IoT based Monitoring System For Sewage Sweeper

T.Silambarasan[1], R.Surya[2], J.Pravinkumar[3], R.Sundar [4], S Saravanan[5]

UG Scholars[1,2,3,] Assistant Professor[4], Professor[5]
Department of Electrical and Electronics Engineering
Muthayammal Engineering College - Tamilnadu

Abstract - This article aims at providing smart solutions to monitor poisonous sewage gases and works on a system of live sewage level detection and monitoring. Whenever, a certain threshold is crossed, an alert is sent to the observer who is examining the conditions from a remote location. The information is then forwarded along with different gas PPM values indicating whether it is safe for the worker to clean or work in that environment or not. The remotely placed IoT monitoring equipment and IoT platform are integrated to create proposed system. This requires calibration of gas sensors for industrial purposes and determining the correct threshold levels for septic plants and facilities. The hardware is designed such that it shall send a prior alert to the sewage worker to ensure their safety, if damaging gaseous constituents increase in concentration over time. Various types of sensors are utilized to monitor parameters present in sewage like MQ136, MQ135, MQ7, MQ4, NO2, SO2 gases. When the threshold value is lesser than the sensed values, this system alerts the sewage worker/cleaner by sending alerts by analyzing concentrations of different toxic gases and graphing out their results for real-time monitoring thereby aiding in protection on android app. Carbon monoxide and methane sensors charted values up-to 2.3 and 60 ppm respectively, and this breached threshold and IOT module was utilized for sending alert to android mobile.

KEY WORDS - Iot , Monitoring system, Sewage, Sweeper, Sensors, Real time Data, Smart city ,Waste Management Automatic Alert.

I.INTRODUCTION

Sewage environment IoT device and IoT platform to monitor poisonous gas has been proposed as a solution to help the sewer workers who put their lives risk. Because of these poisonous gases, the death rate of sewer workers has increased in the recent years. The lack of treatment of sewage after crossing dangerous levels leads to the deaths of thousands of sewage cleaners throughout the year from accidents and various diseases such as hepatitis and typhoid that occur due to sudden or sustained exposure to hazardous gases. Septic tanks are devices which are found commonly in different types of localities, ranging from residential areas to largely developed industrial areas to provide solutions for treatment of sewage wastes. In order to evaluate the gases which are present in sewage environment, sensors have been used to analyze the amount of hazardous gas and send an alert. The hazardous gases like hydrogen sulphide, methane and carbon monoxide emitted from sewage are sensed by gas sensors every moment and updated when it surpasses the normal grade. The project aims at designing a prototype for monitoring a sewage plant or septic tank in real-time for keeping a check on concentration levels of gases. The designed system can be installed in various sewage facilities, both rural and urban. The system can be made to work properly in both domestic as well as industrial plants

II.EXISTING SYSTEM

Existing system focusing on utilizing pollution monitoring for distinguishing the different gases. This framework Pollution check in vehicles and cautioning framework utilizes GSM Technologies.

Fig.1.Block diagram
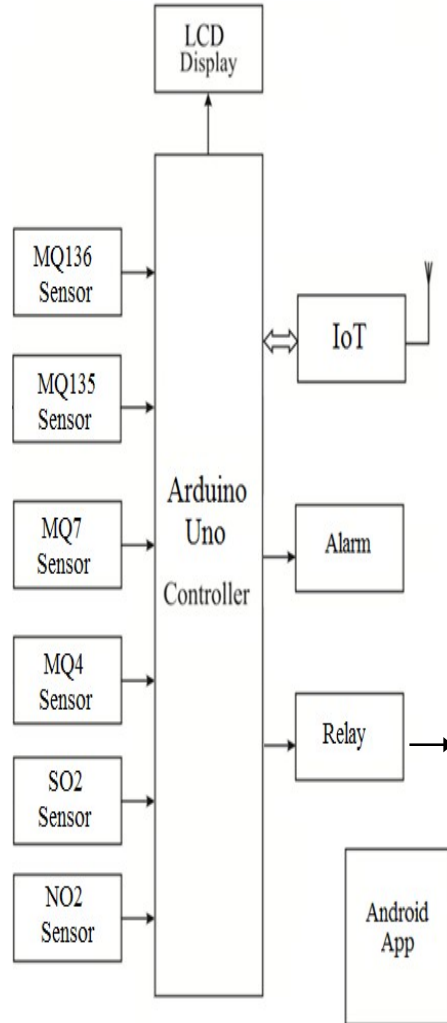
When the contamination level shoots past the effectively set edge level, there will be a notice show in the vehicle to demonstrate that the breaking point has been ruptured and this data will be send to the enrolled versatile number of vehicle proprietor utilizing GSM. They not focus on environment pollution .Less efficient to monitor pollution level. In case of GSM tower issues the message could not send to corporation.

