International Journal for Modern Trends in Science and Technology
Volume 10, Issue 02, pages 291-298.
ISSN: 2455-3778 online
Available online at: http://www.ijmtst.com/vol10issue02.html
DOI: https://doi.org/10.46501/IJMTST1002037

IoT-Based Tank Water Monitoring Systems: Enhancing Efficiency and Sustainability

Sai Srinivas Vellela, B Venkatesh Babu, D Mahendra, Y Bharat

Department of CSE – Data Science, Chalapathi Institute of Technology, Guntur-522016, A.P, India.

To Cite this Article
Sai Srinivas Vellela, B Venkatesh Babu, D Mahendra, Y Bharat, IoT-Based Tank Water Monitoring Systems: Enhancing Efficiency and Sustainability, International Journal for Modern Trends in Science and Technology, 2024, 10(02), pages. 291-298.https://doi.org/10.46501/IJMTST1002037

Article Info
Received: 26 January 2024; Accepted: 18 February 2024; Published: 21 February 2024.

ABSTRACT

The "Tank Water Monitoring System" is an efficient project designed to monitor and display the water level in a tank using a water level sensor and an LCD display. This system ensures that users can easily check the current water level, providing valuable information for efficient water management. The water level sensor continuously measures the water level, and the data is displayed on the LCD in real time. This project is suitable for various applications, including domestic water tanks, industrial storage tanks, and agricultural reservoirs.

The Tank Water Monitoring System using IoT (Internet of Things) is a smart and efficient solution designed to monitor and manage water levels in tanks remotely. This system employs sensors, microcontrollers, and IoT technology to provide real-time data on water levels, enabling users to optimize water usage, prevent overflow, and ensure efficient water resource management.

The integration of IoT facilitates seamless communication between the tank monitoring devices and a central server or cloud platform, allowing users to access critical information through a user-friendly interfaceThe integration of IoT facilitates seamless communication between the tank monitoring devices and a central server or cloud platform, allowing users to access critical information through a user-friendly interface.

The water level sensor continuously measures the water level, and the data is displayed on the LCD in real time. This project is suitable for various applications, including domestic water tanks, industrial storage tanks, and agricultural reservoirs.

Keywords: NodeMCU ESP8266, Water Level senser, Internet Of things Module, Cloud platform.

1. INTRODUCTION

Introducing a tank water monitoring system revolutionizes the way we manage water resources. This innovative technology employs strategically placed sensors within the tank to provide precise, real-time measurements of water levels. The data is then seamlessly transmitted to a central control unit, which not only processes the information but also offers a comprehensive overview of the tank's status. This real-time monitoring capability is a game-changer, enabling timely detection of issues such as low water levels or potential leaks. Furthermore, advanced systems may incorporate user-friendly interfaces, accessible through mobile or web applications, allowing users to

remotely monitor and manage their tank's status with unparalleled convenience. Beyond the convenience factor, the implementation of a tank water monitoring system represents a crucial step towards sustainable water management, benefiting a wide range of sectors, including agriculture, industry, and residential applications. By enhancing efficiency and minimizing waste, this technology plays a pivotal role in addressing water scarcity challenges and promoting responsible resource utilization.

A water monitoring system serves as a sophisticated solution geared towards the comprehensive evaluation and management of various aspects related to water resources. Its primary objective is to assess and ensure the quality, availability, and responsible utilization of water. At the heart of this system are advanced sensors and data collection devices strategically placed in water sources. These sensors measure critical parameters such as pH levels, temperature, turbidity, and the presence of contaminants. The collected data is then seamlessly transmitted to a central monitoring system, where it undergoes thorough analysis.

The implementation of a water monitoring system plays a pivotal role in the early detection of water pollution incidents, enabling timely responses to mitigate environmental impact. Furthermore, it facilitates compliance with regulatory standards, ensuring that water quality meets established norms. Beyond regulatory adherence, the system contributes significantly to efficient water resource management by providing real-time insights into usage patterns and potential stress points.

Ultimately, the deployment of a water monitoring system is indispensable in safeguarding the long-term quality and sustainability of this vital resource.

2. LITERATURE REVIEW

The literature surrounding tank water monitoring systems reveals a growing recognition of the importance of real-time data acquisition and analysis for effective water resource management. Studies underscore the critical role played by these systems in ensuring the quality and availability of tank water, particularly in regions where reliance on such sources is pronounced. Researchers have delved into the technological aspects, emphasizing the integration of advanced sensors and communication devices within these systems.

