Location and Health Monitoring of Human During Disaster using Wearable – IoT

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Abstract - *Life is the most precious thing in the world, Natural calamities like disasters may take up many of our precious lives. During disaster, activities like search, rescue, recovery, etc can be carried out by using the proposed methodology. The proposed methodology is useful for the safety and health of human affected / lost in disaster by locating their position and monitoring their vital signs using a Wireless Wearable Device to the search or rescuing team. This provides the exact position of each person, and monitors their important life parameters like skin temperature and pulse rate, any change in their pulse rate and body temperature may let us know that they are alive or not as the rescue operations will be different for the alive and not alive human. The system could also be used to send early warning alerts and intimate the rescue team to rescue the human from the disaster place. Global Positioning System (GPS), is able to find your exact position on the Earth anytime, in any weather, anywhere. Ground stations, locate worldwide, and continuously monitor them. The satellites transmit signals that can be detected by anyone possessing the GPS receiver. GPS is meant to monitor or locate the position of people. In addition, the health-related parameters are monitored using wearable IOT device which is designed using LoraWAN capable of carrying out two- way communication between the Wearable, GPS Tracker device and the Server at the shelter. The location and health of the human could be tracked and finally the human in the disaster area will be cautioned of the possible disaster and rescued after disaster in an efficient way using this methodology*

1. INTRODUCTION

This project describes about to build a wireless system to track the disaster victim and healthcare monitoring using IOT LORAWAN module. Natural hazards cause loss of human life and infrastructure. Disaster management system is to reduce the impact of natural hazards on common life, and assets. Emergency responders play A key role in effective and efficient disaster management. The safety of emergency responders, whilst in dangerous situations, by continuously monitoring their position and sensing their vital signs, is necessary. By devising a body sensor system, the responders can be located, tracked, and communicates with emergency rescue team. The system will improve support for organizing and managing the real-time delivery of medical and food supplies to disaster hit people. Several environmental factors affects the location accuracy and capability to attain the position of emergency responders. GPS is one of the most popular location tracking system, which needs signals from GPS satellites. The presence of concrete buildings, forests and dense foliage, the satellite signals may get blocked. GPS for all critical objects is not practicable for a large number of emergency responders. In this paper, we are using a fast and cost-effective localization scheme that estimates the position of emergency responder by using RSSI (Received signal strength indicator). The proposed wearable device system which tracks the emergency responder and monitors the vital signs connecting to biomedical sensors and the monitoring device. This system ensures that only well trained and properly fit emergency responders are deployed in a disaster area. In the health management system designed and integrated with Missing Person monitoring device with low cost is mainly used to continuously monitor the Missing Person"s location, health condition. For effectively and accurately measuring the Missing Person physiological parameter such as temperature, and pulse rate of the Missing Person, wearable sensors / devices are commercially available for personal health care, fitness, and activity awareness. IOT LoRaWAN related healthcare is based on IOT LoRaWAN as a network of devices that connect directly with each other to capture and share vital data. It involves sensors, microcontrollers and gateways for sensor data analysis. Data mining techniques are used to find the healthy and unhealthy vital signs data using classification model without Human help. Chronic Disease monitoring system capture vital signs data through medical sensors, data mining algorithms analyse the data and medical professionals wirelessly access the information and make diagnoses and treatment recommendations based on the sensor data. These applications generate huge amount of data. The primary mission of the HUMAN TRACKING SYSTEM is keeping track of the current location and movement of people. The key reason for this tracking is to be able to provide a timely help in emergency or unusual situations. The HUMAN TRACKING SYSTEM consists of a basic GPS-based tracking system like

