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Smart and Compact Health Prediction Mechanism Using IOT

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ABSTRACT: The major objective of this system is to monitor the patient health details each and every second and update the details to Server via an advanced Internet of Things [IOT] and Care takers can immediately view or monitor the present position of patients without any hidden activities as well as to attain high level of accuracy and speed. Internet of Things (IoT) a boon to communication field, which connects the remote people via global medium. The main concern of IOT is to enable the powerful network connection in small devices. In this system the concentration is fall into Medication system based health care Surveillance. This system allows the patient details to be view to global server with respect to access control perspective. With this system, no one can cheat the care takers, no one can hide the patient health summary and no one having restriction to know about the actual situation of respective patient.

KEYWORDS: Internet of Things (IoT), not only SQL (NoSQL) databases, routing protocol, structural health monitoring (SHM), wireless sensor network (WSN).

I. INTRODUCTION

At the end of 1960s, Arpanet, the first network project sponsored by the U.S. Department of Defense designed the first protocol called network control protocol in order to connect different machines and share information by packet switching. Later, Arpanet became Internet project and new standard protocol, which was developed based on an open architecture philosophy. Thus, new protocols that are known as transmission control protocol (TCP) and the Internet protocol (IP) were defined with success in early 1980s and specified how digital messages are packaged, addressed, and sent over the network. The success of IP and the use of satellite and radio networks made Internet a global system with the capability to access and remote computer from another place, collect information, communicate with people around the world via Internet using the TCP/IP architecture. Internet is now opened to everyone who wants to connect to. Thus, the number of hosts visible on the Internet grows exponentially and will be over 50 billion by 2020 according to expert estimations. Nowadays, any objects able to sense, send or receive digital information are connected to the Internet using IP.

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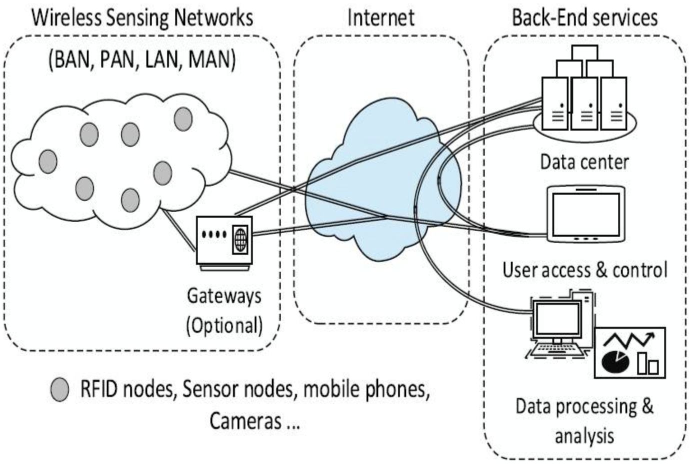

Fig.1. Architectural Design of IOT

In some case, an IP proxy or software able to convert IP into dedicated wireless protocol is used to ensure continuity between a sensing object that cannot support IP and Internet. Objects connected to the Internet can be mobile phones, cameras, home appliances, city infrastructures, medical instruments, and plants or vehicles equipped with sensors. This concept is associated with the Internet of Things (IoT), in which objects sense, and use IPs to communicate among themselves and share information about their environment anytime from anyplace.

Wireless sensors network (WSN) is considered as one of key technologies of IoT and it is widely used in various areas such as healthcare systems, environmental monitoring systems, structural health monitoring (SHM) systems, etc. As novel idea, IoT has rapidly become an attractive topic for researchers and industries. Its integration into monitoring systems like SHM will be advantageous to Industries, businesses, consumers, environment, individuals, and society. The idea behind SHM is to collect data from multiple sensors installed on structures in order to process and extract useful information about current state of the structure for maintenance and safety purpose.

Apart from the potential behind the integration of IoT into such systems, the amount of data sampling that will be collected from smart structures will be so large and complex that it will become difficult to use the traditional data management systems to handle and process such data, hence the emergence of big data technologies, which can be used to store and process large amounts of monitoring data.

