ORIGINAL RESEARCH PAPER

Computer Science

A BASIC WORKING STRUCTURE OF VARIOUS DISASTER MANAGEMENT SYSTEM USING WIRELESS SENSOR NETWORK

KEY WORDS: WSN, Disaster, Aware, Mitag, SENDROM, USN4D , WINSOC , INSYEME

Ragini Bhrigunath Prasad* Research Scholar Sabarmati University *Corresponding Author

Dr. Mukta Agarwal Associate Professor Sabarmati University

Dr. Hitesh H Vandra Pricipal of Shree Swaminarayan Institute of Technology-Bhat

ABSTRACT

Dispersed sensors are used in wireless sensor networks to gather data, which is then transmitted over wi-fi networks. Microsensors are employed in WSN, and the sensors internal GPS units are used to pinpoint the location precisely. In addition to climatic change, temperature, humidity, and soil testing, it is especially utilized to reveal environmental changes. Disasters have typically caused anxiety on a global scale. In fact, it ranks highly among the leading causes of fatalities and accidents worldwide. Floods, monsoons, storms, earthquakes, landslides, droughts, and tsunamis have virtually affected every continent in 2017 due to weather and climate mishaps. Many of those herbal mishaps were incredibly destructive and left a path of devastating effects, including injury, death, a shortage of animals, and loss of property.

INTRODUCTION

WSN:

Wireless Sensor Networks use dispensed sensors to collect data and transmit the accrued data the use of wi-fi networks. In WSN microsensors are used and a international positioning system (GPS) is used within side the sensors to locate the precise location. It is specifically used to reveal the environmental adjustments in addition to climatic change, temperature, humidity, soil test. Sensor networks are very small, reasonably-priced and may be used even in rural areas. Wireless Sensor Networks use 3 forms of topologies. They are star, cluster-tree, dimension and via way of means of the use of those topologies connection may be done. WSN use a few additives like battery, radio, microcontroller, analog circuit, and sensor interface [22].

Disaster:

Disasters control and emergency services are used to shield someone or society from the fee of failures which includes tsunami caution, landslide monitoring, earthquake rescue operation, volcano monitoring, and hearth place protection. Disaster Management is a gigantic task. They may want to rarely enclose to any precise vicinity that neither do they disappear as fast they appear. It is vital approximately right control to optimize performance of making plans and reaction. Due to restricted sources collective efforts occurred. The degree of affiliation calls for a coordinated and prepared attempt to militate against, put together for, replies to, and get over emergencies and their outcomes within side the shortest viable time. A catastrophe is an occasion of herbal or man-made reasons that result in surprising disruption of normalcy inside society, inflicting harm to lifestyles and property, to lessen this harm powerful control of statistics is vital within side the catastrophe control sector. The sectors from emergency reaction making plans to short-variety early caution to long-variety mitigation and prevention making plans are applied [18].

Disasters have usually been a global concern. In fact, it's miles one of the main reasons of dying and accidents across the world. In 2017, weather and climate screw ups: floods, monsoons, hurricanes, earthquakes, landslides, drought, and tsunami have nearly hit all continents. Many of those herbal screw ups had been extraordinarily damaging and left a path of catastrophic impacts: injury, dying, lack of livestock, belongings harm and monetary loss. Thus, answers are had to mitigate the ones outcomes on our society; else the range of losses will boom dramatically. A current document launched through the Centre for Research at the Epidemiology of Disasters [3].

Disaster management:

Disaster control is a fixed of sports which might be precise to manipulate and decrease the effect of screw ups and emergencies. Traditionally, humans used to consider the catastrophe control as post-catastrophe moves only. Yet the idea covers a miles broader scope. In general, the method of catastrophe control consists of 4 phases: mitigation, preparedness, reaction, and recuperation. The mitigation section targets at lowering the effect because of screw ups via challenge a few long-time period measures. The preparedness section is established via way of means of enforcing an movement plan for a destiny catastrophe. The reaction section is the movement achieved whilst catastrophe strikes, and the recuperation section is the act of repairing affected place to its preceding state [3].

Disaster Management System:

SENDROM: SENDROM (Sensor Network for Disaster Relief Operations Management) became in particular proposed for use within side the case of earthquakes in Turkey as it's miles one of the maximum situation nations to earthquakes [17].

