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An ESP32 And Turbidity Sensor Network-Based Intelligent Internet of Things Water Quality Monitoring System

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Abstract

New capabilities are being added to sensors by the development of wireless communication technologies, and continuous improvements in sensor networks are essential for environmental applications. Industry 4.0, the Internet of Things, has an influence on environmental issues in addition to the automation sector. Since water is essential to human life, systems for routinely checking water quality must be established. About 40% of fatalities worldwide are linked to drinking polluted water. As such, there is an immediate need to guarantee that both urban and rural people have access to a steady supply of clean drinking water. Water Quality Monitoring (WQM) employs cost-effective, tailor-made solutions to monitor drinking water quality by integrating Internet of Things (IoT) technologies. The proposed system employs multiple sensors to assess diverse attributes. Since water is essential to human life and health, a monitoring system must be installed to consistently maintain high water quality. Water is essential to modern agricultural and commercial innovations, especially those that help farmers grow crops more efficiently and install surveillance systems to monitor physical factors such as humidity and water availability. Assessing pH variations and other water-quality parameters is made simpler by wireless sensor networks. Real-time quality control across several locations is made possible by a wireless technology, such the Internet of Things (IoT), connecting a base station and nodes. This ambitious attempt's model is built and fueled by solar cells, which improves the utilization of the Internet of Things. The Wireless Sensor Network (WSN) collects information from numerous sensors located at the node, such as pH, turbidness, and oxygen levels, and transmits the gathered data to the central station. Subsequently, the received data is organized and visually represented in a textual format at the central station. The technology offers lower carbon emissions, reduced power consumption, and greater deployment versatility in remote areas.

Keywords: IOT, WQM, Alarm, WSN, WQI, Radio Frequency, ESP32

1. Introduction

The twenty-first century has seen a number of technologies arise in tandem with environmental problems, including pollution and global warming, which have contaminated drinking water supplies worldwide. Global warming, finite water supplies, and population growth are among the main obstacles to real-time water quality monitoring [1-5]. Consequently, it is imperative to develop more effective methods for ongoing assessment of indicators of water quality.

The measurement of water's acidity or alkalinity is determined by the pH parameter, which represents the concentration of hydrogen ions [6-8]. A pH of 7 indicates neutral conditions, while higher values indicate alkalinity and lower values indicate acidity. Drinking water should be maintained at a pH of 6.5 to 8.5. Increased turbidity in water signals the presence of unseen suspended particles, heightening the risk of waterborne infections. Cleaner water is indicated by lower turbidity, though. Temperature sensors measure water temperature and classify it as hot or cold. The flow sensor uses this information to determine how quickly water flows through it [9-14].

To ensure that drinking water remains safe, real-time quality monitoring needs to be implemented. We offer an economical resolution for monitoring water quality in real-time, seamlessly integrated into the IoT framework. These sensors gather information, which a central controller then processes. An ESP32 type core controller would be suitable[15-20]. Ultimately, the sensor data may be accessed online over a WI-FI system.

Analyzing the data that was chosen from the water source becomes essential when contaminants are found. When the detected value drops below a preset threshold, an automated alarm is set off, and several instruments are used to look into the build-up of impurities in the water, allowing for timely remedial action. Our created model evaluates water sources and uses a wireless connection system to send the data it has gathered for examination online. These kinds of communication systems are quite important commercially, especially considering the growing interest in wireless sensor networks throughout the world[21-25].

Going one step further, this system alerts users who are located remotely when there are variations from pre-established benchmarks for water quality measures. The study aims to do two things: first, it presents a simple, affordable, and less complicated model; second, it compares the data with the Water Quality Index (WQI) and analyzes the results. WQIs provide a comprehensive picture based on all measurements. An indicator for evaluating water quality for several purposes, such as drinking, farming, or aquatic life, is the Water Quality Index (WQI), which is commonly computed on a range from 0 to 100[26-28].

2. Literature Review

The thorough investigation of water quality monitoring is covered in a publication by Nikhil Kedia titled **"Water Quality Monitoring for Rural Areas-A Sensor Cloud Based Economical Project,"** It was presented at Dehradun, India, at the First International Conference on Next Generation Computing Technologies (NGCT-2015). In addition to integrating Sensor Cloud technology, the essay discusses the roles that network operators, government organizations, and communities have in promoting effective communication. It also covers methodology, sensors, embedded design, and information distribution. Although it is presently considered unfeasible to enhance water quality automatically, there is potential to increase water quality and public awareness via the judicious application of technology and cost-effective methods[29].