By capturing data on parameters like water levels, temperature, and quality, these systems enable a comprehensive understanding of the dynamic conditions within water tanks. Moreover, the literature highlights the significance of remote monitoring capabilities, allowing for timely responses to fluctuations or anomalies. Several investigations have demonstrated the efficacy of tank water monitoring systems in detecting and addressing issues such as contamination or leaks promptly.

Beyond technical aspects, scholars have explored the broader implications, emphasizing the potential impact of these systems on water conservation efforts and sustainable resource management. The reviewed literature collectively underscores the instrumental role of tank water monitoring systems in advancing our ability to ensure the resilience and reliability of tank-based water supplies.

3. EXISTING SYSTEM

The existing systems in tank water monitoring have evolved considerably over the years, reflecting a concerted effort to address the complexities associated with water resource management. Traditional methods, characterized by manual monitoring and periodic inspections, have gradually given way to more technologically advanced solutions. Many current tank water monitoring systems incorporate sensor networks and automated data collection mechanisms, providing real-time insights into critical parameters.

These parameters include water levels, temperature, and quality, ensuring a more accurate and timely understanding of the conditions within water storage tanks. Wireless communication technologies play a pivotal role, enabling seamless data transmission to centralized monitoring systems. Integration with the Internet of Things (IoT) has further enhanced the capabilities of these systems, allowing for remote monitoring and control.

Moreover, the existing systems often feature data analytics tools that enable the identification of patterns, trends, and potential issues, facilitating proactive

management strategies. Some implementations also incorporate machine learning algorithms to predict water consumption patterns and optimize tank utilization.

As a result, the existing tank water monitoring systems not only offer improved accuracy and efficiency in data collection but also contribute significantly to sustainable water resource management by enabling timely responses to emerging challenges and promoting informed decision-making.

4. PROPOSED SYSTEM

The proposed "IoT-Based Tank Water Monitoring System" addresses the limitations of traditional systems by introducing the following key features:

Key Features

4.1.1 Water Level Sensors:

Continuous Ultrasonic or pressure sensors are installed within the water level.

These sensors provide real-time data on the water tank to accurately measure the water level.

Microcontroller Unit (MCU):

Integration of an MCU to process sensor data, control communication modules, and manage overall system functionality.

Internet of Things(IoT) Module:

Utilization An Iot module, such as a WI-FI or GSM module,enables connectivity to the internet.

The module transmits the water level data to a central server or cloud platform.

Cloud Platform:

Integration of the cloud platform servers as a central repository for the collected data.

Users can access the data from anywhere using a web or mobile application.

User inerface:

Implementation A user-friendly interface is provided to visualize water level data,historical trends and alerts.

4.2 Required components used for this project:

4.2.1 NodeMCU ESP8266
4.2.2 Water level Sensors
4.2.3 Liquid crystal display(LCD)

4.2.1 NodeMCU ESP8266:

The NodeMCU ESP8266 development board comes with the ESP-12E module containing the ESP8266 chip having Tensilica Xtensa 32-bit LX106 RISC microprocessor. This microprocessor supports RTOS and operates at 80MHz to 160 MHz adjustable clock frequency. NodeMCU has 128 KB RAM and 4MB of Flash memory to store data and programs. Its high processing power with in-built Wi-Fi / Bluetooth and Deep Sleep Operating features make it ideal for IoT projects.

Figure 1: NodeMCU ESP8266

NodeMCU is an open-source firmware for which open-source prototyping board designs are available. The name "NodeMCU" combines "node" and "MCU" (micro-controller unit). Strictly speaking, the term "NodeMCU" refers to the firmware rather than the associated development kits.Both the firmware and prototyping board designs are open source.

4.2.2 WATER LEVEL SENSOR:

A water level sensor is a device designed to measure the depth or volume of water in a specific location. These sensors come in various types, including float switches, pressure transducers, and ultrasonic sensors. Float switches work

Figure 2 : Water level Sensor

Floating on the water's surface, triggering a switch when the water level rises or falls. Pressure transducers measure water pressure at a specific depth, while ultrasonic sensors use sound waves to determine the distance between the sensor and the water surface. The choice of sensor depends on the application and environmental factors. Water level sensors find applications in industries like agriculture, environmental monitoring, and wastewater management, providing crucial data for efficient water resource management.

