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Smart Industry Disaster Detection and Prevention Using Iot and Matchine Learning

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Abstract *The latest technology Internet of Things (IoT) visualizes a worldwide, that is, internally connected, networks of smart physical entities. IoT is a promising technology used in several applications including disaster management. If Disaster management is incorporated with a smart technology called machine learning then the system becomes robust. In disaster management, the role of IoT and ML is very much important and ubiquitous and could be life-saving. This article describes the role of IoT and ML in disaster management. More precisely, it presents IoT-based disaster management for different kind of disasters with a comparison between some solutions that are available in the market. It shows an implementation of some examples of the application of IoT such as early-warning system for fire detection and earthquake and represents some approaches talking about the application, IoT architecture, and focusing of the study on different disasters. This study could be a good guide to stakeholder about the use of IoT technology to secure their smart cities infrastructure and to manage disaster and reduce risks.*

Keywords- Disaster Management, IoT, AVR Controller

I. INTRODUCTION

Since May 2020, there have been 30 industrial disasters in India, killing at least 75 workers, according to industrial all a global union of workers, from 2014 to 2017. 8004 such incidents occurred in Indian workplace killing 6368 employees. Most such incidents took place in Delhi, Maharashtra and Rajasthan

In this paper, we elaborate the important role of IoT in the field of the management of disaster. More precisely, it presents IoT-based disaster management for different kind of disasters with a comparison between some solutions that are available now a day.

Internet has crop up and become the new telecommunication platform which is fully developed. The major accomplishment over several years is a new protocol (VoIP) voice over Internet protocol. Due to Internet development, the IoT technology grows. For getting control over the devices, there's a method of IoT that associates existing resources to the Internet. The Massachusetts Institute of Technology (MIT) Auto Labs became the first to implement the idea of IoT in the early 1990's. Also, the first IoT application was the Trojan area coffee pot which is developed in 1999 [1]. The toaster is the world's initially measuring device of the Internet that could be turned off or on according to ones will and it was later developed throughout the constant years. Many of the organizations are working on the main domain of IoT, and there are many kinds of definitions proposed over the years [2].

Due to the latest advancement in technology, the definitions of IoT are gaining new insights by organizations. From those organizations, one termed this definition, "global structure for data society, enabling onward services by bury connecting (physical and virtual) belongings based on existing and evolving, interrogatable data, and communication technologies." The IoT allows the synchronization. In the building of this concept, human intercession makes it possible. As time passed, there are constant changes in technologies and advancements in the field of the Internet. The 2nd state Internet of Content was introduced, and giant messages can be sent. In the 3rd state Internet of service, the email facility was provided and associated with attachments and data and recreation of these were the most utilized prospects of this phase. This advanced IoT time has the potential to attach devices across the globe. That is why all these devices will connect and communicate with each other and perform different activities as shown by programmed steps with a style of objects which is different. For the concept of this era, it was not the end of the road. However, the ideas of computer science are included by the researchers upon those devices which are connected without the intercession of human beings. As we might say, computer science is driven by the Internet of Things. As shown in Figure 1, there is a transition of the Internet from the pre-Internet. The Internet of Things has been the fourth revolution of Business 4.0.

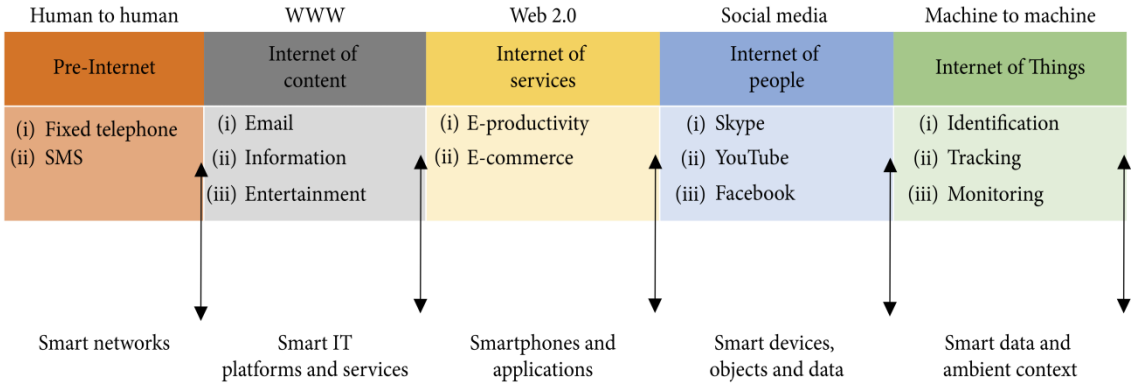

Figure1. Transition of Internet *from the pre-Internet*

The main objective of Industry 4.0 IoT is always to earn maximum profits through the use of interconnected machines and intelligent objects and to increase the efficiency of Internet-connected production. Deploying different IoT devices such as sensors, cloud-based solutions, and edge computing for the manufacturing and transformation units increased the productivity of the organizations. The divided parts of the production's units must work according to the standards of heterogeneous producing IT landscapes. By the usage of IoT, the enterprises are extended seamlessly and are very visible, and the opportunity of new business is the result of it, which was unimagined in previous time.