Automobile Pilot System that has a map installed. Automobile Pilot System receives signals from a satellite about HUMAN TRACKING SYSTEM kits current location, and can show where the user is on the map. General structure of current person tracking systems is a GPS receiver with a GSM transmitter or only Radio Frequency (RF) receiver and transmitter HUMAN TRACKING SYSTEM also has a website that provides live information about the affected areas and necessary information of victims to family and friends. To develop an effective HUMAN TRACKING SYSTEM, the major challenge is to implement a Shortest Distance Algorithm based on rescue team capacity, density of the pick-up points, average time to save each person in pick- up point, and shortest distance between pick-up points so as to guide rescuer to save much more people in a diplomatic way. HUMAN TRACKING SYSTEM is designed to provide management tools that allow responding agencies to work with the large amounts of data available to them. It permits to assign individuals to tasks and facilitates management of people, places, and things that are important in disaster relief. HUMAN TRACKING SYSTEM software ensures that responders and recipients have current relevant information which helps them to respond effectively. The proposed HUMAN TRACKING SYSTEM provides the following services to the users

- Record the details of individuals or families at a shelter, and link requests for aid (e.g., food, water, and blankets) or services (e.g., medical assistance, counseling, and family reunification) at individual or location levels.
- Manage inventories and update the status and capacity of operating shelters and medical facilities. Missing persons record details can be referenced against those recorded at shelters.
- By smooth sharing of known data about disaster through website across the various set of mankind and companies that need to transmit with each other. A major application area of HUMAN TRACKING SYSTEM is keeping track of the current location and movement of people. The key reason for this tracking is to be able to provide a timely help in emergency or unusual situations

2. Literature Survey

The various GPS tracking technologies cited in refences 1 – 8 and the various LoRA tracking technologies cited in references 9-16 were studied and the concepts used were analyzed for adoption into the project.

1) "Wearable Location Tracker during Disaster" - GPS (Global Positioning System) is a network of orbiting satellites that send precise details of their position back to the Earth and track the exact location of the GPS receiver. If it is mounted on a vehicle or even on a person in the form of wearable things, then tracking of the location in times of need or even disasters are possible.

2) "Sustainable Wearables: Wearable Technology for Enhancing the Quality of Human"-Life" Sensor devices that track and collect human data for user monitoring, context-aware technology that processes and analyzes collected data and provides useful information to users, the evolution into wearable technology that is extended through a combination of users" physical bodies and the surrounding environment, and middleware technology that provides efficient wearable applications.

3) " GPS Application in Disaster Management - A Review" - the utilization of the geomatic technologies in the areas of risk and disaster management by placing more emphasis on the use of GPS in monitoring, assessing and managing these disaster events.

4) "Emergency based remote collateral tracking system using Google"s Android mobile platform" - application uses a GPS to track the location information of the user and send that location information as a message via SMS, email and post it on Facebook wall simultaneously, an emergency signal is sent to Arduino Microcontroller.

5) "Human Tracking System Based on GPS and IOT (Internet of Things)" - Human safety is an important issue due to the sudden rise of crimes and accidents. To resolve this issue, we propose a Human Tracking System based on GPS (Global Position System) and internet of Things (IOT) that has dual security features. The proposed system incorporates the available technical know-how in sensors (GPS, gravity etc.) to track, monitor and assist a person in different situations. The proposed system may be utilized by children in crowded areas and by anyone who wants to get assistance at the time of distress like patients. Our proposed concept of developing such a device is to create an environment where anyone can be located at any time thus reducing the cost and efforts involved to track them by several agencies. The system will alert the right agencies if a person, like a child or a patient, is in need of assistance.

6) "An Automatic Wildlife Tracking System Using GPS and Wireless Sensor Networks"- Automatic tracking and alert system has been implemented by incorporating GSM and GPS technology in the form of a device that would be attached to the body of an animal and would be constantly observing the location of the animal with respect to the GPS defined boundaries set up inside a wildlife sanctuary or national park.

7) "wildCENSE: GPS based Animal Tracking System" - wildCENSE is a Wireless Sensor Network (WSN) system which attempts to monitor the behavior and migration patterns of Barasingha (Swamp Deer). The system would collect the micro-climatic as well as positional information of the animal and communicate it to a base station through flooding of data using peer-to-peer network. The base station, using a gateway, will upload all the collected data to a database server on Internet and portray

the information using browser-based visualization software. Each node would monitor five parameters namely position (using GPS), temperature, humidity, head orientation and ambient light.