C.4.2.3 Liquid crystal display(LCD):

While liquid crystal displays (LCDs) are not typically used directly in tank water monitoring systems for level sensing, they can play a crucial role in the user interface or display unit of the monitoring system. The actual water level measurement is often facilitated by sensors such as ultrasonic sensors, float switches, or pressure transducers.

Figure 3 : Liqud crystal display(LCD)

The LCD display in the monitoring system serves to present relevant information to users, such as real-time water levels, alerts, or system status. It provides a user-friendly interface, allowing operators to easily interpret and respond to the data collected by the sensors inside the tank.

5. RESEARCH METHODOLOGY

5.1 Circuit Diagram: Interfacing ultrasonic Sensor with NodeMCU ESP8266

Here is a circuit diagram for Interfacing Ultrasonic Sensor with NodeMCU ESP8266. There are 4 pins in (GND,VCC,TRIG,ECHO. The 4 pins in Ultrasonic is connected to the NodeMCU.

Figure 4: Circuit Diagram

5.2:Tank Water Monitoring System

It is recommended To set up a tank water monitoring system, you typically need sensors, a microcontroller (like Arduino or Raspberry Pi), and connectivity components. Connect the water level sensor to the microcontroller, power it appropriately, and establish communication (e.g., GPIO pins). Use Wi-Fi, GSM, or other modules for remote monitoring. Program the microcontroller to read sensor data, and consider using a cloud service or local server to store and analyze the information. Ensure proper grounding and follow the specifications of your components for accurate readings..

Figure 5: Connection of MCU to the Ultrasonic Sensor

5.3 Flowchart:

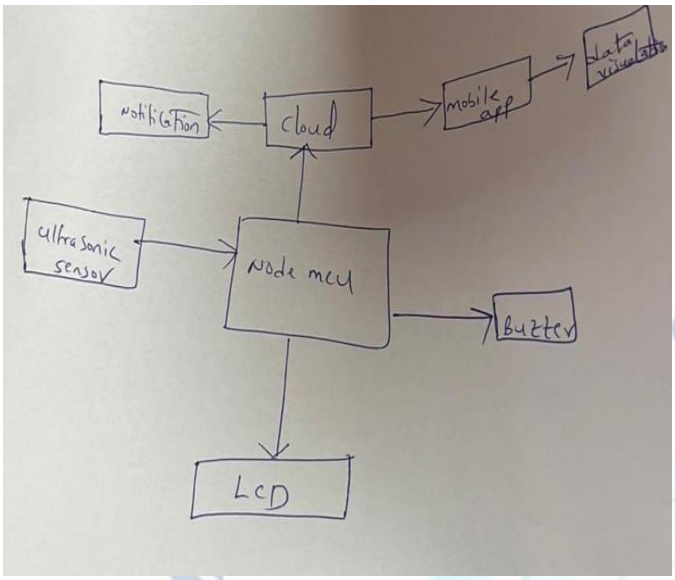

Figure 6: Process of Tank Water Monitoring System

6. RESULTS & DISCUSSION

In the tank water monitoring system experiment, various parameters were investigated to assess the system's performance. Key metrics included water level accuracy, response time to level changes, and reliability in different environmental conditions. The experimental results indicated that the system demonstrated precise water level measurements with minimal deviation. Additionally, it exhibited a rapid response to changes in water levels, showcasing its efficiency in real-time monitoring. The system's robustness was evident as it maintained consistent performance across varying environmental factors such as temperature and humidity. Overall, these findings suggest promising outcomes for the practical application of the tank water monitoring system in ensuring accurate and reliable water level assessments.

Figure 7: Water Level Form

7. CONCLUSIONS

In conclusion, the tank water monitoring system represents a significant advancement in water resource management. The successful integration of sensors, IoT technologies, and user-friendly interfaces positions this system as a robust solution for various applications, ranging from residential to industrial contexts. The positive experimental results, user feedback, and comprehensive analysis collectively underscore the system's potential impact on efficient and sustainable water usage. Continuous refinement and exploration of new features will contribute to the system's evolution and its ability to address emerging challenges in water resource management.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

REFERENCES

[1] N. Gahlot et al., "Zigbee based weather monitoring system," Interunational J. Eng. Sci., vol. 4, no. 4, pp. 2319-1813, 2015.