The term IoT is semantically related to two words “Internet” and “Things,” where Internet is known as the global system that use TCP/IP protocol suite to interconnect different computer networks, while Things refer to any objects that surround us and have the capability to sense and collect data about its environment. Therefore, IoT can be defined as a global system based on IP suite, in which objects equipped with sensors, radio frequency identification (RFID) tags or barcodes have a unique identity, operate in a smart environment and are seamlessly integrated into the information network by using intelligent interfaces.

IoT relies on a wide range of materials, network infrastructure, communication protocols, Internet services, and computing technologies. Among the range of different technologies involve in the IoT concept, WSN is one of the most important technologies that enable the integration of sensing devices into IoT ecosystems. Sensing devices are deployed in network to seamlessly collect and send in real-time raw data through the Internet to reach a data center. End users can remotely control the devices using Internet services. They can also access the data center via Internet anytime from anyplace in order to retrieve, process, and analyze data. IoT architecture is an open architecture based on multi-layers. Services-oriented architecture is one of the approaches that have been adopted by researchers in recent years to implement IoT system. The layers interact with each other by offering different services such as sensing, transmission, collection, storage, and information processing. IoT devices and sensors suffer from computational and energy constraints. Therefore, to achieve interoperability across the heterogeneous networks and seamlessly allow data exchange throughout IoT system, different protocols, and standards are established.

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TABLE I
EXAMPLE OF LPWAN TECHNOLOGIES

LPWAN Technologies	Description	Cellular IoT	Spectrum	Frequency	Max Data rate	Range (Km)	Battery lifetime
SigFox	SigFox is LPWAN technology dedicated for IoT connectivity; Similar to cellular systems used for mobile phones; it uses ultra-narrow band (UNB) binary phase-shift keying (BPSK) to connect remote devices.	No	Unlicensed	Regional sub-GHz bands 868 / 902 MHz	100 bps	3 ~ 17	>10 years
LoRaWAN	Lora is developed for long-range and low-data-rate applications. LoRa networks based on star topology are deployed with a model close to cellular architectures to interconnect devices, which can be end-points, gateways or the network server in the back-ends.	No	Unlicensed	Regional sub-GHz bands 433 / 780 / 868 / 915 MHz	50 kbps	2 ~ 14	>10 years
LTE-M.	LTE-M is a cellular IoT technologies standardized for IoT and low power, wide-area networks (LPWAN). It can also coexist with other LTE services and only requires a very narrow bandwidth, compared to the bandwidth of a normal LTE carrier.	Yes	Licensed	LTE In-bands only 1.08 / 1.4 MHz	1 Mbps	~ 11	>10 years
NB-IoT	NB-IoT like LTE-M has been standardized to be an integral part of the recently finished 3GPP Release 13, in order to address the requirements of IoT. It can be deployed using resource blocks within a normal LTE carrier in terms of frequency: in-band, guard band or standalone.	Yes	Licensed	LTE In-band, Guard band or Standalone 900 MHz	200 kbps	~ 22	>10 years
On-Ramp (Ingenu)	On-Ramp is a proprietary technology that adopts a star networking topology with access points acting as coordinators of end points. It is powered by RPMA (Random Phase Multiple Access) technology, which is their main point of differentiation from their competitors.	No	Unlicensed	Global band: 2.4 GHz	20 kbps	1 ~ 10	>10 years

II. IOT – APPLICATIONS

Since the first definition given by Ashton in 1999 at MIT Auto-ID Center, IoT has evolved significantly and become a reality thanks to its key technologies such as WSN, RFID, and cloud computing which facilitate its integration into existing systems. In this context, IoT applications involve a wide range of areas such as security and surveillance, environmental monitoring, medical and healthcare, SHM, agriculture, logistics and transportation, manufacturing, etc. IoT-based applications rely on the creation of smart environment and things such as smart homes, smart cities, smart infrastructures, smart transport, smart health, smart grid, and smart products. One of the well-known applications of IoT is in the healthcare sector, with the development of applications running on electronic devices, which combine sensors and mobile phone as a platform to monitor in real-time personal health status.