In the exploration of "Real Time Water Quality Monitoring System," Jayti Bhatt and Jignesh Patoliya underscore the imperative for real-time surveillance in ensuring the safety of potable water. Addressing this imperative, the authors advocate for an inventive solution centered on Internet of Things (IoT) technology for water quality monitoring. The envisaged system integrates a multitude of sensors capturing crucial parameters such as temperature, dissolved oxygen, conductivity, turbidity, pH, and turbidity, presenting a forward-thinking approach to instantaneous water quality assessment[30].

The significance of the term "smart city" has grown notably, particularly in response to the global financial crisis of 2008. The rise of the Smart City Initiative is motivated by the imperative to formulate sustainable urban frameworks and enhance the well-being of inhabitants[31].

This method integrates graph topology analysis, anomaly detection, and lightweight compression to enhance burst detection accuracy. Through a meticulous examination of vibration change arrival times at sensor locations, the proposed methodology not only refines the precision of water burst event localization but also substantially reduces communication overhead between sensor devices and backend servers. The study indicates that, in contrast to conventional periodic reporting models, potential communication savings of up to 90% can be achieved[32].

K. Sri Dhivya Krishnan and P.T.V. Bhuvaneswari (2017) conducted a study to explore the correlation among pH, Total Dissolved Solids (TDS), and Conductivity as key indicators of water quality parameters (WQPs) for detecting hexavalent chromium in drinking water systems. The researchers emphasized the significance of these parameters in the identification of hexavalent chromium within drinking water. The investigation involved the analysis of four distinct samples contaminated with hexavalent chromium to extract essential WQPs, with conductivity, pH, and TDS acting as pivotal sensing elements.

To normalize the correlational links among the parameters under consideration, the authors utilize several Linear Regression (MLR), which is a computationally complex procedure that involves several estimations of WQPs from the samples. The study's findings are graphically presented and show errors between estimated and actual values. The estimated values, according to the authors, are in close agreement with the metric values; the range of calculation errors is 0.33% to 19.18%.

Development and Deployment of an Economical Water Quality Assessment System (2017), a versatile and cost-effective solution for water quality monitoring is proposed. The researchers introduce a microcontroller-based system with a focus on heightened accuracy. The primary objective of this system is to oversee various water attributes such as pH, turbidity, and temperature. The outcomes from the sensors are identified and presented on an LCD screen.

In Lambrou et al.'s investigation conducted in 2014, emphasis was placed on the development and application of a portable, mobile, cost-effective, and reliable water level management system within a connected framework. The system incorporates two radio frequency (RF) transceivers strategically positioned on the sump and tank to continuously monitor water quality at the designated location. Facilitated by these RF transceivers, wireless connectivity to an internet server is established. The system is designed to operate autonomously, efficiently managing water levels to prevent depletion or overflow when the microcontroller is appropriately configured. Enhancing the system's functionality, a sensor array is integrated to capture various parameters such as temperature, turbidity, pH, and dissolved oxygen. The incorporation of this wireless system not only ensures effective water level management but also proves to be a cost-saving measure during installation[33].

3. Existing system

A comprehensive soil assessment system may be developed by integrating sensors designed to detect hydrocarbons, compounds, and metal levels in soil. Monitoring soil quality and detecting waste material presence are two benefits of this technology. Additionally, sensors that can measure things like pH, conductivity, dissolved oxygen, turbidity, and so on[34].

Although previous attempts have successfully included detecting components like pH and temperature sensors, there is still a problem with manually recording the results that are shown on the LCD. Not only does this manual process take longer, but it also causes delays in recording the outcomes of quantitative improvements. As a result, a more effective technique is needed to make it easier to record and analyze the full results of various change-of-state operations[35-37].

The scope of environmental telemonitoring applications has expanded dramatically with the growth of IoT and improvements in sensor technology. By developing stationary stations or floats with digital measurement capabilities, data logging, and wireless communication, research institutions have significantly advanced the field of aquatic monitoring. This study focuses on the following parameters: salinity, dissolved oxygen, temperature, turbidity, and pH. It is crucial to monitor them. Before enabling sensor interaction, establish connections between the Arduino and the sensors, including pH, turbidity, temperature, dissolved oxygen, and electrical conductivity. The gathered data is then processed using Arduino. After processing, the data is sent character by character from Arduino to NodeMCU over a serial connection. Subsequently, the entire string dataset is split into multiple datasets.

The Firebase Realtime database receives the processed parameter data. From Firebase Cloud Store, we export the data in JSON format to our web domain, where it is displayed on our website. The online system is used for statistical analysis and decision-making procedures.