8) "IoT Based Health Monitoring System with LoRa Communication Technology" - Supporting sensors integrated with IoT healthcare can effectively analyze and gather the patients" physical health data that has made the IoT healthcare ubiquitously acceptable. The continuous presence of the healthcare professionals and staff as well as the proper amenities in remote areas during emergency situations need to be addressed for developing a flexible IoT based health monitoring system. Development of IoT based health monitoring system allows a personalized treatment in certain circumstances that helps to reduce the healthcare cost and wastage with a continuous improving outcome.

9) "Monitoring and Support for Elderly People Using LoRa Communication Technologies: IoT Concepts and Applications" - This article focuses on the rapid implementation of low-cost technologies, which allow us to answer a fundamental question: how can near real- time monitoring and follow-up of the elderly and their health conditions, as well as their homes, especially for those living in isolated and remote areas, be provided within their care and protect them from risky events? The system proposed here as a proof of concept uses low-cost devices for communication and data processing, supported by Long-Range (LoRa) technology and connection to The Things Network, incorporating various sensors, both personal and in the residence, allowing family members, neighbors and authorized entities, including security forces, to have access to the health condition of system users and the habitability of their homes, as well as their urgent needs, thus evidencing that it is possible, using low-cost systems, to implement sensor networks for monitoring the elderly using the LoRa gateway and other support infrastructures.

10) "EMERGENCY VEHICLE AND HEALTH MONITORING SYSTEM USING LoRA" - The prime innovation of the project is to develop a low cost, long range,   completely   automated communication system to address the accidents that happen in any rural area. It starts right from generation of shortest route to nearby hospital, to clearance of traffic signal in the stipulated path using LORA.

11) "Wearable Sensors for Remote Health Monitoring" - Remote healthcare monitoring allows people to continue to stay at home rather than in expensive healthcare facilities such as hospitals or nursing homes. It thus provides an efficient and cost-effective alternative to onsite clinical monitoring [6]. Such systems equipped with non-invasive and unobtrusive wearable sensors can be viable diagnostic tools to the healthcare personnel for monitoring important physiological signs and activities of the patients in real- time, from a distant facility

12) "Bushfire Disaster Monitoring System Using Low Power Wide Area Networks (LPWAN)" - Some applications, including disaster monitoring and recovery networks, use low-power wide-area networks (LPWAN). LPWAN sensors capture data bits and transmit them to public carrier networks (e.g. Cellular networks) via dedicated gateways

13) "LoRa Based Network for Accident Detection and providing Quicker Ambulance Services for Medical Assistance" - Coverage includes accident detection, emergency ambulance transportation (including wait time and treatment at the scene) by a licensed ambulance service from the location of the sudden accident to the nearest hospital where Emergency health services can be performed. For this purpose, we have implemented an effective ambulance system by using GPS, GSM, and along with LoRa technology. Along with this the traffic is also cleared in the route that the ambulance is travelling, for this to happen the GPS location of the accident vehicle is sent to the traffic control cell, where the traffic in the route of the ambulance is cleared and thus the vehicle arrives as earliest as possible.

14) "A Wearable LoRa-Based Emergency System for Remote Safety Monitoring" - Low Power Wide Area (LPWA) technologies are becoming popular as a result of the fast development of the Internet of Things (IoT) market. In this paper, we propose a wearable LoRa-based system for remote safety monitoring of people performing activities in remote areas with no network coverage. The designed system is supposed to detect possible heart problems and/or a "man- down" situation. It then transmits an emergency alert containing information about the state of the concerned individual and its location via LoRa to the surrounding recipients. The proposed system composed of a GPS enabled IoT device, a smart-watch and a smart-phone, has been validated in a remote area in the city of Belfort in France. The obtained results demonstrate the feasibility of such a system.