III.PROPOSED SYSTEM

In the proposed system we use various gas sensors inclusive of MQ4 (Methane sensor) MQ7 (Carbon Monoxide sensor), MQ135(Ammonia Sensor), MQ136(H2S Sensor), NO2 sensor & SO2 sensor for detecting the presence of hazardous gases in sewage. The sensor produces a wide range of values which are emitted from sewage to the controlling kit. The calibration of these sensorsis done by defining resistor networks to make them usable for industrial and domestic utilization. The system continually monitors there different gases in surrounding atmosphere. If an abnormal condition is occurred the system will trigger a buzzer to alert the surrounding people and send the notification android mobile using IOT.

INTERNET OF THINGS (IOT)

The Internet of things (IOT) is the network of physical devices, vehicles, home appliances, and other items embedded with electronics, software, sensors, actuators, and connectivity which enables these things to connect, collect and exchange data. IOT involves extending Internet connectivity beyond standard devices, such as desktops, laptops, smart phones and tablets, to any range of traditionally dumb or non-internet-enabled physical devices and everyday objects. Embedded with technology, these devices can communicate and interact over the Internet, and they can be remotely monitored and controlled. With the arrival of driverless vehicles, a branch of IOT, i.e. the Internet of Vehicle starts to gain more attention.

The definition of the Internet of things has evolved due to convergence of multiple technologies, real-time analytics, machine learning, commodity sensors, and embedded systems .Traditional fields of embedded systems, wireless sensor networks, control systems, automation (including home and building automation), and others all contribute to enabling the Internet of things. The extensive set of applications for IOT devices is often divided into consumer,commercial, industrial, and infrastructure spaces.

SMART HOME

IOT devices are a part of the larger concept of home automation, which can include lighting, heating and air conditioning, media and security systems. Long term benefits could include energy savings by automatically ensuring lights and electronics are turned off.

IV.SIMULATION

PROTEUS
Proteus is software for microprocessor and microcontroller simulation, schematic capture, and printed circuit board (PCB) design. It is developed by Lab center Electronics.

Visual Aids to Design
ISIS is designed to be as user friendly as possible and provides two main ways to help you see what is happening during the design process – objects are encircledwith a dashed line or 'twitched' when the mouse is over them and mouse cursors will change according to function.
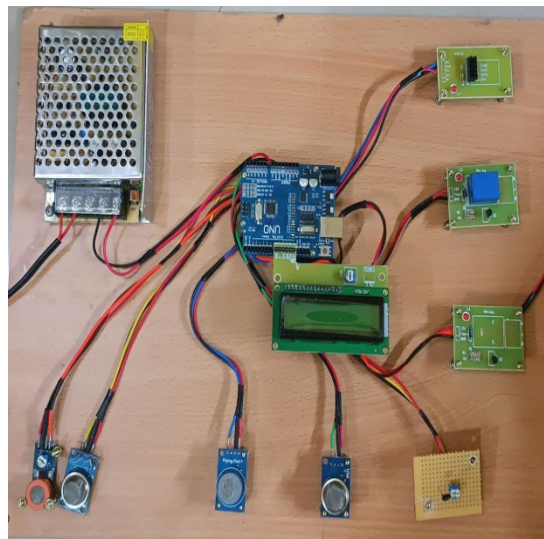
V.HARDWARE RESULS