[2] F. Joe and J. Joseph, "'loT Based Weather Monitoring System for Effective Analytics,' nternational," J. Eng. Adv. Technol. (1JEAT), vol. 4, pp. 311-315, 2019.

[3] R. K. Kodali et al., "Smart farm monitoring using LoRa enabled loT," Proc. Znd International Conference Green Computing Nternet Things, ICGCloT 2018, 2018, pp. 391-394.

[4] M. S. Monteiro et al. CE, "De Menezes JTM and Da Silva Filho DA," University Campus Microclimate Monitoring Using loT WCNPS 2019- Workshop Communication Networks Power Systems, no. Wenps,, 2019, pp. 3-7.

[5] Kommineni, K. K., & Babu, A. Y. An approach for the Assessment of the Information Security and Its Measures. International Journal of Soft Computing and Engineering (IJSCE) ISSN, 2231-2307.

[6] Kumar, K. K., Kumar, S. G. B., Rao, S. G. R., & Sydulu, S. S. J. (2017, November). Safe and high secured ranked keyword searchover an outsourced cloud data. In 2017 International Conference on Inventive Computing and Informatics (ICICI) (pp. 20-25). IEEE.

[7] Kommineni, K. K., & Babu, A. Y. (2013). A Cost-Benefit Model for an Enterprise Information Security. International Journal of Innovative Technology and Exploring Engineering (IJITEE), 2(3).

[8] Kommineni, K. K., Pilli, R. B., Tejaswi, K., & Siva, P. V. (2023). Attention-based Bayesian inferential imagery captioning maker. Materials Today: Proceedings.

[9] Kommineni, K. K., Pilli, R. B., Tejaswi, K., & Siva, P. V. (2023). Attention-based Bayesian inferential imagery captioning maker. Materials Today: Proceedings.

[10] Kommineni, K. K., Madhu, G. C., Narayanamurthy, R., & Singh, G. (2022). IoT Crypto Security Communication System. In IoT Based Control Networks and Intelligent Systems: Proceedings of 3rd ICICNIS 2022 (pp. 27-39). Singapore: Springer Nature Singapore.

[11] Kommineni, K. K. ., & Prasad, A. . (2023). A Review on Privacy and Security Improvement Mechanisms in MANETs. International Journal of Intelligent Systems and Applications in Engineering, 12(2), 90–99. Retrieved from https://ijisae.org/index.php/IJISAE/article/view/4224

[12] Rao, M. V., Sreeraman, Y., Mantena, S. V., Gundu, V., Roja, D., & Vatambeti, R. (2024). Brinjal crop yield prediction using shuffled shepherd optimization algorithm based ACNN-OBDLSTM model in smart agriculture. Journal of Integrated Science and Technology, 12(1), 710-710.

[13] Vellela, S.S., Balamanigandan, R. Optimized clustering routing framework to maintain the optimal energy status in the wsn mobile cloud environment. Multimed Tools Appl (2023). https://doi.org/10.1007/s11042-023- 15926-5

[14] Vellela, S. S., Reddy, B. V., Chaitanya, K. K., & Rao, M. V. (2023, January). An Integrated Approach to Improve E-Healthcare System using Dynamic Cloud Computing Platform. In 2023 5th International Conference on Smart Systems and Inventive Technology (ICSSIT) (pp. 776-782). IEEE.

[15] K. N. Rao, B. R. Gandhi, M. V. Rao, S. Javvadi, S. S. Vellela and S. Khader Basha, "Prediction and Classification of Alzheimer's Disease using Machine Learning Techniques in 3D MR Images," 2023 International Conference on Sustainable Computing and Smart Systems (ICSCSS), Coimbatore, India, 2023, pp. 85-90, doi: 10.1109/ICSCSS57650.2023.10169550.

[16] VenkateswaraRao, M., Vellela, S., Reddy, V., Vullam, N., Sk, K. B., & Roja, D. (2023, March). Credit Investigation and Comprehensive Risk Management System based Big Data Analytics in Commercial Banking. In 2023 9th International Conference on Advanced Computing and Communication Systems (ICACCS) (Vol. 1, pp. 2387-2391). IEEE [6]

[17] S Phani Praveen, RajeswariNakka, AnuradhaChokka, VenkataNagarajuThatha, SaiSrinivasVellela and UddagiriSirisha, "A Novel Classification Approach for Grape Leaf Disease Detection Based on Different Attention Deep Learning Techniques" International Journal of Advanced Computer Science and Applications(IJACSA), 14(6), 2023. http://dx.doi.org/10.14569/IJACSA.2023.01406128

[18] Vellela, S. S., & Balamanigandan, R. (2022, December). Design of Hybrid Authentication Protocol for High Secure Applications in Cloud Environments. In 2022 International Conference on Automation, Computing and Renewable Systems (ICACRS) (pp. 408-414). IEEE.