IoT/Edge devices equipped with cameras can be deployed strategically throughout hillsides, ridges, and high elevation areas, automatically monitoring for signs of smoke or fire. Drones and quad copters can be flown above areas prone to wildfires, strategically scanning for smoke. Satellites can be used to take photos of large acreage areas while computer vision and deep learning algorithms process these images, looking for signs of smoke. That's all fine and good for wildfires — but what if you wanted to monitor your own home for smoke or fire?

II. LITERATURE SURVEY

Background of IOT-Enabled Disaster Management System. The background of IoT-enabled disaster management systems starts with the IoT. Arpanet-linked coke device was built by four students at Carnegie Mellon to tell if the Coca-Cola in the cane was hot or cold in 1982. the main idea to estimate was that how many bottles of Coke were left in that line and even how long this would have lasted. If it is left on the system line for such a long period, it is called "chilled." By using the fingerprint interface, this entire machine will serve customers. is experiment encourages many researchers and scientists to create connected appliances for the world [6]. At the beginning of the 1990s, IBM scientists proposed and patented Ultra-High Frequency (UHF) and RFID Tags (RFID), which covered a wider distance and permitted faster data transmission. In the mid1990s, IBM conducted many pilot experiments, but with the issues that make them auction their patents to the Intermec barcode technology, they will never start marketing this revolutionary invention. Intermec RFID systems are implementing many implementations of such an innovation, and due to the cost of technology at the time and limited power, it has not been distributed as anticipated by Intermac.

For this incident, Professor David Brock and Sanjay Sharma suggested RFID tags to track the different items in the distribution chain in which they decided to use the very bar code tags to monitor the items to save the price of the service and to manufacture more complex shapes with bigger, more costly memory capacity. the FID tags associated with the data link have been placed in the database and accessible via the Internet [7]. A few research and journals have reported that Ashton, Executive Director, in MIT ID Centre in1999, first launched the Internet of things [8, 9]. Aston suggests that the Internet of *ings has the potential to change the environment as often as the Internet has done and more [6].

Due to rapid urbanization, inadequate emergency facilities and vulnerability to extreme weather incidents, developing nations are contaminated material to the threats of natural catastrophes and also have little means to minimize their impacts. As a result, as shown in a World Bank report, over 95% of all disaster-related deaths occur in developing countries. The presence of monitoring systems, warnings, and real-time decision support can be a determining factor in reducing the negative effects of disasters in urban environments. Early warning and decision support systems provide information about approaching dangerous hazards. It further facilitates follow-up actions to reduce the associated risks and loss of life, and reduce the material and economic impact of a disaster. Such systems have benefited greatly from the latest advances in Information Technology such as the Internet of Things (IoT). IoT technology currently available is very advanced and has the potential to be quite useful in disaster situations. Disaster management planning depends heavily on the topology, climatic conditions, vegetation, etc. of the region, as well as the available resources of the machinery Sinha et al. 2017.

Disaster management systems (DMS) and related technologies have a very important role to ensure the resilience and security of human life. Several resources such as wireless sensor networks (WSNs), delay-tolerant networks (DTN), mobile ad hoc networks (MANET), vehicle ad hoc networks (VANET), low-power wide area networks (LPWAN), and cellular networks to manage disasters can be utilized by DMS (Butt 2019).

Ray et al. 2017 has made knowledge taxonomies related Classification of IoT-based disaster management systems, can be seen in the figure 1. Based on the taxonomy, we will describe the work related to the categories: Volcanic disaster management, flood disaster management, forest-fire disaster management, landslide disaster management and earthquake disaster management.