15) "Tracking and Monitoring System Based on LoRa Technology for Lightweight Boats" - technologies such as cellular communications or wireless sensor networks have been employed so far; nevertheless, all of them present different drawbacks mostly related with the coverage and energy-efficiency of the system. Recently, a novel communication paradigm, so-called Low Power-Wide Area Network (LP-WAN) has gained momentum due to its interesting characteristics regarding transmission distances and end-node"s power consumption. The latter may be of great interest for ships with energetic restrictions such as small sailboats, recreational boats, or radio control ships. For that reason, in this work, we present a boat tracking and monitoring system based on LoRa (Long Range), one of the most prominent LP- WAN technologies.

16) "Locating and monitoring emergency responder using a wearable device" - This paper presents Wireless Wearable Device architecture with a location tracking scheme, for tracking and monitoring emergency responders. The localization scheme presented estimates the distance of emergency responders to their neighbors using localized nodes. Since the traffic in the network is limited to those emergency responders who are in communication range.

3. Limitation analysis for Research Direction

Table -1: Limitation Analysis

Author	Description	Limitations
Soumya Dipta Boral, Abhisek Das, Aditya Khare, Ambalika Gupta, Chaitali Bhattacharyya, Susmita Das	"Wearable Location Tracker During Disaster "The motive is to set a GPS receiver module with Arduino interfacing board and set a RF (Radio Frequency) transmitter receiver module as well to send the coordinates from the GPS receiver from one part to another. The receiving part will be containing another Arduino board with an LCD (Liquid Crystal Display) attached to it such that the coordinates will travel along and be received by the receiver. The Arduino will display the coordinates on the LCD screen	Only it tends to track the location. Peoples health status are less well defined and usage of GPS in need of nodes to transmit signals. It is affected by the weather conditions. It slows down or fully stops working in garages or basements, tunnels, and really tall buildings
Jaewoon Lee , Dongho Kim , Han-Young Ryoo and Byeong- Seok Shin[2]	"Wearable Technology for Enhancing the Quality of Human Life" This paper aims to elicit insights about sustainable wearables by investigating recent advancements in wearable technology and their applications. This analyzes collected data and provides useful information to users and wearable sustainability.	Only wearable technologies discussed. Only tracks the data of human individuals It is also highly important to study the middleware that controls and manages by integrating a large number of sensors
KamilMuhammad Kafi,Mohamed BarakatA. Gibril	"GPS Application in Disaster Management: A Review "This paper deals with use of GPS in monitoring, assessing and managing these disaster events. Furthermore, this study highlighted cases where GPS was used in three disaster periods namely; pre-disaster, during disaster and post-disaster events to predict potentially vulnerable areas, detect occurrences and identify the extent of damages done by disaster. The integration of GPS, RS, and GIS in disaster management the utilization of these geomatic technologies in the areas of risk and disaster management by placing more emphasis on the use of GPS in monitoring, assessing and managing these disaster events.	GPS is mainly concerned with precise positioning, most of its limitation will not be unconnected to the degree of precision in finding locations. Consequently, these results to poor accuracy and low accuracies termed as "ERRORS" resulting from the satellite system, GPS receiver, atmospheric or environmental effects. GPS satellite signals are weak so it does not work well in indoors, underwater, under bridge and trees, etc. The highest accuracy requires line-of-sight from the receiver to the satellite; this is why GPS does not work very well in an urban environment
Prabhu Dorairaj, Saranya Ramamoorthy, and Ashok Kumar Ramalingam	"Emergency Based Remote Collateral Tracking System" application using Google"s Android Mobile Platform" uses GPS to track the location information of the user and send that location information as a message via SMS, email and post it on Facebook wall Simultaneously, an emergency signal is sent to Arduino Microcontroller.	GPS technology used. Mobile should be kept safe for rescue during accident period. Need of Wi-Fi, internet to track the location
Sonam Priyanka ,Sandip Dutta, and Soubhik Chakraborty	"Human Tracking System Based on GPS and IOT (Internet of Things)" The proposed system may be utilized by children in crowded areas and by anyone who wants to get assistance at the time of distress like patients. The proposed concept of developing such a device is to create an environment where anyone can be located at any time thus reducing the cost and efforts involved to track them by several agencies. The system will alert the right agencies if a person, like a child or a patient, is in need of assistance.	GPS Technology based on Satellite availability. The identified latitude and longitude of the object will be sent to the cloud and from there the details will be shared to the rescue team .i.e availability of satellite / cloud. It is affected by the weather conditions. It slows down or fully stops working in garages or basements, tunnels, and really tall buildings
D.Aravind, S.Anupriya,	"An Automatic Wildlife Tracking System Using GPS and Wireless Sensor Networks" implemented by incorporating	This methodology deals only with in limited boundaries not upon to the