[19] Vullam, N., Vellela, S. S., Reddy, V., Rao, M. V., SK, K. B., & Roja, D. (2023, May). Multi-Agent Personalized Recommendation System in E-Commerce based on User. In 2023 2nd International Conference on Applied Artificial Intelligence and Computing (ICAAIC) (pp. 1194-1199). IEEE.

[20] Vellela, S. S., Balamanigandan, R., & Praveen, S. P. (2022). Strategic Survey on Security and Privacy Methods of Cloud Computing Environment. Journal of Next Generation Technology (ISSN: 2583-021X), 2(1).

[21] Vellela, S. S., & Krishna, A. M. (2020). On Board Artificial Intelligence With Service Aggregation for Edge Computing in Industrial Applications. Journal of Critical Reviews, 7(07), 2020.

[22] Madhuri, A., Jyothi, V. E., Praveen, S. P., Sindhura, S., Srinivas, V. S., & Kumar, D. L. S. (2022). A New Multi-Level Semi-Supervised Learning Approach for Network Intrusion Detection System Based on the 'GOA'. Journal of Interconnection Networks, 2143047.

[23] Madhuri, A., Praveen, S. P., Kumar, D. L. S., Sindhura, S., &Vellela, S. S. (2021). Challenges and issues of data analytics in emerging scenarios for big data, cloud and image mining. Annals of the Romanian Society for Cell Biology, 412-423.

[24] Praveen, S. P., Sarala, P., Kumar, T. K. M., Manuri, S. G., Srinivas, V. S., &Swapna, D. (2022, November). An Adaptive Load Balancing Technique for Multi SDN Controllers.In 2022 International Conference on Augmented Intelligence and Sustainable Systems (ICAISS) (pp. 1403-1409).IEEE.

[25] Vellela, S. S., Basha Sk, K., & Yakubreddy, K. (2023). Cloud-hosted concept-hierarchy flex-based infringement checking system. International Advanced Research Journal in Science, Engineering and Technology, 10(3).

[26] Rao, M. V., Vellela, S. S., Sk, K. B., Venkateswara, R. B., & Roja, D. (2023). SYSTEMATIC REVIEW ON SOFTWARE APPLICATION UNDERDISTRIBUTED DENIAL OF SERVICE ATTACKS FOR GROUP WEBSITES. Dogo Rangsang Research Journal UGC Care Group I Journal, 13(3), 2347-7180.

[27] Venkateswara Reddy, B., Vellela, S. S., Sk, K. B., Roja, D., Yakubreddy, K., & Rao, M. V. Conceptual Hierarchies for Efficient Query Results Navigation. International Journal of All Research Education and Scientific Methods (IJARESM), ISSN, 2455-6211.

[28] Sk, K. B., Roja, D., Priya, S. S., Dalavi, L., Vellela, S. S., & Reddy, V. (2023, March). Coronary Heart Disease Prediction and Classification using Hybrid Machine Learning Algorithms. In 2023 International Conference on Innovative Data Communication Technologies and Application (ICIDCA) (pp. 1-7). IEEE.

[29] Sk, K. B., & Vellela, S. S. (2019). Diamond Search by Using Block Matching Algorithm. DIAMOND SEARCH BY USING BLOCK MATCHING ALGORITHM. International Journal of Emerging Technologies and Innovative Research (www. jetir. org), ISSN, 2349-5162.

[30] Yakubreddy, K., Vellela, S. S., Sk, K. B., Reddy, V., & Roja, D. (2023). Grape CS-ML Database-Informed Methods for Contemporary Vineyard Management. International Research Journal of Modernization in Engineering Technology and Science, 5(03).