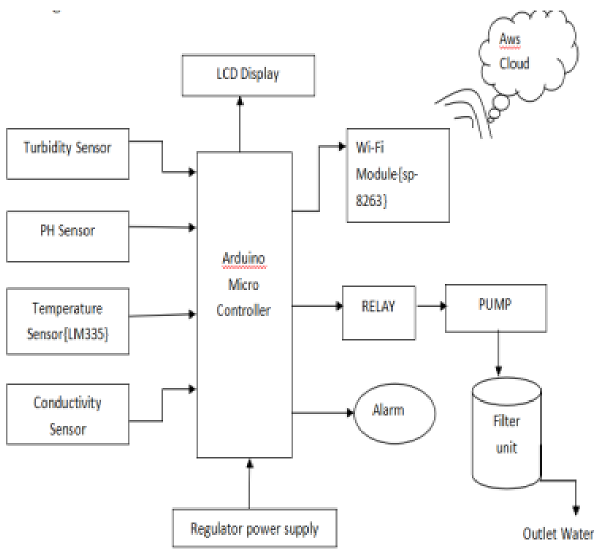

Fig 1: Flow of Existing System

Prior to exploring the complexities of our Innovative IoT-driven Water Quality Monitoring solution, it is essential to evaluate existing systems dedicated to water quality assessment. A variety of tools are used in traditional water quality monitoring systems, including "Secchi disks (for assessing water clarity), probes, nets, gauges, meters," and so on. However, the conventional methodology lacks in providing thorough measurements of water characteristic and identifying noteworthy changes. In the 21st century, despite numerous innovations, the challenge of widespread water pollution persists, particularly in coastal regions[37-40].

4. Proposed Method

In the envisioned system, an amalgamation of four sensors, pH, turbidity, ultrasonic, and DHT-11, is integrated, with a microcontroller unit functioning as the central processing module. Additionally, the ESP32 Wi-Fi module (NodeMCU) is employed for data transmission. The microcontroller unit plays a pivotal role in water quality assessment, and the ESP32 stands out for its compact dimensions and minimal power consumption, making it an ideal choice for meeting the demands of point-of-sale technology.

Analog signals are obtained by two of the four sensors that are used to collect data. The on-chip ADC of the microcontroller unit transforms these analog data into digital representation so that additional analysis may be performed. Consequently, the analog output of the sensors is linked to the analog pins on the MCU. The digital pins on the MCU unit are immediately connected to the outputs of the other two sensors. All sensor data is analyzed by the MCU and sent to the Blynk server using the Wi-Fi data transmission module ESP32 (NodeMCU) for centralized server updates. When there is an issue, alert alerts are sent to mobile devices.

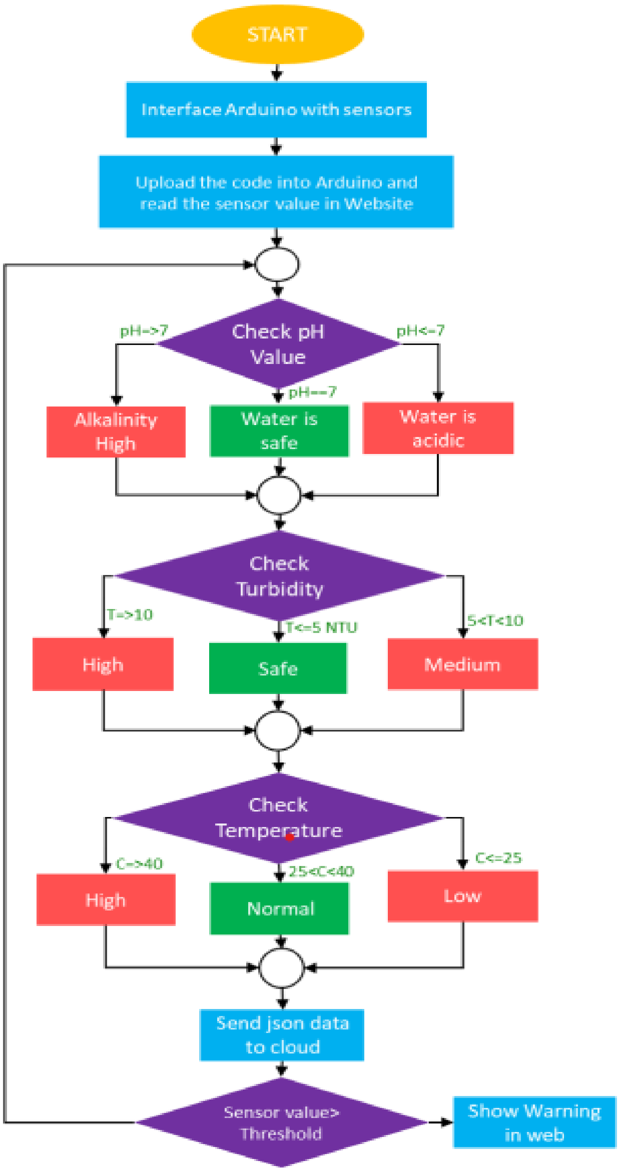

Fig 2: FLOW CHART

The block diagram illustrates how several sensors, such as those for flow, pH, temperature, and turbidity, are linked to a central controller. The central controller gathers and verifies the sensor values before transmitting the data over the internet. In this configuration, the main core controller is an Arduino. With Wi-Fi, the sensor data can be accessed online.