A.T.Aarthi, C.Saravana Kumar	GSM and GPS technology in the form of a device that would be attached to the body of an animal and would be constantly observing the location of the animal with respect to the GPS defined boundaries set up inside a wildlife sanctuary or national park. In case an animal stray out of the GPS defined zone, an alarm will go.	farther place to track their location using GPS. The usage of GSM results in usage of mobile communication system or cellular system for tracking
Vishwas Raj Jain, RaviBagree, Aman Kumar,Prabhat Ranjan	"Wireless Sensor Network (WSN) system which attempts to monitor the behavior of the connected nodes. The system would collect the micro-climatic as well as positional information of the animal and communicate it to a base station using peer-to-peer network. . The system would be integrated in the form of a collar that can be easily fitted on the neck of animal.	Peer to peer network needs autonomous nodes to transmit Radio Frequency waves.It needs power supply to nodes through battery sources When the nodes are mobile difficult to locate
Norbahiah Misran, Mohammad Shahidul Islam, Gan Kok Beng, Nowshad Amin, Mohammad Tariqul Islam	"IoT Based Health Monitoring System with LoRa Communication Technology" This paper focuses on Supporting sensors integrated with IoT healthcare can effectively analyze and gather the patients" physical health data that has made the IoT healthcare ubiquitously acceptable. IoT based healthcare system that is applied to different biomedical sensors with a MySignals development platform	Only the health care data monitored using Mysingnals and LoRa
JoséPaulo Lousado, and Sandra Antunes	"Monitoring and Support for Elderly People Using LoRa Communication Technologies: IoT Concepts and Applications "This article focuses on the rapid implementation of low-cost technologies, which allow us to answer a fundamental question: how can near real- time monitoring and follow-up of the elderly and their health conditions, as well as their homes, especially for those living in isolated and remote areas, be provided within their care and protect them from risky events The system proposed here as a proof of concept uses low-cost devices for communication and data processing, supported by Long-Range (LoRa)technology	This may monitor only the people and they may ot give the health report of people present in remote or disastrous places.
Ajitha S, Monisha Thangam K S, Viveka Vikram K	"EMERGENCY VEHICLE AND HEALTH MONITORING SYSTEM USING LoRA"- The Long-Range Radio (LoRa) is a new technology that provides a low power wide area network suitable for Rural Infrastructure development. LoRaWAN can be designed to control 1000s of end devices with a coverage range of about 15 Kms for each device. Smooth mobility of e m e r g e n c y services.	Only it helps to track the nearby hospitals using LoRa wan

Sumit Majumder , Tapas Mondal and M.Jamal Deen	Wearable Sensors for Remote Health Monitoring "Remote health monitoring, based on non-invasive and wearable sensors, actuators and modern communication and information technologies offers an efficient and cost-efficient solution that allows the elderly to continue to live in their comfortable home environment instead of expensive healthcare facilities. The measured and processed physiological data are, eventually, transmitted to the remote healthcare facility over the internet	Healthcare uses Internet for data processing health related data and Transmission process Nodal transmission of data Due to transmitting base stations. Only health monitored.
James Jin Kang and Sasan Adibi	"BushfireDisaster Monitoring System Using Low Power Wide Area Networks" In a disaster situation and when the public network is not available due to the impact, P2P networks such as LPWAN, ad hoc and balloon networks can be used to deliver the sensor data. Those networks may be connected to IoT devices, which can forward the information through the	The Network is to be properly configured for communication between them and internet.