Fig.2.Hardware Implementation

An IoT-based monitoring system for sewage sweeper results can be designed using a combination of sensors, microcontrollers, and wireless communication technologies. The purpose of the system is to monitor the performance of sewage sweepers and provide real-time data to the concerned authorities

VI.CONCLUSION

The proposed system will help sewage workers to protect their lives from risk and harmful disease. According to recent news updates, many sewage workers lost their lives while doing their job by coming across the high concentration of such poisonous gases, which once inhaled led to serious health issues. This proposed system with advanced technology based on IoT will significantly impact the lives of sewage workers. Moreover, by introducing new functionalities like location services, tracking and modified alert system, this design can serve a great social cause. Previously proposed system involves manual sampling for sewer gas analysis at decided intervals of time.

REFERENCES

[1] R. Pan, Y. Wang, X. Zhang, D. Yang and Z. Chen, "Power capability prediction for Lithium-Ion batteries based on multiple constraints analysis", Electrochemical Acta, vol. 238, pp. 120-133, 2017.

[2] D. E. Acuña, M. E. Orchard and R. J. Saona, "Conditional predictive Bayesian cramér-rao lower bounds for prognostic algorithms design", Appl. Soft Comput., vol. 72, pp. 647-665, 2018.

[3] D. E. Acuña and M. E. Orchard, "A theoretically rigorous approach to failure prognosis", Proc. Annu. Conf. Prognostics Health Manage. Soc., pp. 1-14, 2018.

[4] V.Dhinesh, T.Premkumar, S.Saravanan and G.Vijayakumar," Online Grid Integrated Photovoltaic System with New Level Inverter System" International Research Journal of Engineering and Technology (IRJET), Vol.5, Issue 12, pp.1544-1547, 2018.

[5] J.Vinoth, T.Muthukumar, M.Murugagndam and S.Saravanan," Efficiency Improvement of Partially Shaded PV System, International Journal of Innovative Research in Science, Engineering and Technology, Vol.4, Special issue 6, pp.1502-1510, 2015.

[6] M.B.Malayandi, Dr.S.Saravanan, Dr. M.Muruganandam, "A Single Phase Bridgeless Boost Converter for Power Factor Correction on Three State Switching Cells", International Journal of Innovative Research in Science, Engineering and Technology, Vol. 4, Special Issue 6, pp. 1560-1566, May 2015.

[7] A.Sasipriya, T.Malathi, and S.Saravanan, "Analysis of Peak to Average Power Ratio Reduction Techniques in SFBC OFDM System" IOSR Journal of Electronics and Communication Engineering (IOSR-JECE), Vol. 7, No.5, 2013.

[8] P.Ranjitha, V.Dhinesh, M.Muruganandam, S.Saravanan, "Implementation of Soft Switching with Cascaded 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.

[9] 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.

[10] N.Yuvaraj, B.Deepan, M.Muruganandam, S.Saravanan, "STATCOM Based of Adaptive Control Technique to Enhance Voltage Stability on Power Grid", International Journal of Innovative Research in Science, Engineering and Technology, Vol. 4, Special Issue 6, pp. 1454-1461, May 2015.

[11] P.Manikandan, S.Karthick, S.Saravanan and T.Divya," Role of Solar Powered Automatic Traffic Light Controller for Energy Conservation" International Research Journal of Engineering and Technology (IRJET), Vol.5, Issue 12, pp.989-992, 2018.

[12] R.Satheesh Kumar, D. Kanimozhi, S. Saravanan, "An Efficient Control Scheme for Wind Farm Using Back to Back Converter," International Journal of Engineering Research & Technology (IJERT), Vol. 2, No.9, pp.3282-3289, 2013.

[13] K.Prakashraj, G.Vijayakumar, S.Saravanan and S.Saranraj, "IoT Based Energy Monitoring and Management System for Smart Home Using Renewable Energy Resources," International Research Journal of Engineering and Technology, Vol.7, Issue 2, pp.1790-1797, 2020.