pH sensor: The pH value of a solution determines how acidic or alkaline the solution is. The logarithmic pH scale runs from 0 to 14, with 7 serving as the neutral point. Solutions are categorized as basic or alkaline if their pH is greater than 7, and as acidic if it is less than 7. This sensor connects to Arduino with ease and runs on a 5Vpower source. Under normal circumstances, the pH ranges between 6 and 8.5.

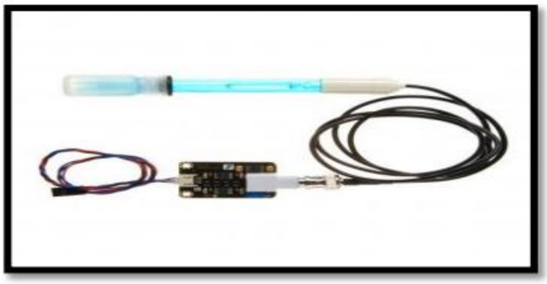

Fig 3: pH Sensor

Turbidity sensor: Turbidity is a measurement of the degree of haziness or cloudiness in water, showing how much of its purity has been lost. This metric is crucial for determining the water's quality. Underwater aquatic plants are unable to get the light they need to thrive due to turbidity. Moreover, surface water temperatures may rise above average due to suspended particles at the water's surface, which boost solar radiation absorption.

Fig 4: Turbidity Sensor

Temperature sensor: The temperature of the water indicates how warm or cold it is. The DS18B20 temperature sensor is designed to detect temperatures between -55 and +125 °C. This digital sensor can measure temperature with accuracy and reliability.

Fig. 5: Temperature Sensor

Flow sensor: The flow sensor gauges the velocity of water passing through it, featuring a pinwheel rotor comprised of a plastic valve body, a Hall Effect sensor, and a rotor. This rotor, rotating in tandem with the liquid flow, establishes a precise correlation between its speed and the flow rate. With each rotation of the pinwheel rotor, the Hall Effect sensor generates an electrical pulse.

Fig 6: Flow Sensor

Wifi module: With the inbuilt TCP/IP protocol stack of the stand-alone System on a Chip (SOC) ESP32 WiFi Module, any microcontroller may establish a WiFi network. This module can manage all Wi-Fi networking tasks without the assistance of another application processor, or it may act as a host for an application. Every ESP32 module is pre-programmed with software that includes an AT command set when it is supplied. This module, which is well acknowledged for its affordability, has amassed a sizable and continuously expanding customer base.

Fig. 7: WiFi Module

5. Schematic Circuit with its Working

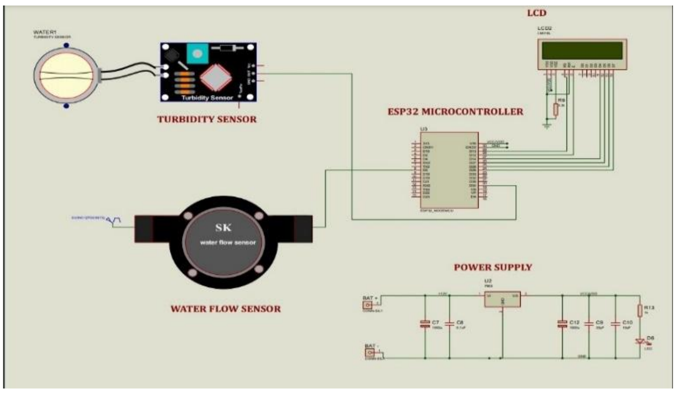

Fig 8: Circuit diagram

6. Methodology

This work displays a system that is connected to a database and server and has the ability to monitor things remotely. The Conductivity Sensor-equipped System Controller serves as the user interface for several sensors, including turbidity, pH, LCD, temperature, and water level sensors, in addition to a Wi-Fi module. The system controller continuously collects data from every sensor and displays it on the LCD when it is switched on. Concurrently, it transmits relevant data to the Wi-Fi module so that cloud storage is possible. The turbidity sensor senses physical impurities in the water, such as dirt or dissolved materials, and when it finds these, it triggers an alert and turns off the water pump.