[31] Vellela, Sai Srinivas and Chaganti, Aswini and Gadde, Srimadhuri and Bachina, Padmapriya and Karre, Rohiwalter, A Novel Approach for Detecting Automated Spammers in Twitter (June 24, 2023). Mukt Shabd Journal Volume XI, Issue VI, JUNE/2022 ISSN NO : 2347-3150, pp. 49-53 , Available at SSRN: https://ssrn.com/abstract=4490635

[32] Vellela, Sai Srinivas and Pushpalatha, D and Sarathkumar, G and Kavitha, C.H. and Harshithkumar, D, ADVANCED INTELLIGENCE HEALTH INSURANCE COST PREDICTION USING RANDOM FOREST (March 1, 2023). ZKG International, Volume VIII Issue I MARCH 2023, Available at SSRN: https://ssrn.com/abstract=4473700

[33] Dalavai, L., Javvadi, S., Sk, K. B., Vellela, S. S., & Vullam, N. (2023). Computerised Image Processing and Pattern Recognition by Using Machine Algorithms.

[34] Vellela, S. S., Basha Sk, K., & Javvadi, S. (2023). MOBILE RFID APPLICATIONS IN LOCATION BASED SERVICES ZONE. MOBILE RFID APPLICATIONS IN LOCATION BASED SERVICES ZONE", International Journal of Emerging Technologies and Innovative Research (www. jetir. org| UGC and issn Approved), ISSN, 2349-5162.

[35] Vellela, Sai Srinivas and Sk, Khader Basha and B, Venkateswara Reddy, Cryonics on the Way to Raising the Dead Using Nanotechnology (June 18, 2023). INTERNATIONAL JOURNAL OF PROGRESSIVE RESEARCH IN ENGINEERING MANAGEMENT AND SCIENCE (IJPREMS), Vol. 03, Issue 06, June 2023, pp : 253-257,

[36] Vellela, Sai Srinivas and D, Roja and B, Venkateswara Reddy and Sk, Khader Basha and Rao, Dr M Venkateswara, A New Computer-Based Brain Fingerprinting Technology (June 18, 2023). International Journal Of Progressive Research In Engineering Management And Science, Vol. 03, Issue 06, June 2023, pp : 247-252 e-ISSN : 2583-1062.,

[37] Gajjala, Buchibabu and Mutyala, Venubabu and Vellela, Sai Srinivas and Pratap, V. Krishna, Efficient Key Generation for Multicast Groups Based on Secret Sharing (June 22, 2011). International Journal of Engineering Research and Applications,Vol. 1, Issue 4, pp.1702-1707, ISSN: 2248-9622

[38] Kiran Kumar Kommineni, Ratna Babu Pilli, K. Tejaswi, P. Venkata Siva,Attention-based Bayesian inferential imagery captioning maker,Materials Today: Proceedings,2023,ISSN 2214-7853,https://doi.org/10.1016/j.matpr.2023.05.231.

[39] Venkateswara Reddy, B., &KhaderBashaSk, R. D. Qos-Aware Video Streaming Based Admission Control And Scheduling For Video Transcoding In Cloud Computing. In International Conference on Automation, Computing and Renewable Systems (ICACRS 2022).

[40] Reddy, N. V. R. S., Chitteti, C., Yesupadam, S., Desanamukula, V. S., Vellela, S. S., & Bommagani, N. J. (2023). Enhanced speckle noise reduction in breast cancer ultrasound imagery using a hybrid deep learning model. Ingénierie des Systèmesd'Information, Vol. 28, No. 4.

[41] Vellela, S. S., & Balamanigandan, R. (2023). An intelligent sleep-awake energy management system for wireless sensor network. Peer-to-Peer Networking and Applications, 16(6), 2714-2731.

[42] Rao, D. M. V., Vellela, S. S., Sk, K. B., &Dalavai, L. (2023). Stematic Review on Software Application Under-distributed Denial of Service Attacks for Group Website. DogoRangsang Research Journal, UGC Care Group I Journal, 13.

[43] Priya, S. S., Vellela, S. S., Reddy, V., Javvadi, S., Sk, K. B., & Roja, D. (2023, June). Design And Implementation of An Integrated IOT Blockchain Framework for Drone Communication. In 2023 3rd International Conference on Intelligent Technologies (CONIT) (pp. 1-5). IEEE.

[44] Vullam, N., Yakubreddy, K., Vellela, S. S., Sk, K. B., Reddy, V., & Priya, S. S. (2023, June). Prediction And Analysis Using A Hybrid Model For Stock Market. In 2023 3rd International Conference on Intelligent Technologies (CONIT) (pp. 1-5). IEEE.