[14] J Mohammed siddi, A. Senthil kumar, S.Saravanan, M. Swathisriranjani, "Hybrid Renewable Energy Sources for Power Quality Improvement with Intelligent Controller," International Research Journal of Engineering and Technology, Vol.7, Issue 2, pp.1782-1789, 2020.

[15] S. Raveendar, P.M. Manikandan, S. Saravanan, V. Dhinesh, M. Swathisriranjani, "Flyback Converter Based BLDC Motor Drives for Power Device Applications," International Research Journal of Engineering and Technology, Vol.7, Issue 2, pp.1632-1637, 2020.

[16] K. Manikanth, P. Manikandan, V. Dhinesh, Dr. N. Mohananthini, Dr. S. Saravanan, "Optimal Scheduling of Solar Wind Bio-Mass Systems and Evaluating the Demand Response Impacts on Effective Load Carrying Capability," International Research Journal of Engineering and Technology, Vol.7, Issue 2, pp.1632-1637, 2020.

[17] T.R. Vignesh, M.Swathisriranjani, R.Sundar, S.Saravanan, T.Thenmozhi," Controller for Charging Electric Vehicles Using Solar Energy", Journal of Engineering Research and Application, vol.10, Issue.01,pp.49-53, 2020.

[18] V.Dhinesh, Dr.G.Vijayakumar, Dr.S.Saravanan," A Photovoltaic Modeling module with different Converters for Grid Operations", International Journal of Innovative Research in Technology, vol.6, Issue 8, pp.89-95, 2020.

[19] V. Dhinesh, R. Raja, S. Karthick, Dr. S. Saravanan", A Dual Stage Flyback Converter using VC Method", International Research Journal of Engineering and Technology, Vol.7, Issue 1, pp.1057-1062, 2020.

[20] G. Poovarasan, S. Susikumar, S. Naveen, N. Mohananthini, S. Saravanan," Study of Poultry Fodder Passing Through Trolley in Feeder Box," International Journal of Engineering Technology Research & Management, vol.4, Issue.1, pp.76-83, 2020.

[21] C. Sowmya, N. Mohananthini, S. Saravanan, and A. Senthil kumar," Using artificial intelligence inverter power control which is based on DC link voltage regulation for IPMSM drives with electrolytic capacitor," AIP Conference Proceedings 2207, 050001 (2020); https://doi.org/10.1063/5.0000390, Published Online: 28 February 2020.

[22] M.Revathi, S.Saravanan, R.Raja, P.Manikandan," A Multiport System for A Battery Storage System Based on Modified Converter with MANFIS Algorithm," International Journal of Engineering Technology Research & Management, vol.4, issue 2, pp.217-222, 2020.

[23] D Boopathi, S Saravanan, Kaliannan Jagatheesan, B Anand, "Performance estimation of frequency regulation for a micro-grid power system using PSO-PID controller", International Journal of Applied Evolutionary Computation (IJAEC), Vol.12, Issue.4, pp.36-49, 2021.

[24] V Deepika, S Saravanan, N Mohananthini, G Dineshkumar, S Saranraj, M Swathisriranjan, "Design and Implementation of Battery Management System for Electric Vehicle Charging Station", Annals of the Romanian Society for Cell Biology, Vol.25, Issue.6, 17769-17774, 2021.

[25] A Senthilkumar, S Saravanan, N Mohananthini, M Pushparaj, "Investigation on Mitigation of Power Quality Problems in Utility and Customer side Using Unified Power Quality Conditioner", Journal of Electrical Systems, Vol.18, Issue.4, pp.434-445, 2022.

[26] V Kumarakrishnan, G Vijayakumar, D Boopathi, K Jagatheesan, S Saravanan, B Anand," Frequency regulation of interconnected power generating system using ant colony optimization technique tuned PID controller", Control and Measurement Applications for Smart Grid: Select Proceedings of SGESC 2021, pp..129-141.