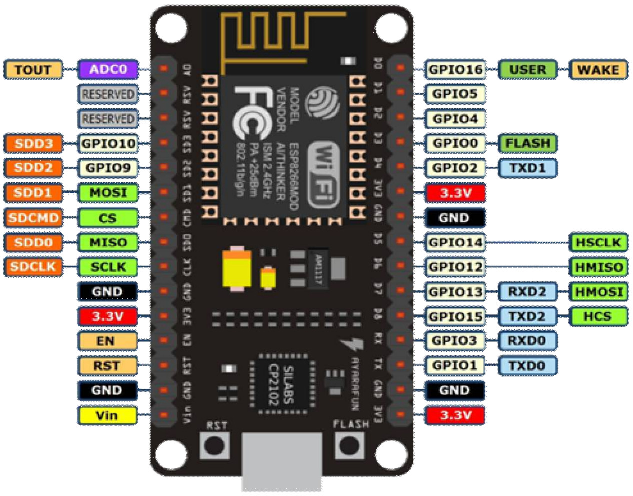

Fig.2. IOT PIN Configurations

A good example of IoT application-based mobile gateways for intelligent health monitoring is the platform AMBRO, which is presented in past systems. These kinds of applications can also be used for patients or clinical experiments to record and process data in order to make a diagnosis, treatments, and prevention of some regular diseases. The application of IoT in industries is expected to improve business process and supply chain management

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with intelligent monitoring and services. Examples include intelligent electricity and water consumption services, intelligent parking services, online traffic monitoring, intelligent transportation, and so on. This system introduces the conceptual design of SHM system based on IoT. Several challenges regarding smart sensors integration into IoT ecosystem and big data management need to be taken into consideration before implementing such system. Based on IoT and big data tools, a reliable, flexible and large-scale health monitoring system will be implemented in order to monitor any events or changes in structural conditions in real-time as well as to improve the quality of service in any urban and rural infrastructures such as buildings, bridges, railway tracks, etc.

III. EXISTING APPROACHES – A SUMMARY

Now a day there is no automatic medication surveillance based health care system. Everything is done and monitored manually using man power. Heavy machines are used to monitor the patient details in hospitals, which requires huge space and power supplies while processing. Efficiency is so poor compare to the latest technologies such as Internet of Things (IOT). The existing approaches contains lots of disadvantages, some of them are listed below: (a) There is no proper intimation system, (b) Big Devices are required to monitor the patient and report the details, (c) Limited hospital resources, connectivity and range is available, so care takers are restricted to enquire the patient details only with doctor and they have to believe them and (d) High cost and more time consumption.

IV. PROPOSED SYSTEM SUMMARY

In the proposed system, an efficient surveillance system is designed, that can monitor the patient on time and without the presence of the nurse in any place by using IOT technologies. In-house human behavior detection and Classification are involving in this system, even the patients can be monitored in any scenarios without any restrictions. Because of its compatibility and cost anyone can use this device so easily and its operation is too user-friendly. This system provides Global Communication with small size of devices with less power consumption. The proposed system contains lots of advantages; some of them are listed below: (a) Simplicity, mobility and low price, (b) This system has the ability of using by common people, especially children and aged people, and don't need any special training, (c) Power consumption is low and (d) Compatible in size.