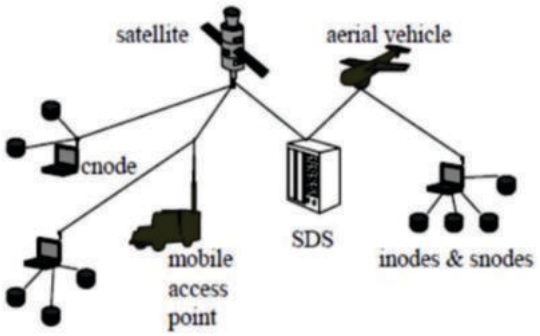

Figure 1: SENDROM after a disaster [17]

AWARE :

AWARE is the acronym of Platform for Autonomous self deploying and operation of Wireless sensor-actuator networks cooperating with AeRial gadgets [17]. This European challenge is composed in growing a platform allowing the cooperation of self sufficient aerial cars (UAVs) with floor wi-fi sensor-actuator networks composed of static and cell nodes. Additionally, the challenge additionally considers the self-deployment of the community the use of self sufficient helicopters which have the capacity to move and install loads.The fundamental purpose of this challenge is to construct a middleware allowing the cooperation of heterogeneous gadgets which include aerial cars, static actuator nodes and cell nodes carried with the aid of using floor cars and agents, in order that the entire machine can come across events (e.g. fire) with the aid of temperature sensors and wirelessly speak those events [17].

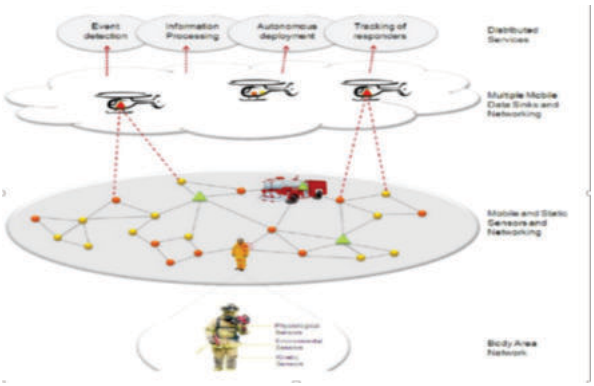

Figure 2: AWARE Architecture [17]

Mitag:

The fundamental challenge of Medical Information TAG (miTag) is to routinely tune sufferers during every step of the catastrophe reaction process, from catastrophe scenes, to ambulances, to hospitals. The miTag helps two-manner conversation with the aid of using sending messages to and from sufferers. Members of the disbursed reaction crew along with remedy officers, incident commanders, receiving hospitals and public fitness officials, can log onto an internet portal to check real-time affected person information. Each miTag sends and gets facts with a transmission bandwidth of 250kbps and the indoor variety is ready 20m [17].

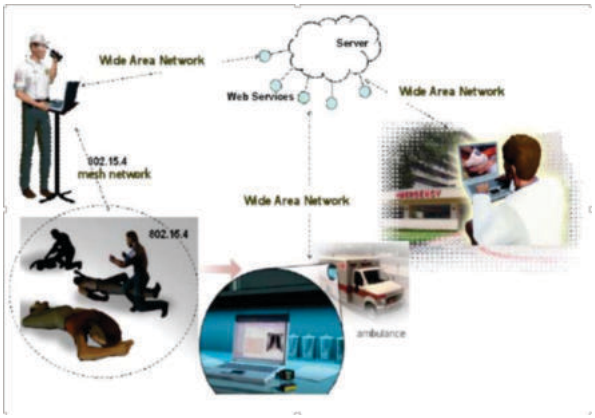

Figure 3: Real-time communication with miTag [17]

USN4D

The purpose of the challenge USN4D (Ubiquitous wi-fi Sensor Network For Development) is to offer early caution for Air pollutants and to disseminate surveillance data for towns with the intention to assist municipality provider shipping and to offer entertainment of the residents and tourists [17].

The platform of USN4D consists of 4 predominant components.

Data collectors: Sensed records may be gathered via kinds of sensors, ZigBee sensors and GPRS sensors. Each kind is associated with a network.

Pyton code: this element consists of the 2 Gateway Interfaces among the machine coordinator, the sensor networks and the Database Interface linking the machine coordinator to a MySQL database.

Database: an real relational database (MySQL) turned into used

End User Interface: the consumer can question the database and extract analyzed and localized records. Results may be proven thru GoogleMaps services.

