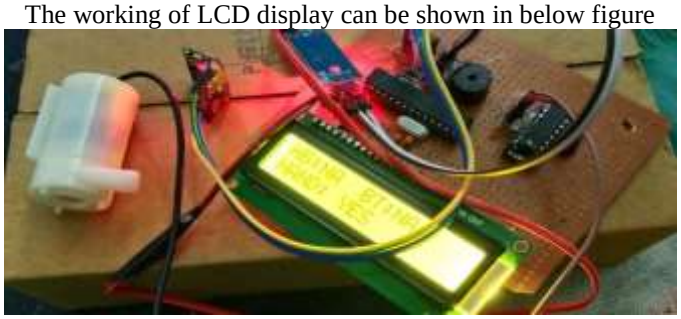


Figure 10: LCD Display Working

And now the infrared sensor attached to the arduino board gets activated and measures the heartbeat of the person.

Figure 11: Obtained Output of Person 1

Figure 12: Obtained Output of Person 2

7. Conclusion

Based on the testing results and discussion, it is possible to conclude that the results of the automatic hand sanitizer and heart rate, temperature monitoring testing can be easily run with minimal data discovery error. Infrared can detect up to 50 mm of disturbance. The IR detector can send data to the MCU and activate the sanitizer pump. So that it can be concluded that the system is simple to use

and can aid in the spread of Covid- 19. We conclude that contagions like COVID-19 can be transmitted via touch and contact. The distribution of sanitizer from the bottle and storeroom would necessitate homemade involvement. This touch-free sanitising equipment is designed to reduce the threat of contact. The system detects proximity using an infrared detector and delivers a signal to the microcontroller. The detector data is processed by the regulator, which then activates the pump and solenoid stopcock. The proposed system also monitors the user's heart rate and detects their body temperature.

ACKNOWLEDGEMENT

The authors want to thank the department of ECE and QIS Management

REFERENCES

1] Ing-K L, Chih-C W, et al February 2020 Effective Strategies to Prevent Coronavirus Disease-2019 (Covid-19) Outbreak in Hospital Journal of Hospital Infection

[2] World Health Organization 2020 Naming the Coronavirus Disease (COVID-19) and The Virus that Causes it (Internet) Wolrd Health Organization Available on https://www.who.int/emergencies/diseases/novel -coronavirus-2019/technical guidance/namingthe-coronavirus-disease-(COVID-2019)-and-thevirus-that-causes-it.

[3] Adityo S, G Martin R, et al March 2020 Coronavirus Disease 2019: Review of Current Literatures, Jurnal Penyakit Dalam Indonesia 7.

[4] Yan-R G, Qing-D C, et al 2020 The Origin, Transmission, and Clinical Therapies on Coronavirus Disease 2019 (Covid-19) OutbreakAn Update on The Status, Military Medical Research 7.

[5] "Construction and Application of an Intelligent Air Quality Monitoring System for Healthcare Environment," 2014, DOI: 10.1007/s10916-014- 0015-3.

[6] T. S. Hong et al., "Systems-Level Quality Improvement A Hand Hygiene Compliance Check System : Brief Communication on a System to Improve Hand Hygiene Compliance in Hospitals and Reduce Infection," 2015, DOI: 10.1007/s10916- 015-0253-z.

[7] E. Tartari et al., "Train-the-Trainers in hand hygiene : a standardized approach to guide education in infection prevention and control,"

[8] automatic hand sanitizer tutorial by nikolas babetas in arduino profile.

[9] Jafar Ali Ibrahim. S, Mohamed Affir. A "Effective Scheduling of Jobs Using Reallocation of Resources Along With Best Fit Strategy and Priority", International Journal of Science Engineering and Advanced Technology(IJSEAT) – ISSN No: 2321- 6905, Vol.2, Issue.2, Feb-2014, http://www.ijseat.com/index.php/ijseat/article/view/62

[10] S. Jafar Ali Ibrahim et al, "An Overview on NetworkRepresentation", Learning Journal of University of Shanghai for Science and Technology ISSN: 1007-6735 Vol.23, Issue 01 Page 60-69, January 2021, https://jusst.org/wp-content/uploads/2021/01/Network-Representation-Learning.pdf

[11] M. Thangamani, and Jafar Ali Ibrahim. S, "KnowledgeExploration in Image Text Data using Data HidingScheme," Lecture Notes in Engineering and Computer Science: Proceedings of The International MultiConferenceof Engineers and Computer Scientists 2018, 14-16 March, 2018, Hong Kong, pp352-357http://www.iaeng.org/publication/IMECS2018/IMECS2018_pp352-357.pdf