The pH sensor assesses the acidity or alkalinity of water post-examination, providing insights into potential dissolved solvents or metallic particles while also determining whether the water is colorless, sharp, or alkaline. The water's conductivity is measured by the conductivity sensor; if metallic ions are present in excess, the conductivity will be greater, and the water will not be appropriate for drinking. When the conductivity goes beyond a certain threshold, the controller sounds an alert.
The Arduino IDE is used to emulate the code, and the entire system is coded in Embedded C. The pH, turbidity, temperature, humidity, and water level of the surrounding environment are measured by sensors in the water quality monitoring system. Combining an M/S Espino microcontroller chip, a Wi-Fi chip, and a comprehensive TCP/IP stack, ESP8266 is an inexpensive WiFi module. Code is executed directly from external flash during program execution, increasing system performance and meeting storage requirements with the ideal cache size.

7. Result and Conclusion

The water quality monitoring system uses systematic data collection to measure contaminant levels in remote areas sequentially. This technique not only provides a thorough evaluation of the aquatic environment but also makes it easier to quickly identify unforeseen episodes of water pollution or natural disasters. It quickly transmits data on poor water quality to the monitoring centre via a high-speed communication network, providing decision-makers with graphical views to assess water quality. Our suggested method addresses this issue by leveraging Internet of Things technology to assess water contaminated with pollutants and provide a purifying solution.

A water detection system employs a sensor to monitor water temperature, pH levels, and turbidity, utilizing the distinctive capabilities of the established GSM network. This technology's ability to independently assess water quality provides a low-cost, employee-free replacement. Water quality testing thus becomes more economical, useful, and rapid, demonstrating the system's adaptability.

By substituting the appropriate sensors and adjusting the software, the system can be configured to monitor additional water-quality parameters. The operating process is easy to follow. The system's versatility and potential for future use are evident in its ability to monitor hydrological conditions, industrial and agricultural output, and air pollution.

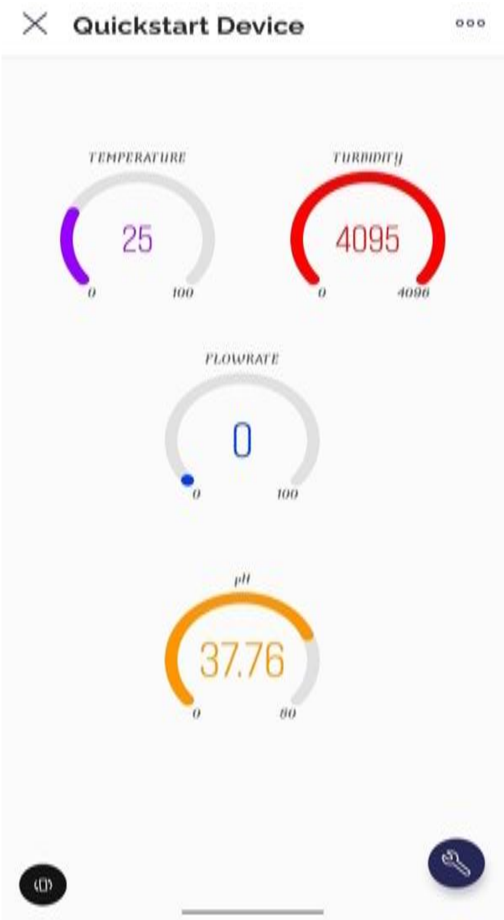

Fig 9: Reading diagram

8. Outcomes and Future Work

Elevated Water Safety: Improved monitoring and real-time data analysis help ensure a safer drinking water environment by efficiently identifying and addressing contaminants and impurities.

Reliable Water Quality: Homeowners can anticipate a consistent, elevated standard of water quality, ensuring the water purifier consistently delivers clean, safe water.

Timely Contaminant Detection: The system's ability to detect contaminants early enables prompt maintenance and component replacement, mitigating health risks associated with subpar water quality.

Energy-Efficient Operations: Efficient energy use leads to cost savings and a reduced environmental impact, resulting in lower utility bills for homeowners.

References

[1] Yaroshenko, I.; Kirsanov, D.; Marjanovic, M.; Lieberzeit, P.A.; Korostynska, O.; Mason, A.; Frau, I.; Legin, A. Real-time water quality monitoring with chemical sensors. Sensors 2020, 20, 3432. [Google Scholar] [CrossRef]

[2] Ruchitra K, Reshma N, Seema LB, Sharanamma, Suvanam Sasidhar Babu, Water Quality Monitoring and Filter System to Preserve Water Resource Using IOT, Published by: The Mattingley Publishing Co., Inc, May-June 2020 ISSN: 0193-4120 Page No. 4156-4159.