|	internet where available	
Sudeepa.K.R, Rashmi.N, Prarthana.D.Raj, Sindhu.S,Vani.S Badiger	"LoRa Based Network for Accident Detection and providing Quicker Ambulance Services for Medical Assistance "implemented an effective ambulance system by using GPS, GSM, and along with LoRa technology. Along with this the traffic is also cleared in the route that the ambulance is travelling, for this to happen the GPS location of the accident vehicle is sent to the traffic control cell, where the traffic in the route of the ambulance is cleared and thus the vehicle arrives as earliest as possible.	Uses GPS, GSM LORA. It is for emergency handling of accident
Gaby Bou Tayeha,Joseph Azara,Abdallah Makhoula, Christophe Guyeuxa and Jacques Demerjianb	"A Wearable LoRa-Based Emergency System for Remote Safety Monitoring" - The designed system is supposed to detect possible heart problems and/or a "man- down" situation. It then transmits an emergency alert containing information about the state of the concerned individual and its location via LoRa to the surrounding recipients. The proposed system composed of a GPS enabled IoT device, a smart-watch and a smart-phone, has been validated in a remote area in the city of Belfort in France. The obtained results demonstrate the feasibility of such a system	LoRA for detecting alive GPS for location detection It is affected by the weather conditions. It slows down or fully stops working in garages or basements, tunnels, and really tall buildings
Ramo Sanchez Iborra, Ignacio G.Liaño, Christian Simoes and Elena Couñago and Antonio F. Skarmeta	"Tracking and Monitoring System Based on LoRa Technology for Lightweight Boats" - present a boat tracking a n d monitoring system based on LoRa (Long Range), one of the most prominent LP- WAN technologies. To locate boats in efficient way and safeguard the sailing boats form being lost	LoRA for the boats
Abishek Thekkeyil Kunnath Preeja Pradeep Maneesha Vinodini Ramesh	"Locating and monitoring emergency responder using a wearable device" - framework for supporting the safety and health of emergency responders by locating their position and monitoring their vital signs using a Wireless Wearable Device. As an initial step towards the development of a wireless wearable tracking and monitoring system for emergency responders, this system uses an iterative localization based scheme, which provides the exact position of each emergency responder, and monitors their vital signs like skin temperature and pulse rate. Any change in the vital signs can be easily sensed and tracked, and could be used to provide warnings when critical events are detected.	It is only iterative localization based scheme for Health monitoring but not for location monitoring.

4. FINDINGS

Based on the literature survey we have discussed in this paper, there are many tracking techniques for monitoring the location and health parameters. There are one or some other limitations in each monitoring system. Combining location and health monitoring will not only help in locating the person in disastrous but also his health monitoring will make it easier to plan the rescue operation.

5. LOCATION AND HEALTH MONITORING

An IOT wearable device – Arduino having GPS sensors for location tracking, Health sensors for monitoring temperature, pulse along with LoRA module for wireless localization for the missing person during disastrous & sending wireless signals to the Firebase Database cloud through mobile / Personal computer along with the GSM communication module for sending the alert messages based on the data received to the affected person by the Rescue Team will facilitate to monitor the Location and health of human during disaster.