12. **Dr**.R.Chinnaiyan , M.S.Nidhya (2018), " Reliability Evaluation of Wireless Sensor Networks using EERN Algorithm" , Lecture Notes on Data Engineering and Communications Technologies, Springer International conference on Computer Networks and Inventive CommunicationTechnologies (ICCNCT - 2018), August 2018 (Online)
13. Dr.R.Chinnaiyan , R.Divya (2018), " Reliable AI Based Smart Sensors for Managing Irrigation Resources in Agriculture" , Lecture Notes on Data Engineering and Communications Technologies, Springer International conference on Computer Networks and Inventive CommunicationTechnologies (ICCNCT - 2018), August 2018 (Online)
14. Dr.R.Chinnaiyan , S.Balachandar (2018) , " Reliable Digital Twin for Connected Footballer" , Lecture Notes on Data Engineering and Communications Technologies, Springer International conference on Computer Networks and Inventive Communication Technologies(ICCNCT - 2018), August 2018 (Online)
15. Dr.R.Chinnaiyan , S.Balachandar (2018) , " Centralized Reliability and Security Management of Data in Internet of Things (IoT) with Rule Builder"
, Lecture Notes on Data Engineering andCommunications Technologies, SpringerInternational conference on Computer Networks and Inventive Communication Technologies(ICCNCT - 2018), August 2018 (Online)
16. Dr.R.Chinnaiyan, Abishek Kumar (2017) " Reliability Assessment of Component BasedSoftware Systems using Basis Path Testing" , IEEE International Conference on Intelligent Computing and Control Systems, ICICCS 2017, 512 – 517

17. Dr.R.Chinnaiyan, AbishekKumar(2017) ,"Construction of Estimated Level Based Balanced Binary Search Tree", 2017 IEEE International Conference on Electronics,Communication, and Aerospace Technology (ICECA 2017), 344 - 348, 978-1-5090-5686-6.
18. Dr.R.Chinnaiyan, AbishekKumar(2017), Estimation of Optimal Path in Wireless Sensor Networks based on Adjancy List, 2017 IEEE International Conference on Telecommunication,Power Analysis and Computing Techniques (ICTPACT2017) ,6,7,8th April 2017,IEEE 978-1-5090-3381-2.
19. Dr.R.Chinnaiyan, R.Divya (2017)," Reliability Evaluation of Wireless Sensor Networks", IEEE International Conference on Intelligent Computing and Control Systems, ICICCS 2017, 847 – 852
20. Dr.R.Chinnaiyan, Sabarmathi.G (2017)," Investigations on Big Data Features , Research Challenges and Applications", IEEE International Conference on Intelligent Computing and Control Systems, ICICCS 2017, 782 – 786

21. G.Sabarmathi , Dr.R.Chinnaiyan (2018), "Envisagation and Analysis of Mosquito Borne Fevers – A Health Monitoring System by Envisagative Computing using Big Data Analytics" in ICCBI 2018 – Springer on 19.12.2018 to 20.12.2018 (Recommended for Scopus Indexed Publication IEEE Xplore digital library)
22. G.Sabarmathi , Dr.R.Chinnaiyan, Reliable Data Mining Tasks and Techniques for Industrial Applications, IAETSD JOURNAL FOR ADVANCED RESEARCH IN APPLIED SCIENCES, VOLUME 4, ISSUE 7, DEC/2017,PP- 138-142, ISSN NO: 2394-8442
23. Dr. M. Thangamani, Jafar Ali Ibrahim, Information Technology E-Service Management System, International Scientific Global Journal in Engineering Science and Applied Research (ISGJESAR). Vol.1. Issue 4, pp. 13-18, 2017. http://isgjesar.com/Papers/Volume1,Issue4/paper2.pdf
24. Ibrahim, Mr S. Jafar Ali, K. Singaraj, P. Jebaroopan, and S. A. Sheikfareed. "Android Based Robot for Industrial Application." International Journal of Engineering Research & Technology 3, no. 3 (2014).
25. Ibrahim, S. Jafar Ali, and M. Thangamani. "Momentous Innovations in the Prospective Method of Drug Development." In Proceedings of the 2018 International Conference on Digital Medicine and Image Processing, pp. 37-41. 2018.
26. Ibrahim, S. Jafar Ali, and M. Thangamani. "Prediction of Novel Drugs and Diseases for Hepatocellular Carcinoma Based on Multi-Source Simulated Annealing Based Random Walk." Journal of medical systems 42, no. 10 (2018): 188. https://doi.org/10.1007/s10916-018-1038-y ISSN 1311-8080, https://acadpubl.eu/hub/2018-119-16/1/94.pdf
27. Jafar Ali Ibrahim. S, Mohamed Affir. A "Effective Scheduling of Jobs Using Reallocation of Resources Along With Best Fit Strategy and Priority", International Journal of Science Engineering and Advanced Technology(IJSEAT) – ISSN No: 2321-6905, Vol.2, Issue.2, Feb-2014, http://www.ijseat.com/index.php/ijseat/article/view/62
28. M. Thangamani, and Jafar Ali Ibrahim. S, "Knowledge Exploration in Image Text Data using Data Hiding Scheme," Lecture Notes in Engineering and Computer Science: Proceedings of The International MultiConference of Engineers and Computer Scientists 2018, 14-16 March, 2018, Hong Kong, pp352-357 http://www.iaeng.org/publication/IMECS2018/IMECS2018_pp352-357.pdf