[3] Varsha Lakshmikantha, Anjitha Hiriyannagowda, Akshay Manjunath, Aruna Patted, Jagadeesh Basavaiah, Audre Arlene Anthony, IoT based smart water quality

monitoring system, Global Transitions Proceedings 2 (2021)

[4] A. N. Prasad, K. A. Mamun, F. R. Islam and H. Haqva, "Smart Water Quality Monitoring System",2nd Asia-Pacific World Congress on Computer Science and Engineering 1-6.-References-Scientific Research Publishing“, 2021 IEEE.

[5] G. N. Satya Sai, R. Sudheer, K. S. Manikanta, S. G. Arjula, B. N. Rao and D. V. Sai Maneeswar Mutyala, "IoT based Water Quality Monitoring System," 2021 IEEE 9th Region 10 Humanitarian Technology Conference (R10-HTC), Bangalore, India, 2021, pp. 01-06, doi: 10.1109/R10-HTC53172.2021.9641630.

[6] K. Shanmugam, M. E. Rana, D. Tan Zi Xuen and S. Aruljodey, "Water Quality Monitoring System: A Smart City Application With IoT Innovation," 2021 14th International Conference on Developments in eSystems Engineering (DeSE), Sharjah, United Arab Emirates, 2021, pp. 571-576, doi: 10.1109/DeSE54285.2021.9719480.

[7] Y. Liu, Q. Xue, C. Chang, R. Wang, Z. Liu, L. He, Recent progress regarding electrochemical sensors for the detection of typical pollutants in water environments. Anal Sci 38, 55 (2022).

[8] O.V. Kuznetsova, N.V. Dushenko, A.R. Timerbaev, How feasible is direct determination of rare earth elements in seawater by IcpMs? Anal. Sci. 37, 1633 (2021)

[9] R. Kumar, M. Mohan, S. Vengateshapandiyan, M. Kumar and R. Eswaran, "Solar based advanced water quality monitoring system", International Journal of Science Engineering and Technology Research (IJSETR), vol. 3, no. 3, 2020

[10] A.N. Prasad, K.A. Mamun, F.R. Islam and H. Haqva, "Smart water quality monitoring system", The University of the South Pacific. 2nd Asia-Pacific World congress on Computer Science and Engineering IEEE Conference, 2020

[11] Nikhil Kedia, Water Quality Monitoring for Rural Areas- A Sensor Cloud Based Economical Project, in 1st International Conference on Next Generation Computing Technologies (NGCT-2015) Dehradun, India, 4-5 September 2015. 978-1-4673-6809-4/15/$31.00 ©2015 IEEE

[12] Jayti Bhatt, Jignesh Patoliya, Iot Based Water Quality Monitoring System, IRFIC, 21feb,2016.

[13] Michal lom, ondrej priby & miroslav svitek, Internet 4.0 as a part of smart cities, 978-1-5090-1116-2/16/$31.00 ©2016 IEEE

[14] Zhanwei Sun, Chi Harold Liu, Chatschik Bisdikia_, Joel W. Branch and Bo Yang, 2012 9th Annual IEEE Communications Society Conference on Sensor, Mesh and Ad Hoc Communications and Networks (SECON), 978-1-4673-1905-8/12/$31.00 ©2012 IEEE

[15] Sokratis Kartakis, Weiren Yu, Reza Akhavan, and Julie A. McCann, 2016 IEEE First International Conference on Internet-of-Things Design and Implementation, 978-1-4673-9948-7/16 © 2016 IEEE

[16] Mithaila Barabde, shruti Danve, Real Time Water Quality Monitoring System, IJIRCCE, vol 3, June 2015.

[17] Akanksha Purohit, Ulhaskumar Gokhale, Real Time Water Quality Measurement System based on GSM, IOSR (IOSR-JECE) Volume 9, Issue 3, Ver. V (May - Jun. 2014)

[18] Eoin O'Connell, Michael Healy, Sinead O'Keeffe, Thomas Newe, and Elfed Lewis, IEEE Sensors Journal, vol. 13, no. 7, July 2013, 1530-437x/$31.00 © 2013 IEEE

[19] Nidal Nasser, Asmaa Ali, Lutful Karim, Samir Belhaouari, 978-1-4799- 0792-2/13/$31.00 ©2013 IEEE

[20] Vijayalakshmi Y, Manimegalai, Suvanam Sasidhar Babu," Accurate Approach towards Efficiency of Searching Agents in Digital Libraries using Keywords", Journal of Medical Systems (SPRINGER) 43:164 https://doi.org/10.1007/s10916-019-1294-5,

1st May 2019, Impact Factor: 5.23 – Q1 Rated Journal. https://dl.acm.org/toc/jmsy/2019/43/6

[21] Teena Jose, Suvanam Sasidhar Babu – "Detecting Spammers on Social Network Through Clustering Technique", Journal of Ambient Intelligence and Humanized Computing (SPRINGER)", pp-1-15, https://doi.org/10.1007/s12652-019-01541-6, Impact Factor: 7.104 (2020) – Q1 Rated Journal.