Fig -1: System Architecture
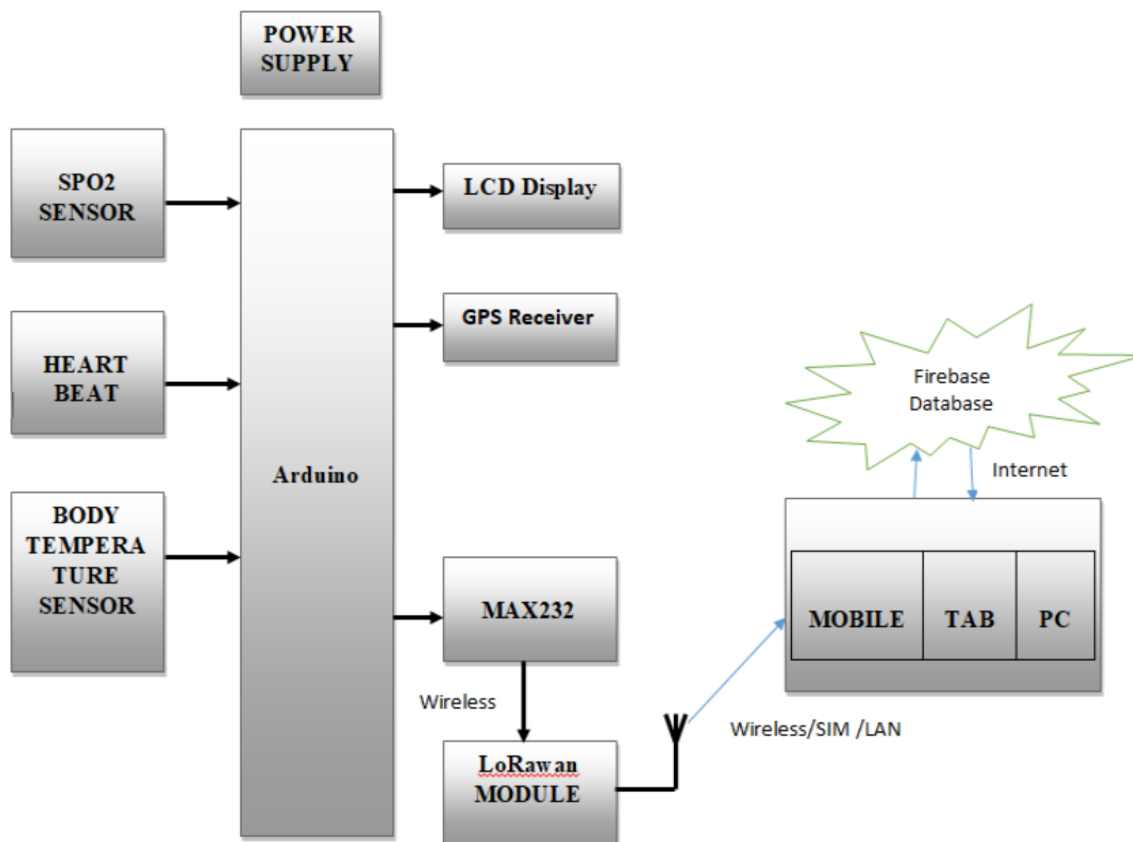
7. CONCLUSION

- Using the proposed methodology of Wearable based Disaster health monitoring system using IoT, we could able to locate the position of the individual and analyze the health issues of the human during disaster.
- Any abnormalities in the health conditions can be known directly and are informed to the rescue team through alert / SMS through internet.
- The proposed system is simple, power efficient and easy to understand.
- It acts as a connection between persons and Disaster Management team for better & quicker rescue operations.

8. FUTURE SCOPE:

- The system could be integrated with the nearby Traffic control system & Hospital.
- On Communication of the acquired / processed data of alive or not alive condition and the health parameters, the local road traffic system and the hospital can be alerted for clearing the traffic for transportation of the victim and arranging the medical facilities viz., medicine, medical supports and speeding up the recovery of the affected human during disaster.

REFERENCES

1. Title: "Wearable Location Tracker During Disaster"
    Authors: Soumya Dipta Boral, Abhisek Das, Aditya Khare, Ambalika Gupta, Chaitali Bhattacharyya, Susmita Das

    Publication: International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056

2. Title: "Sustainable Wearables: Wearable Technology for Enhancing the Quality of Human Life"
    Authors: Jaewoon Lee, Dongho Kim , Han-Young Ryoo and Byeong-Seok Shin , Publication: Sustainability in MDPI

("Molecular Diversity Preservation International".)