Figure 4: USN4D Platform [17]

WINSOC

The purpose of WINSOC (WIreless sensor Network with SelfOrganization Capabilities for important and emergency applications) undertaking is to estimate the risk prevalence of landslides through detecting rainfalls the use of wi-fi sensor networks [4]. For that purpose, the authors designed a Deep Earth Probe (DEP) mounted withinside the ground. The entire landslide susceptible location is split into areas processing soil geological and hydrological properties, namely, Crown location, Middle location and Toe location with a hard and fast of sensors planted in every one [17]. The community structure consists of two-layers hierarchically. The decrease layer includes WSNs that pattern and gather facts from the DEP and transmit facts to the top layer. While the top layer aggregates the facts and forwards them to the sink (on the deployment web website online). For the experiments of WINSOC, twenty wi-fi sensor nodes of GrossbowMicaZ have been divided hierarchically into clusters and gateways. Data are transmitted from the gateway to the Filed Management Center (FMC) via a Wifi community. In addition, the FMC carries a Very Small Aperture Terminal (VSAT) earth station used to transmit facts from the deployment web website online to the Data Management Center (DMC) a long way away three hundred km. The DMC is a database server and evaluation station wherein effects and evaluation facts are real-time streamed on Internet. Figure 1.five suggests in information the WINSOC components [17].

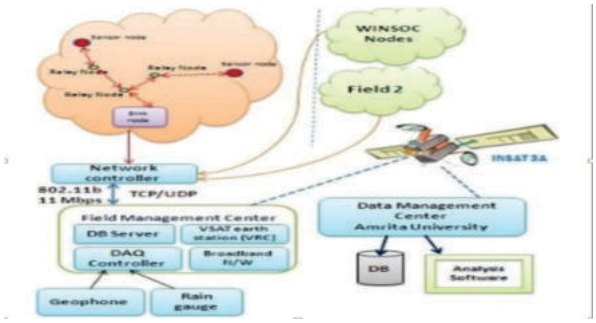

Figure 5: WINSOC Architecture [17]

INSYEME

The important purpose of the IN.Sy.EME (Integrated System for Emergency) assignment is to outline an included device to assist emergency operations that combine a pervasive Grid shape and a wi-fi conversation community. The community consists of quite a few constant and cell processing nodes. The important traits of this community are the excessive heterogeneity, the mobility, and the dynamism of its nodes. In particular, Wireless Sensor Networks are had to acquire records from the surroundings on the way to assist forecasting techniques to screen and are expecting the catastrophe evolution. The car grid then turns into a sink of the community which may be remotely accessed from the Internet. Authors of INSYEME suggest additionally to equip the sensing gadgets with interfaces to wi-fi get right of entry to networks along with 2/3G, WLAN and WMAN permitting ubiquitous connectivity [17].

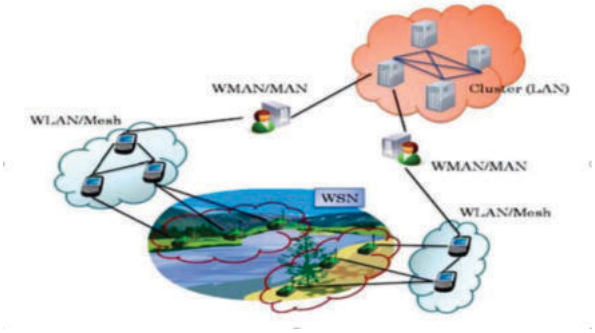

Figure 6: The forecasting model in INSYEME [17]

In addition, they recommend to apply WIMAX that may function a spine for integrating WSNs and connecting heterogeneous networks. However, the WIMAX needs to be optimized as a way to offer an outstanding Non Line of Sight (NLoS) coverage.

CONCLUSION:

In this paper, we've got supplied a few catastrophe and emergency control tasks that use wi-fi sensor networks of their architectures to degree and speak beneficial information. The position of a sensor node is to feel the environment, speak and exchange sensory information with different nodes with inside the area, locally technique its personal information and make clever selections about what it observes. Many countrywide and international tasks that use WSNs were investigated in order to facilitate the reaction control and therefore save lives. To the high-quality of our knowledge, this paper is the first that surveys the tasks coping with catastrophe control and emergency reaction and that use the generation of wi-fi sensor networks. Since these tasks are primarily based totally on WSNs, they inherit all the benefits and the bounds of such networks, so, designers should take this factor into consideration. In order to gain from preceding tasks and experiences, we plan quickly to layout a singular architecture primarily based totally on wi-fi mesh sensor networks that responds to emergency necessities which include the mobility of first responders and real-time routing and localization while taking account of the electricity conservation of the sensor network.