[22] Dijesh P, Suvanam Sasidhar Babu, Yellepeddi Vijayalakshmi – "Enhancement Of E-Commerce Security Through Asymmetric Key Algorithm", Computer Communications, ELSEVIER, Science Direct, Volume153, Pages 125-134, 2020, https://doi.org/10.1016/j.comcom.2020.01.033

[23] Y. Vijayalakshmi, P. Manimegalai, GKD Prasanna Venkatesan, Suvanam Sasidhar Babu "Contextual Information Retrieval in Digital Library and Research Over Current Search Engines" Jour of Adv Research in Dynamical & Control Systems, Vol. 11, 01-ISSN 1943-023X, 2019, pp 790-793.

[24] Bindhia K.F, Yellepeddi Vijayalakshmi, Dr.P. Manimegalai & Suvanam Sasidhar Babu, Classification using Decision Tree Approach towards Information Retrieval Keywords Techniques and A Data Mining Implementation using WEKA data set, International Journal of Pure and Applied Mathematics,ISSN: 13118080 (printed version), Volume 116 No. 22 2017, 19-29, ISSN: 1311-8080 (printed version); ISSN: 1314-3395 (on-line version) http://acadpubl.eu/jsi/2017-116-13-22/issue22.html https://www.scopus.com/sourceid/19700182690

[25] Yellepeddi Vijayalakshmi, Neethu Natarajan, Dr.P. Manimegalai and Suvanam Sasidhar Babu, "Study On Emerging Trends In Malware Variants" , for publication in IJPAM International Journal of Pure and Applied Mathematics (SCOPUS), ISSN 1314-3395.Volume 116 No. 22 2017pages 479-489, ISSN: 1311-8080 (printed version); ISSN: 1314-3395 (on-line version) http://acadpubl.eu/jsi/2017-116-13-22/issue22.html https://www.scopus.com/sourceid/19700182690

[26] Neethu Natarajan, Teena Jose, Suvanam Sasidhar Babu, "Secret Data Hiding Using Image Segmentation and Least Significant BIT (LSB) Insertion Steganography" for publication in IJPAM International Journal of Pure and Applied Mathematics (SCOPUS), ISSN 1314-3395 Volume 117 No. 15, 2017, p.p 527-534, ISSN: 1311-8080 (printed version); ISSN: 1314-3395 (on-line version) https://www.scopus.com/sourceid/19700182690

[27] Hridya V Devaraj, Anju Chandran, Suvanam Sasidhar Babu "MANET Protocols: Extended ECDSR Protocol for Solving Stale Route Problem and Overhearing" IEEE proceedings of the 2016 International Conference on Data Mining and Advanced Computing (SAPIENCE), 2016. http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=7684168
DOI: 10.1109/SAPIENCE.2016.7684168

[28] Divya. D, Suvanam Sasidhar Babu "Methods to detect different types of outliers" IEEE proceedings of the 2016, International Conference on Data Mining and Advanced Computing (SAPIENCE), 2016 http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=7684114

DOI: 10.1109/SAPIENCE.2016.7684114 Electronic ISBN: 978-1-4673-8594-7 Print on Demand (PoD) ISBN: 978-1-4673-8595-4

[29] Sajay K.R, Suvanam Sasidhar Babu "A Study of Cloud Computing Environments for High Performance Applications", IEEE proceedings of the 2016 International Conference on Data Mining and Advanced Computing (SAPIENCE), 2016. http://ieeexplore.ieee.org/document/7684127/
DOI: 10.1109/SAPIENCE.2016.7684127, Electronic ISBN: 978-1-4673-8594-7 Print on Demand (PoD) ISBN: 978-1-4673-8595-4

[30] Teena Jose, Vijayalakshmi, Yellepeddi, Suvanam Sasidhar Babu and Dr. Mani Megalai "Cyber Crimes in India: A Study", IEEE proceedings of the SCOPES 2016.Date Added to IEEE Xplore: 26 June 2017 DOI: 10.1109/SCOPES.2016.7955584 http://ieeexplore.ieee.org/document/7955584/ pp: 960 – 965