3. Title: " GPS Application in Disaster Management - A Review"
    Authors: Kamil Muhammad Kafi , Mohamed Barakat A. Gibril

    Publication: Asian Journal of Applied Sciences (ISSN: 2321 – 0893)

4. Title: "Emergency based remote collateral tracking system using Google's Android mobile platform"
    Authors: Ashokkumar Ramalingam, Prabhu Dorairaj, Saranya Ramamoorthy

    Publication: Blekinge Institute of technology – Sweden

5. Title: "Human Tracking System Based on GPS and IOT (Internet of Things)"
    Authors: Sonam Priyanka, Sandip Dutta, Soubhik Chakraborty

    Publication: -Research Gate - January 2020,DOI: 10.1007/978-3-030-24643-3_61

6. Title: " An Automatic Wildlife Tracking System Using GPS and Wireless Sensor Networks"
    Authors: D.Aravind1, S.Anupriya, A.T.Aarthi, C.Saravana Kumar

    Publication: National Conference on Electronics, Communication and Computing (NCECC-2017)

7. Title: "wildCENSE: GPS based Animal Tracking System"
    Authors: Vishwas Raj Jain, Ravi Bagree, Aman Kumar, Prabhat Ranjan

    Publications: Research Gate - Information and Communication Technology Dhirubhai Ambani Institute of Information and Communication Technology Gandhinagar, India

8. Title: "IoT Based Health Monitoring System with LoRa Communication Technology"
    Authors: Norbahiah Misran, Mohammad Shahidul Islam,

    Publication: International Conference on Electrical Engineering and Informatics (ICEEI) July 2019, 9 - 10, Bandung, Indonesia.

9. Title: "Monitoring and Support for Elderly People UsingLoRa Communication Technologies: IoT Concepts and Applications"
    Authors: José Paulo Lousado, and Sandra Antunes

    Publication: Future internet -MDPI

10. Title : "EMERGENCY VEHICLE AND HEALTH MONITORING SYSTEM USING LoRA"
    Innovation by: Ajitha S , Monisha Thangam K S, Viveka Vikram K

     Publication: September 25, 2018 – MY Gov Innovation – Government of India.

11. Title: "Wearable Sensors for Remote Health Monitoring"
    Authors: Sumit Majumder, Tapas Mondal, and M. Jamal Deen

    Publication; Senors – MDPI

12. Title: "Bushfire Disaster Monitoring System Using Low Power Wide Area Networks (LPWAN)"
    Authors: James Jin Kang and Sasan Adibi – Technologies

    Publication: MSPI Received: 21 September 2017; Accepted: 2 October 2017; Published: 8 October 2017

13. Title: "LoRa Based Network for Accident Detection and providing Quicker Ambulance Services for Medical Assistance"
    Authors: Sudeepa K R, Rashmi N, Prarthana D Raj, Sindhu S, Vani S Badiger (Guide)

    Publication: International Journal of Engineering Research & Technology (IJERT) ISSN: 2278-0181

14. Title:" A Wearable LoRa-Based Emergency System for Remote Safety Monitoring"
    Authors: Gaby Bou Tayeha , Joseph Azara , Abdallah Makhoula , Christophe Guyeuxa and Jacques Demerjianb

    Publication: Faculty of Sciences, Lebanese University, Fanar, Lebanon

15. Title: "Tracking and Monitoring System Based on LoRa Technology for Lightweight Boats"
    Authors: Ramon Sanchez-Iborra , Ignacio G. Liaño , Christian Simoes and Elena Couñago2 and Antonio F. Skarmeta

    Publication: Electronics – MDPI

16. Title: "Locating and monitoring emergency responder using a wearable device"

Authors: Abishek Thekkeyil Kunnath, Preeja Pradeep, Maneesha Vinodini Ramesh

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