29. M. Thangamani, and Jafar Ali Ibrahim. S, "Knowledge Exploration in Image Text Data using Data Hiding Scheme," Lecture Notes in Engineering and Computer Science: Proceedings of The International MultiConference of Engineers and Computer Scientists 2018, 14-16 March, 2018, Hong Kong, pp352-357 http://www.iaeng.org/publication/IMECS2018/IMECS2018_pp352-357.pdf
30. S. Jafar Ali Ibrahim and M. Thangamani. 2018. Momentous Innovations in the Prospective Method of Drug Development. In Proceedings of the 2018 International Conference on Digital Medicine and Image Processing (DMIP '18). Association for Computing Machinery, New York, NY, USA, 37–41. https://doi.org/10.1145/3299852.3299854
31. S. Jafar Ali Ibrahim and Thangamani, M "Proliferators and Inhibitors Of Hepatocellular Carcinoma", International Journal of Pure and Applied Mathematics (IJPAM) Special Issue of Mathematical Modelling of Engineering Problems Vol 119 Issue. 15. July 2018
32. Thangamani, M., and S. Jafar Ali Ibrahim. "Ensemble Based Fuzzy with Particle Swarm Optimization Based Weighted Clustering (Efpso-Wc) and Gene Ontology for Microarray Gene Expression." In Proceedings of the 2018 International Conference on Digital Medicine and Image Processing, pp. 48-55. 2018. https://dl.acm.org/doi/abs/10.1145/3299852.3299866

33. Testing" , IEEE International Conference on Intelligent Computing and Control Systems, ICICCS 2017, 512 – 517
34. Dr.R.Chinnaiyan, Abishek Kumar(2017) ,"Construction of Estimated Level Based Balanced Binary Search Tree", 2017 IEEE International Conference on Electronics,Communication, and Aerospace Technology (ICECA 2017), 344 - 348, 978-1-5090-5686-6.
35. R.Chinnaiyan, S.Somasundaram (2012) , Reliability Estimation Model for Software Components using CEP", International Journal of Mechanical and Industrial Engineering (IJMIE) , ISSN No.2231-6477, Volume-2, Issue-2, 2012, pp.89-93.
36. R.Chinnaiyan, S. Somasundaram (2011) ,"An SMS based Failure Maintenance and Reliability Management of Component Based Software Systems", European Journal of Scientific Research, Vol. 59 Issue 1, 9/1/2011, pp.123 (cited in EBSCO, Impact Factor: 0.045)
37. R.Chinnaiyan, S.Somasundaram(2011), "An Experimental Study on Reliability Estimation of GNU Compiler Components - A Review", International Journal of Computer Applications, Vol.25, No.3, July 2011, pp.13-16. (Impact Factor: 0.814)
38. R.Chinnaiyan, S.Somasundaram(2010) "Evaluating the Reliability of Component Based Software Systems " ,International Journal of Quality and Reliability Management , Vol. 27, No. 1., pp. 78-88 (Impact Factor: 0.406)
39. Dr.R.Chinnaiyan, Abishek Kumar(2017), Estimation of Optimal Path in Wireless Sensor Networks based on Adjancy List, 2017 IEEE International Conference on Telecommunication,Power Analysis and Computing Techniques (ICTPACT2017) ,6,7,8th April 2017,IEEE 978-1-5090-3381-2.