[27] C Nagarajan, B Tharani, S Saravanan, R Prakash," Performance estimation and control analysis of AC-DC/DC-DC hybrid multi-port intelligent controllers based power flow optimizing using STEM strategy and RPFC technique", International Journal of Robotics and Control Systems", Vol.2, Issue.1, pp.124-144, 2022.

[28] G Vijayakumar, M Sujith, S Saravanan, Dipesh B Pardeshi, MA Inayathullaa," An optimized MPPT method for PV system with fast convergence under rapidly changing of irradiation", 2022 International Virtual Conference on Power Engineering Computing and Control: Developments in Electric Vehicles and Energy Sector for Sustainable Future (PECCON), pp.1-4.

[29] C Nagarajan, K Umadevi, S Saravanan, M Muruganandam, "Performance Analysis of PSO DFFP Based DC-DC Converter with Non Isolated CI using PV Panel", International Journal of Robotics and Control Systems' Vol.2, Issue.2, pp.408-423, 2022.

[30] VM Geetha, S Saravanan, M Swathisriranjani, CS Satheesh, S Saranraj, "Partial Power Processing Based Bidirectional Converter for Electric Vehicle Fast Charging Stations", Journal of Physics: Conference Series, Vol.2325, Issue.1, pp.012028, 2022.

[31] M Santhosh Kumar, G Dineshkumar, S Saravanan, M Swathisriranjani, M Selvakumari, "Converter Design and Control of Grid Connected Hybrid Renewable Energy System Using Neuro Fuzzy Logic Model", 2022 Second International Conference on Computer Science, Engineering and Applications (ICCSEA), pp.1-6, 2022.

[32] C Gnanavel, A Johny Renoald, S Saravanan, K Vanchinathan, P Sathishkhanna, "An Experimental Investigation of Fuzzy-Based Voltage-Lift Multilevel Inverter Using Solar Photovoltaic Application", Smart Grids and Green Energy Systems, pp.59-74, 2022.

[33] C Nagarajan, K Umadevi, S Saravanan, M Muruganandam, "Performance investigation of ANFIS and PSO DFFP based boost converter with NICI using solar panel", International Journal of Engineering, Science and Technology, Vol.14, Issue.2, pp.11-21,2022.

[34] K Priyanka, N Mohananthini, S Saravanan, S Saranraj, R Manikandan, "Renewable operated electrical vehicle battery charging based on fuzzy logic control system", AIP Conference Proceedings, Vol.2452, Issue.1, pp.030007, 2022.

[35] V Kumarakrishnan, G Vijayakumar, D Boopathi, K Jagatheesan, S Saravanan, B Anand, "Optimized PSO technique based PID controller for load frequency control of single area power system", Solid State Technology, Vol.63. Issue.5, pp.7979-7990, 2020.

[36] G. Poovarasan, S. Susikumar, S. Naveen, N. Mohananthini, S. Saravanan, "Implementation of IoT Based Poultry Feeder Box", International Journal of Innovative Research In Technology, Vol.6, Issue.2, pp.33-38, 2020.

[37] N.Gokulnath, B.Jasim Khan, S.Kumaravel, Dr.A.Senthil Kumar and Dr.S.Saravanan, "Soldier Health and Position Tracking System", International Journal of Innovative Research In Technology (IJIRT)), Vol-6 Issues 12, pp.39-45, 2020.

[38] P.Navaneetha, R.Ramiya Devi, S.Vennila, P.Manikandan and Dr.S.Saravanan , " IOT Based Crop Protection System against Birds and Wild Animal Attacks", International Journal of Innovative Research In Technology (IJIRT)), Vol-6 Issues 11, pp.133-143, 2020.

[39] V. Dhinesh, D. Prasad, G. Jeevitha, V. Silambarasan, Dr. S. Saravanan, " A Zero Voltage Switching Pulse Width Modulated Multilevel Buck Converter", International Research Journal of Engineering and Technology (IRJET), Vol 7 Issue 3, pp.1764,2020.

