International Journal of Engineering& Scientific Research
Vol.10 Issue 01, January 2022
ISSN: 2347-6532 Impact Factor: 6.660
Journal Homepage: http://www.ijmra.us, Email: editorijmie@gmail.com
Double-Blind Peer Reviewed Refereed Open Access International Journal - Included in the International Serial Directories Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gage as well as in Cabell's Directories of Publishing Opportunities, U.S.A

Literature Review of Internet of Things Solutions for Early Warning Systems

Venkatachalapathy M V

Assistant Professor
Department of Electronics and Communication Engineering
Government Engineering College
Chamarajanagara India

***Abstract* – Natural disasters cause great damage and losses every year, both economically and in the middle about people's lives. It is important to develop disaster risk management and production systems as well disseminate warnings in a timely manner. More recently, technologies such as the Internet of Things solutions have integrated into the warning systems to provide an effective way to collect location data and generate warnings. This function updates books related to Internet of Things solutions to Warning Field of various natural disasters: floods, earthquakes, tsunamis, and landslides. The purpose of this paper is to review the issues of the Early Warning Program, it mainly emphasizing the benefits of integrating the Fog / Edge layer into improvements IoT Architectures.**

Index Terms - Internet of Things, Early Warning Systems

I. Introduction

The Early Warning System is an integrated risk management structure, forecasting, disaster risk assessment, communication and preparedness activities, programs, and processes that make individuals, communities, governments, businesses, and others to take timely steps to reduce disasters before they become catastrophic events Social impact of the Early Warning national system in terms of risk readiness and risk reduction is expected to be highly correlated.

A successful disaster a risk reduction framework requires a multi-risk approach and information that includes risk decision-making based on open exchange and distributed data. The use of advanced knowledge and communication technology can provide solutions making multi-hazard warning systems available in many countries that do not yet have a national implementation, due to their low shipping costs, and provide options for wise and effective warning and broadcast information in particular, technology such as Internet of Things, Cloud Computing, and Artificial Intelligence can help
monitoring, forecasting and Early Warning alarm production features by providing tools for hearing, cleaning, processing, and analyzing data from the environment.

Internet of Things (IoT) consists of interconnected infrastructure items and allowing their managers, data mining and access to the data they receive produce. It aims to connect objects, actuators, or sensors to achieve a variety of purposes functions, such as environmental monitoring for various customized purposes. In the event of a disaster management and early warning systems, IoT provides distribution methods environmental monitoring from different data sources, low latency connections and real-time data processing, which allows for the production of accurate and timely alerts a state of disaster or prediction.

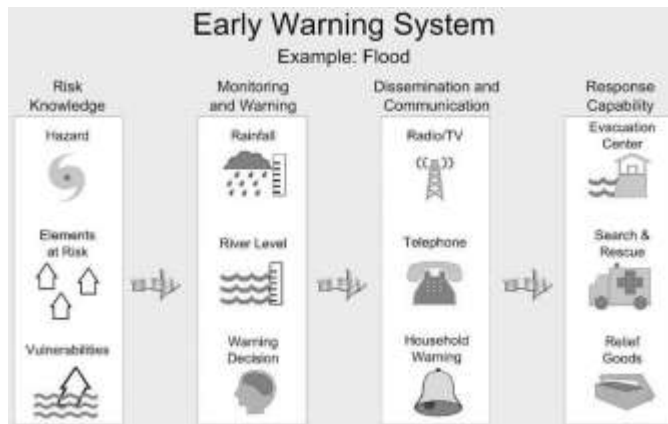

Figure 1 Early Warning System Example

. II. IoT Architectures For Early Warning Systems

IoT architecture is used to describe Early Warning systems based on the IoT paradigm. IoT systems' functions and peculiarities can be described starting from their architectural configuration. [3]

Figure 2. IoT architecture for Early Warning System [1]

The perception layer is responsible for hearing and collecting data from the area, usually through the senses. Wireless sensor networks are widely used in disaster monitoring conditions: consisting of nodes equipped with sensory units and communication units it can harvest data from the environment and transfer it to the gate area communication and communication with higher layers.

The communication layer transmits the data obtained and processed visually layer on server, cloud service or application. This layer is responsible for the route, communication between different networks, as well as reliable data transfer. There various communication technologies that can be used to transfer data.

Application layer is advanced IoT layered architecture. Using data obtained from the contact layer to provide services or services, possibly integrating collected data with historical data, as well as satellite or weather forecasting data from other sources. The program layer uses algorithms to generate and distribute warnings if a dangerous incident is imminent; can provide data retention information as well current data in real time; can make predictions and so on.

III. Literature Review

Jayashree et al. [2] has pointed out that this type of solution is flawed of needing many different types of nodes and dealing with different data; therefore, it very expensive and requires complex calculations. They lift the generator once
simple EW structures to solve this and other problems such as power consumption, durability if there is no cell coverage, the delay is short and the count is short. Properties contains flow and water level sensors that send data to the server only when the data is audible rises above the set limit. The android app will be used for mobile, active users with Zigbee hardware connected to mobile phones via USB On-The-Go module communication, so that the system works even if the cellular coverage is low, but this the method will require users to be equipped with the specified USB On-The-Go program.