REFERENCES:

[1] J. A. dela Cruz, N. J. Libatique, and G. Tangonan, "Design of a Disaster Information System using Mobile Cloud Wireless Mesh with Delay Tolerant Network", IEEE, 2019.
[2] Mohsin Ashraf, GengGuohua, Xiaofeng Wang, Farooq Ahmad, "Detection and Resolving WSN issues with the use of Data Mining & Intelligent Algorithms", IEEE.
[3] RabiahAlnashwan, Hala Mokhtar, "Disaster Management System Over Wifi Direct", IEEE, 2018.
[4] Harshil Bhatt, Pranesh G, Pranesh G, ShriyashHaralikar, "Wireless Sensor Networks for Optimisation of Search and Rescue Management in Floods", IEEE, 2021.
[5] Kaljot Sharma, DarpanAnand, Munish Sabharwal, Pradeep Kumar Tiwari , Omar Cheikhrouhou and Tarek Frikha, "A Disaster Management Framework Using Internet of Things-Based Interconnected Devices", Hindawi, 2021.
[6] MeghaviChoksi, HiteshwariGamit and Mukesh A Zaveri, "Data sensing and resource scheduling in clustered environment for post disaster management using Internet of Things", IEEE, 2018.
[7] IrawanDwiWahyono, KhoirudinAsfani, MohdMurtadha Mohamad, HA Rosyid, AN Afandi, Aripriharta, "The New Intelligent Wireless Sensor Network using Artificial Intelligence for Building Fire Disasters", IEEE, 2020.
[8] Taku Noguchi, Yosuke Komiya, "Persistent Cooperative Monitoring System of Disaster Areas Using UAV Networks", IEEE, 2019.
[9] Miss.PoojaKrishnathPatil, Prof.Dr.S.R.Patil, "Structural Health Monitoring system using WSN for bridges", IEEE, 2017.
[10] Shridevi G.S, Mimithacharan raj, "Disaster Management Using Vehicle Assist Resilient Network System", IEEE, 2018.
[11] Oh SeungSub, HahmJehun, Jang Hyunjung, Lee Soyeon, Suh Jinho, "A Study on the Disaster Response Scenarios using Robot Technology", IEEE, 2017.
[12] HamraAfzaal, Nazir Ahmad Zafar, "Cloud Computing Based Flood Detection and Management System using WSANs", IEEE, 2016.
[13] Vipin Kumar Pandey, Suddhasil D, "Communication Deployability in Disaster Management: Taxonomy, Recent Developments and Future Challenges", IEEE, 2017.
[14] Zhiping CHEN, Chaoyang FANG, Nanchang, "Research and Application of Jinggangshan Geological Disaster Prevention System Based on Wireless Sensor Network System", IEEE, 2015.
[15] Abu Asaduzzaman and AbhignanTelakapalli, "Smart Disaster Management Using Software-Defined Unmanned Aerial Systems", IEEE, 2021.
[16] ShaikKarimunnisa*, D.K .Kavitha, "DISASTER MANAGEMENT SYSTEM USING WSN", ISSN: 2277-9655, IJESRT, 2017.
[17] ImaneBenkhelifa, Nadia Nouali-Taboudjemat, "Disaster Management Projects using Wireless Sensor Networks: An Overview", IEEE, 2014.
[18] TanushreeTiwari, ShubhangiBorkar, "A Review on WSN for Detection of Natural Disaster Using Data Mining", IJESC, 2018.
[19] Swapnil Bande, Prof. Dr. Virendra V. Shete, "Smart flood disaster prediction system using IoT & Neural Networks", IEEE, 2017.
[20] Priyadharsini. K, Dinesh Kumar J.R, Ganesh Babu.C, Surendiran P, Sankarshnan S, Saranraj R, "An Experimental Investigation on Communication Interference and Mitigation during Disaster Using Lifi Technology", IEEE, 2020.
[21] Diwaker Pant, Sandeep Verma, PiyushDhuliya, "A Study on Disaster Detection and Management using WSN in Himalayan Region of Uttarakhand", IEEE, 2017.
[22] Devi Kala Rathinam. D, Surendran. D, Shilpa. A, Santhiya Grace. A, Sherin. J, "Modern Agriculture Using Wireless Sensor Network (WSN)", IEEE, 2019.