[40] K. Punitha, M. Rajkumar, S. Karthick and Dr. S. Saravanan, " Impact of Solar And Wind Integration on Frequency Control System", International Research Journal of Engineering and Technology (IRJET), Vol 7 Issue 3, pp.1357-1362,2020.

[41] A.Arulkumar, S.Balaji, M.Balakrishnan, G.Dineshkumar and S.Saravanan, "Design And Implementation of Low Cost Automatic Wall Painting Machine" International Journal of Engineering Technology Research & Management (IJETRM), Vol-4 Issues 03, pp.170-176, 2020.

[42] V.Periyasamy, S.Surya, K. Vasanth, Dr.G.Vijayakumar and Dr.S.Saravanan, "Design And Implementation of Iot Based Modern Weaving Loom Monitoring System" International Journal of Engineering Technology Research & Management (IJETRM), Vol-4 Issues 04, pp.11-18, 2020.

[43] M.Yogheshwaran, D.Praveenkumar,S.Pravin,P.M.Manikandan and Dr.S.Saravanan, "IoT Based Intelligent Traffic Control System" International Journal of Engineering Technology Research & Management (IJETRM), Vol-4 Issues 04, pp.59-63, 2020.

[44] R.Pradhap, R.Radhakrishnan, P.Vijayakumar, R.Raja and Dr.S.Saravanan, "Solar Powered Hybrid Charging Station For Electrical Vehicle" International Journal of Engineering Technology Research & Management (IJETRM), Vol-4 Issues 04, pp.19-27, 2020

[45] S.Shenbagavalli, T.Priyadharshini, S.Sowntharya, P.Manikandan and Dr.S.Saravanan, "Design and Implementation of Smart Traffic Controlling System" International Journal of Engineering Technology Research & Management (IJETRM), Vol-4 Issues 04, pp.28-36, 2020.

[46] M.Pavithra, S.Pavithra, R.Rama Priya, M.Vaishnavee, M.Ranjitha and S.Saravanan, "Fingerprint Based Medical Information System Using IoT" International Journal of Engineering Technology Research & Management (IJETRM), Vol-4 Issues 04, pp.45-51, 2020.

[47] A.Ananthan, A.M.Dhanesh, J.Gowtham, R.Dhinesh, G.Jeevitha and Dr.S.Saravanan, "IoT Based Clean Water Supply" International Journal of Engineering Technology Research & Management (IJETRM), Vol-4 Issues 03, pp.154-162, 2020.

[48] R.Anbarsan, A.Arsathparvez, K.S.Arunachalam, M.Swathisriranjani and Dr.S.Saravanan, "Automatic Class Room Light Controlling Using Arduino" International Journal of Engineering Technology Research & Management (IJETRM), Vol-4 Issues 03, pp.192-201, 2020.

[49] S.Karthikeyan, A.Krishnaraj, P.Magendran, T.Divya and Dr.S.Saravanan , "The Dairy Data Acquisition System" International Journal of Engineering Technology Research & Management (IJETRM), Vol-4 Issues 03, pp.163-169, 2020.

[50] M.Amaran, S.Mannar Mannan, M.Madhu, Dr.R.Sagayaraj and Dr. S.Saravanan, "Design And Implementation of Low Cost Solar Based Meat Cutting Machine" International Journal of Engineering Technology Research & Management (IJETRM), Vol-4 Issues 03, pp.202-208, 2020.

[51] N.Harish, R.Jayakumar, P.Kalaiyarasan, G.Vijayakumar and S. Saravanan, "IoT Based Smart Home Energy Meter" International Journal of Engineering Technology Research & Management (IJETRM), Vol-4 Issues 03, pp.177-183, 2020.

[52] K.Subashchandrabose, G.Moulieshwaran, M.Raghul, V.Dhinesh and S.Saravanan, "Design of Portable Sanitary Napkin Vending Machine", International Journal of Engineering Technology Research & Management (IJETRM), Vol-4 Issues 03, pp.52-58, 2020.