Elmoulat et al. [4] proposed the creation of an Edge AI for Landslide EW that could not significantly reducing system delay by performing ML model training in on the edge of the IoT network. The network contains two types of LoRa Weather nodes and Ground nodes [5] connected to the gate, which connects to the Edge AI collection of Cloud solutions for storage and further processing using additional computer power. Compared to the cloud-only method, an advanced solution is allowed reduce delays, bandwidth usage, and the amount of data transferred

Tariq et al. [6] proposed and evaluated the Seismic Wave event acquisition algorithm to achieve millisecond earthquakes and warning. It uses an inclinometer Industrial 4.0 nodes and CAN Open communication protocol for industrial IoT. See designed and produced two types of sensor nodes: a flat inclinometer that combines two accelerometers, and a cylindrical containing seven sensors connected to the 24-bit sigma delta ADC and systematic gain amplifier to maximize adjustment. With the exception of P waves, this program can also detect S waves, Rayleigh waves, and love waves, but they are different sensor placement is required to detect different types of low-frequency waves attempts (parallel sensory positions and direction / angular removal of earthquakes). The data processing algorithm is designed to avoid false alarms once and for all reduce the cost of calculating the performance of floating point and measurement, finally it is important to avoid false alarms.

Gamperl et al. [7] developed a MEMS-based system that uses LoRa to communicate. The sub-layer of the Landslide EW program contains: (i) LoRa for multiple sensors. a network consisting of three types of sensor nodes and at least two LoRa gates operating individually duplicate node; and (ii) Continuous Shear Monitors, piezometers, and extensometers systems, which require a lot of space and are difficult to install compared to LoRa nodes. LoRa nodes are therefore used to cover a large area and to monitor a wide range of them natural boundaries at low cost. The central channel collects data from LoRa nodes and other applications and transfer them to a central Cloud server called Inform @ Risk. Cloud manages and integrates data from various sensors to produce prematurely Warnings and risk levels are based on the limits currently set. Alerts are issued with the app and alarms installed in place, but alarms come immediately is only sent when at least two neighboring nodes show strong acceleration in simultaneously with data analysis

.

Khedo et al. [8] mimicked the WSN model on the site to predict and detect earthquakes on the island of Mauritius, and they are analyzing how different WSN parameters can be compromised or improve speed and incident measurements so that check the feasibility of such a program. The article focuses on the synchronization issues of WSNs in seismic monitoring: it is important that all nodes and base channel be synchronized, otherwise the clock moves between nodes becomes part of the delay in broadcasting the waves, thus making the warnings inaccurate. A simulated architecture is used Timing-sync Protocol for Sensor Networks (TPSN) to achieve synchronization between nodes. The simulation results show that while the networks are using the TPSN protocol to sync have a much worse performance compared to fully compatible systems, networks that do not have sync agreements have serious consequences goals of speed and landmarks

IV. Conclusion

Based on the literature reviewed, it was found that the use of WSN has improved architecture allows to reduce delays, transfer numbers, and data processing. Another finding is that the new IoT-based Early Warning systems should be the main focus embedded in the ability to tolerate the errors of the solutions used, by experience networks and communication strengths. In addition, some recommendations about battery efficiency, delay, communication efficiency and reliability are appropriate taking into account improvements to existing programs or future research

References

[1] Sood, S.K.; Sandhu, R.; Singla, K.; Chang, V. IoT, big data and HPC based smart flood management framework. Sustain. Computer. Inform. Syst. 2018, 20, 102–117.

[2] Jayashree, S.; Sarika, S.; Solai, A.L.; Prathibha, S. A novel approach for early flood warning using android and IoT. In Proceedings of the 2017 2nd International Conference on Computing and Communications Technologies, ICCCT 2017, Chennai, India, 23–24 February 2017; pp. 339–343.

[3] Dorsemaine, B.; Gaulier, J.P.; Wary, J.P.; Kheir, N.; Urien, P. Internet of Things: A Definition and Taxonomy. In Proceedings of the NGMAST 2015: The 9th International Conference on Next Generation Mobile Applications, Services and Technologies, Cambridge, UK, 9–11 September 2015; pp. 72–77.

[4] Elmoulat, M.; Debauche, O.; Mahmoudi, S.; Mahmoudi, S.A.; Manneback, P.; Lebeau, F. Edge computing and artificial intelligence for landslides monitoring. Procedia Comput. Sci. 2020, 177, 480–487.

[5] Joshi, A.; Grover, J.; Kanungo, D.P.; Panigrahi, R.K. Edge assisted reliable landslide early warning system. In Proceedings of the 2019 IEEE 16th India Council International Conference, INDICON 2019, Rajkot, India, 13–15 December 2019; pp. 1–4.

[6] Tariq, H.; Touati, F.; Al-Hitmi, M.A.E.; Crescini, D.; Mnaouer, A.B. A real-time early warning seismic event detection algorithm using smart geo-spatial bi-axial inclinometer nodes for Industry 4.0 applications. Appl. Sci. 2019, 9, 3650.

[7] Gamperl, M.; Singer, J.; Thuro, K. Internet of things geosensor network for cost-effective landslide early warning systems. Sensors 2021, 21, 2609.

[8] Khedo, K.K.; Bissessur, Y.; Goolaub, D.S. An inland Wireless Sensor Network system for monitoring seismic activity. Future Gener. Comput. Syst. 2020, 105, 520–532.