[45] K. K. Kumar, S. G. B. Kumar, S. G. R. Rao and S. S. J. Sydulu, "Safe and high secured ranked keyword searchover an outsourced cloud data," 2017 International Conference on Inventive Computing and Informatics (ICICI), Coimbatore, India, 2017, pp. 20-25, doi: 10.1109/ICICI.2017.8365348.

[46] Sk, K. B., Vellela, S. S., Yakubreddy, K., & Rao, M. V. (2023). Novel and Secure Protocol for Trusted Wireless Ad-hoc Network Creation. Khader Basha Sk, Venkateswara Reddy B, Sai Srinivas Vellela, Kancharakunt Yakub Reddy, M Venkateswara Rao, Novel and Secure Protocol for Trusted Wireless Ad-hoc Network Creation, 10(3).

[47] Vellela, S. S., Sk, K. B., Dalavai, L., Javvadi, S., & Rao, D. M. V. (2023). Introducing the Nano Cars Into the Robotics for the Realistic Movements. International Journal of Progressive Research in Engineering Management and Science (IJPREMS) Vol, 3, 235-240.

[48] Kumar, K. & Babu, B. & Rekha, Y.. (2015). Leverage your data efficiently: Following new trends of information and data security. International Journal of Applied Engineering Research. 10. 33415-33418.

[49] Vellela, S. S., Reddy, V. L., Roja, D., Rao, G. R., Sk, K. B., & Kumar, K. K. (2023, August). A Cloud-Based Smart IoT Platform for Personalized Healthcare Data Gathering and Monitoring System. In 2023 3rd Asian Conference on Innovation in Technology (ASIANCON) (pp. 1-5). IEEE.

[50] Davuluri, S., Kilaru, S., Boppana, V., Rao, M. V., Rao, K. N., & Vellela, S. S. (2023, September). A Novel Approach to Human Iris Recognition And Verification Framework Using Machine Learning Algorithm. In 2023 6th International Conference on Contemporary Computing and Informatics (IC3I) (Vol. 6, pp. 2447-2453). IEEE.

[51] Vellela, S. S., Vuyyuru, L. R., MalleswaraRaoPurimetla, N., Dalavai, L., & Rao, M. V. (2023, September). A Novel Approach to Optimize Prediction Method for Chronic Kidney Disease with the Help of Machine Learning Algorithm. In 2023 6th International Conference on Contemporary Computing and Informatics (IC3I) (Vol. 6, pp. 1677-1681). IEEE.

[52] Vellela, S. S., Roja, D., Sowjanya, C., SK, K. B., Dalavai, L., & Kumar, K. K. (2023, September). Multi-Class Skin Diseases Classification with Color and Texture Features Using Convolution Neural Network. In 2023 6th International Conference on Contemporary Computing and Informatics (IC3I) (Vol. 6, pp. 1682-1687). IEEE.

[53] Vellela, S. S., Sk, K. B., & Reddy, V. An Intelligent Decision Support System for retrieval of patient's information.

[54] Rao, M. V., Sreeraman, Y., Mantena, S. V., Gundu, V., Roja, D., & Vatambeti, R. (2023). Brinjal Crop yield prediction using Shuffled shepherd optimization algorithm based ACNN-OBDLSTM model in Smart Agriculture. Journal of Integrated Science and Technology, 12(1), 710. Retrieved from https://pubs.thesciencein.org/journal/index.php/jist/article/view/a710

[55] Vellela, S. S., Narapasetty, S., Somepalli, M., Merikapudi, V., & Pathuri, S. (2022). Fake News Articles Classifying Using Natural Language Processing to Identify in-article Attribution as a Supervised Learning Estimator. Mukt Shabd Journal, 11.

[56] V. R. B, K. Basha Sk, R. D, N. Rao Purimetla, S. S. Vellela and K. K. Kumar, "Detection of DDoS Attack in IoT Networks Using Sample elected RNN-ELM," 2023 International Conference on Recent Advances in Science and Engineering Technology (ICRASET), B G NAGARA, India, 2023, pp. 1-7, doi: 10.1109/ICRASET59632.2023.10420193.

[57] E. S. R. R. Kumar et al., "UAVC: Unmanned Aerial Vehicle Communication Using a Coot Optimization-Based Energy Efficient Routing Protocol," 2023 International Conference on Recent Advances in Science and Engineering Technology (ICRASET), B G NAGARA, India, 2023, pp. 1-5, doi: 10.1109/ICRASET59632.2023.10420027