**II. LITERATURE SURVEY**

*A. D. Davcev, K. Mitreski, S. Trajkovic, V. Nikolovski and N. Koteli, "loT agriculture system based on LoRaWAN," 2018 14th IEEE International Workshop on Factory Communication Systems (WFCS), lmperia, 2018, pp. 1-4, doi: 10.1109/WFCS20I8.8402368.*

Innovative, power efficient and highly scalable IoT agricultural system has been proposed in this system. LoRaW AN network has been used here for long range and low power consumption data transmission from the sensor nodes to the cloud services. For analytics purposes data stream has been utilised by the system of cloud services which are highly scalable. This paper shows the useful methods that can be used in smart agriculture system with the help of LoRa technology. The sensor nodes are connected with LoRa modules in order to transfer the sensor data to the processing system, in order to upload it on cloud platform.

*B. C Bouras, A. Gkamas, V Kokkinos and N. Papachristos, "Using LoRa Technology for loT Monitoring Systems," 2019 10th International Conference on Networks of the Future (NoF), Rome, Italy, 2019, pp. 134-137, doi: 10.1109/NoF47743.2019.9014994.*

Rescue monitoring system has been proposed here which dies the comparative study of various scenarios for IoT.WiFi & LoRa as wireless technologies have been compared initially, however the end devices require high power consumption for processing and thus there is requirement of low power network technologies. LoRa based gateway and WiFi Router is used to connect the end devices have been connected by using used in our scenarios to the Internet Experiments carried out on real time basis indicate that LoRa could be an ideal option for building smart rescue monitoring. For building the ecosystem with rescue concepts this study is beginning of development and use ofLoRa technology in this area, by making combine use of various software and hardware.

*C. S. C. Gaddam and M K. Rai, "A Comparative Study on Various LPWAN and Cellular Communication Technologies for IoT Based Smart Applications," 2018 International Conference on Emerging Trends and Innovations In Engineering And Technological Research (ICETIETR), Ernakulam, 2018, pp. 1-8.doi: 10.1109/ICETIETR.2018.8529060.*

This paper explains the importance and use of recent wireless technology, LPW AN. LPW AN which is Low Power Wide Area Networks has proved to be beneficial in designing various IoT systems.The concept of IoT is kept in mind while designing the new devices these days, due to increase in it's demand by the people. The requirement of an automation has been understood and preferred by people which has increased the need of development in this field. This gave rise to study of wireless technology evaluation.

This paper shows the WAN technology study, ofLPW AN which uses wireless network and requires very low power supply. It also provides the long range communication, providing low bit rate and using low bandwidth. The usage of Internet of Things (IoT) technology in device designing is increasing rapidly. (LPW AN) is popular and leading technology created for IoT networks. LPW AN is wireless based WAN technology that enables Low power consumption, long range, lower bandwidth with low bit rates. The leading low power technologies with wide area network such as LoRa, sigfo x, NB-IoT, L TE-M are useful for developing IoT networks. By keeping these technologies as reference, the comparison study has been presented in this paper. The parameters such as network coverage, cost of maintenance, life span of battery, security of network and network range have been discussed thoroughly.

The virtues and limitations also have been presented of LPW AN technology. The real time scenarios have been considered while presenting this study and the details of the best technology among the compared ones has been also given by the author for IoT smart applications.

*D. M Saari, A. M bin Baharudin, P. Si/Iberg, S. Hyrynsalmi and W Yan, "LoRa -A su111ey of recent research trends," 2018 41st International Convention on Information and Communication Technology, Electronics and Microelectronics (Mf PRO), Opatija, 2018, pp. 0872-0877, doi: 10.23919/MJPRO.2018.8400161.*

This study focuses on the new communication technology called LoRaWAN. Evaluation of the LoRaW AN technology in the field of ioT has been done, and especially in sensor network solutions. systematic literature review has been presented in this case study, in the methodology section. More than fifty suitable research papers were identified. Certain questions based on LoRaWAN study were formulated. Most recent and practical applications ofLoRa have been revealed. This study has given give recommendations to the researchers and practitioners on how the LoRa-based technologies are beneficial and can be exploited fully in enhancement of IoT solutions and development ofloT systems.

*E. A. Lavric and V Popa, "Internet of Things and LoRa™ Low-Power Wide-Area Networks: A survey," 2017 International Symposium on Signals, Circuits and Systems (ISSCS), Iasi, 2017, pp. 1-5, doi: 10.1 I 09/ISSCS.2017.80349 I 5.*

Review of the challenges and the obstacles has been presented in this paper regarding LoRa technology with reference to IoT systems. Lot of effort has been put on the study of high-density sensor networks which are used as part of the IoT (Internet of Things) concept and new solutions have been analysed related to it. Long-range transfer of information is enabled by LoRa modules, with a low transfer rate. Considering the requirements this paper presents the evaluation of the LoRa technology in the field of Io T.A discussion of main obstacles faced during IoT development is done here. The details of challenges faced and requirement of solution for various problems in WSN research have been discussed. Architecture requirements of LoRaW AN communication protocol have been discussed along with the evaluation ofLoRa modulation performance.

**iii. LITERATURE OVERVIEW**

The literature survey done from all the above-mentioned research papers, indicates that there is wide scope of using LoRa technologies in various smart IoT systems. It also indicates that LoRaW AN is beneficial low power protocol that can be implemented for smart agriculture IoT systems. The study proves that LoRa technology is comparatively rapid and secure as compared to other technologies and can be used over long distance. Specific modules have been considered here for comparative study of these technologies. Parameters like Transmission Range, transmission rate, transmission power, sleep power and Cost have been considered for study purpose.