[31] Palagiri Mohammad Reehan, Nikhilesh, Revanth, Venkata Vikas Chandra, Suvanam Sasidhar Babu "Disease Prediction and Medicine Recommendation System", AIP Conf. Proc. 2742, 020089-1–020089-17; Published by AIP Publishing. 978-0-7354-4849-0/$30.00, Pages: 020089-1 to 020089-17. DOI: https://doi.org/10.1063/5.0184521
https://pubs.aip.org/aip/acp/article/2742/1/020089/3263662/Disease- prediction-and-medicine-recommendation

[33] Suvanam Sasidhar Babu, Santhosh, Ganga D Benal, "Fatigue Detection for Drivers Using Face Object Features Based on Aspect Ratio of Eyes and Mouth" AIP Conf. Proc. 2742, 020042-1–020042- 8; Published by AIP Publishing. 978-0-7354-4849-0/$30.00, Pages: 020042-1 to 020042-8. DOI: https://doi.org/10.1063/5.0184515
https://pubs.aip.org/aip/acp/article/2742/1/020042/3263613/Fatigue-detection-for-drivers-using-face-object

[33] Keerthana, Suvanam Sasidhar Babu, Vijayalakshmi Yellepeddi, "Radical Sound Valuation of Fetal Weight with the Use of Deep Learning", AIP Conf. Proc. 2742, 020044-1–020044-10; Published by AIP Publishing. 978-0-7354-4849-0/$30.00, Pages: 020044-1 to 020044-10. DOI: https://doi.org/10.1063/5.0184155
https://pubs.aip.org/aip/acp/article/2742/1/020044/3263651/Radical-sound-valuation-of-fetal-weight-with-the

[34] K. R. Pruthvi Kumar, Anjan K. Koundinya, S. Harsha, G. S. Nagaraja, and Suvanam Sasidhar Babu, " A Cognitive Comparative Analysis of Geometric Shape-Based Cryptosystem", Fourth Congress on Intelligent Systems, Volume-1, ISSN 2367-3370 ISSN 2367-3389 (electronic) Lecture Notes in Networks and Systems, March 2024, pages: 51-62, DOI: https://doi.org/10.1007/978-981-99-9037-5_5

[35] S.V.S. Raghu Vardhan , Dr. N.P. Nethravathi , Suvanam Sasidhar Babu "An Innovative Approach to Control and Monitor I.V(Intravenous) Fluids", International Journal of Engineering Research & Technology (IJERT), ISSN: 2278-0181, Vol. 12 Issue 05, May-2023 DOI : 10.17577/IJERTV12IS050211 https://www.ijert.org/research/an-innovative-approach-to-control-and-monitor-ivintravenous-fluids-IJERTV12IS050211.pdf

[36] Shyamji A. Pandey , Suvanam Sasidhar Babu, Gardas Naresh Kumar, Samrit Kumar Maity, "Introspection Into Distributed Deep Learning On Hpc Platform", International

Journal For Technological Research In Engineering Volume 6, Issue 7, March-2019 ISSN (Online): 2347 – 4718. https://ijtre.com/images/scripts/2019060735.pdf

[37] Karthikgowda H S, Suvanam Sasidhar Babu, Vijayalakshmi Yellepeddi, "Implementation of Novel Deep Learning Model for Covid Opinion Mining In Social Media", e-ISBN: 9788770229005, 4th International Virtual Conference on Advances in Computing & Information Technology – 2022, DOI: https://doi.org/10.13052/rp-9788770229005, https://www.riverpublishers.com/pdf/ebook/RP_P9788770229005_ebook.pdf

[38] Aditya Kumar Pandey, Aman Srivastava, Aman Kumar Singh, Abhishek Kumar Singh, Suvanam Sasidhar Babu, "Credit Card Fraud Detection using Machine Learning", 2022 https://www.riverpublishers.com/pdf/ebook/chapter/RP_9788770229005C104.pdf

[39] Kishorchand Hirasingh Rawat, Suvanam Sasidhar Babu, Prof. Keerthana P, "Sentiment Analysis of Customer Text Content in Product Reviews Using the LDA Method", 2022, https://www.riverpublishers.com/pdf/ebook/RP_P9788770229005_ebook.pdf

[40] Keerthana. P, Suvanam Sasidhar Babu, "A Systematic Review On The Applications of Machine Learning for Fetal Birth Weight Prediction ", African Journal of Biological Sciences, ISSN: 2663-2187, Volume 6, Issue -14: Page: 12243-12270, September 2024, DOI: 10.48047/AFJBS.6.14.2024.12243-12270