III. SYSTEM DESIGN

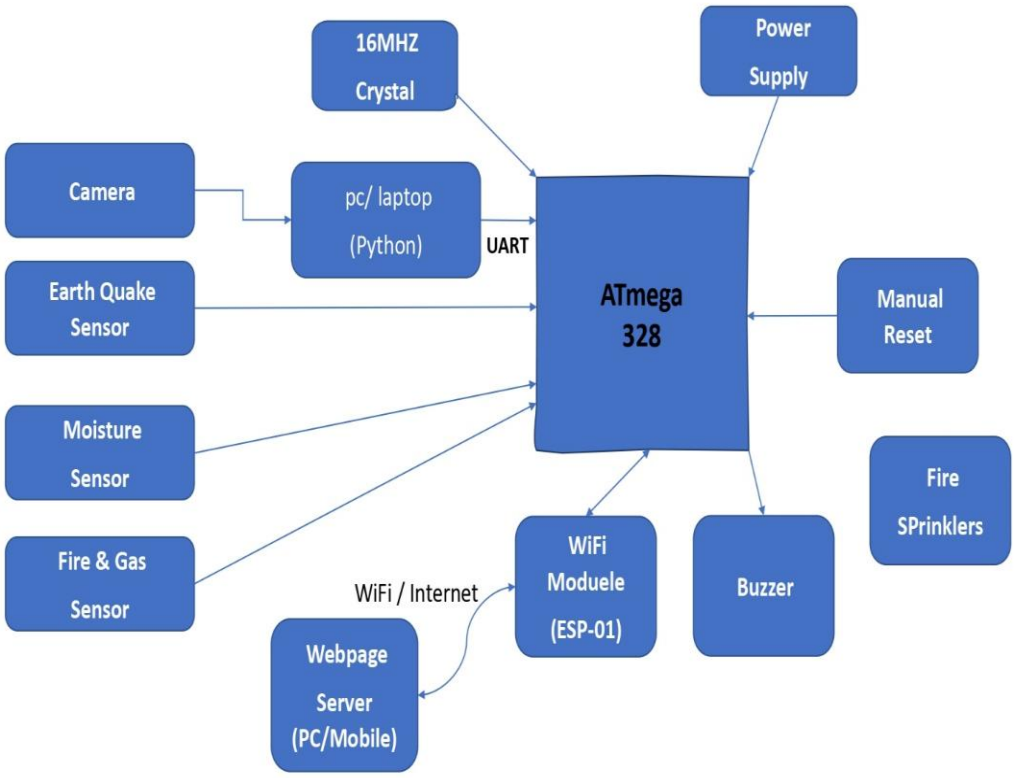

Figure 2. Block Diagram of Proposal System

IV. METHODOLOGY

The aim of this paper is to design and implement an IoT based Disaster Monitoring and Management System for Dams (IDMMSD). The proposed system involves real-time monitoring of water levels of a group of dams under study. Water levels may vary due to drastic changes in water levels of connected rivers or lakes, or due to excessive rainfall in the catchment area. The proposed project includes a mechatronics system to open the shutters at the heights pre calculated. The system comprises of sensor nodes, smart controller and communication system. The proposed system is an app based IoT system which will monitor and send real time parameters related to Dam (gate position, water discharge, water level) and weather conditions (rain fall, temperature, humidity).

Hardware used

- ATMEGA 328 and Node MCU ESP8266
- Water level sensor
- Rainfall sensor
- Ultrasonic sensor
- Temperature sensor
- Flow sensor

The AVR32 is a 32-bitRISC microcontroller architecture produced by Atmel. The microcontroller architecture was designed by a handful of people. The multiply–accumulate unit can perform a 32-bit × 16-bit + 48-bit arithmetic operation in two cycles (result latency), issued once per cycle.

The Wi-Fi module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands. However, at the time there was almost no English-language documentation on the chip and the commands it accepted.[2] The very low price and the fact that there were very few external components on the module which suggested that it could eventually be very inexpensive in volume. The Fire sensor, as the name suggests, is used as a simple and compact device for protection against fire. The module makes use of IR sensor and comparator to detect fire up to a range of 1 -2 meters depending on fire density.

V. CONCLUSION

The Internet of Things technology becomes actually a part of one human life. In fact, it can connect the world and allow humans to connect with each other. In some applications, this technology could be life-saving. As an example, it allows us to save lives of many by disaster management where there is a loss of human life and disruption to a large-scale environment due to natural and man-made disasters. As the IoT permits interconnections of different devices, the IoT enabled disaster management system, for early-warning systems, is used by implementing information analytics and computational tools. We relate various open research issues for IoT disaster management programs in this survey. In disaster management, IoT devices are playing a very important and unique role and mitigate the effect of disaster. is survey paper presents IoT-based disaster management of different disasters and compares between some existing solutions for disasters presenting the role of IoT in disaster management. It shows implementation of some examples of IoT applications, such as, the early-warning system for fire detection and earthquake. It describes the whole application, IoT architecture, and focuses on the study of different disasters.

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