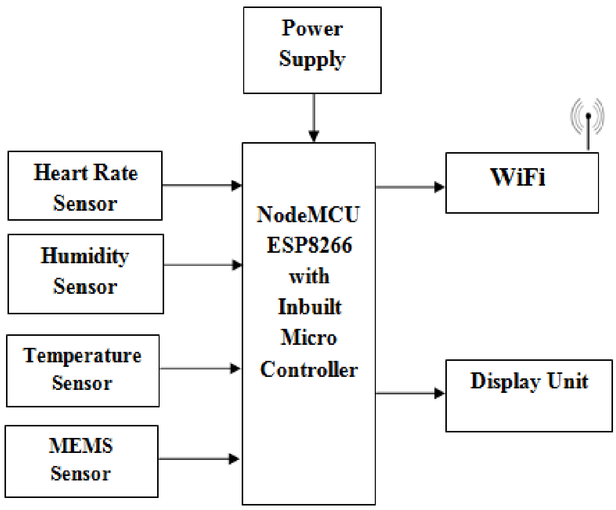

Fig.3. Top Level Block Diagram

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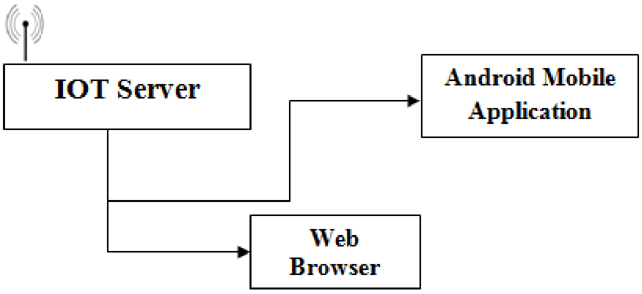

Fig4. Slave Block Diagram

V. LITERATURE SURVEY

In the year of 2015, the authors "G. T. Webb, P. J. Vardanega, and C. R. Middleton" proposed a paper titled "Categories of SHM deployments: Technologies and capabilities", in that they described such as: the findings of an extensive literature survey focusing on bridge structural health monitoring (SHM) deployments are presented. Conventional, maturing, and emerging technologies are reviewed as well as deployment considerations for new SHM endeavors. The lack of published calibration studies (and quantification of uncertainty studies) for new sensors is highlighted as a major concern and area for future research. There are currently very few examples of SHM systems that have clearly provided significant value to the owners of monitored structures. The results of the literature survey are used to propose a categorization system to better assess the potential outcomes of bridge SHM deployments. It is shown that SHM studies can be categorized as one (or a combination) of the following: (1) anomaly detection, (2) sensor deployment studies, (3) model validation, (4) threshold check, and (5) damage detection. The new framework aids engineers specifying monitoring systems to determine what should be measured and why, hence allowing them to better evaluate what value may be delivered to the relevant stakeholders for the monitoring investments.

In the year of 2015, the authors "S. J. Samuel, K. RVP, K. Sashidhar, and C. R. Bharathi " proposed a paper titled "A survey on big data and its research challenges", in that they described such as: a huge repository of terabytes of data is generated each day from modern information systems and digital technolo-gies such as Internet of Things and cloud computing. Analysis of these massive data requires a lot of efforts at multiple levels to extract knowledge for decision making. Therefore, big data analysis is a current area of research and development. The basic objective of this paper is to explore the potential impact of big data challenges, open research issues, and various tools associated with it. As a result, this article provides a platform to explore big data at numerous stages. Additionally, it opens a new horizon for researchers to develop the solution, based on the challenges and open research issues.

In the year of 2010, the authors "L. Atzori, A. Iera, and G. Morabito" proposed a paper titled "The Internet of Things: A survey", in that they described such as: main enabling factor of this promising paradigm is the integration of several technologies and communications solutions. Identification and tracking technologies, wired and wireless sensor and actuator networks, enhanced communication protocols (shared with the Next Generation Internet), and distributed intelligence for smart objects are just the most relevant. As one can easily imagine, any serious contribution to the advance of the Internet of Things must necessarily be the result of synergetic activities conducted in different fields of knowledge, such as telecommunications, informatics, electronics and social science. In such a complex scenario, this survey is directed to those who want to approach this complex discipline and contribute to its development. Different visions of this Internet of Things paradigm are reported and enabling technologies reviewed.

VI. CONCLUSION

In order to provide a framework for SHM implementation, this system intended to give a survey of current technologies on IoT paradigm. It can be seen that the choice of wireless technologies, which address SHM system deployment based on IoT, is extremely large. As IoT is a technology that is in trend, a myriad of technologies is being developed to meet all the requirements from IoT community. A number of solutions for IoT communications of SHM have been proposed in recent years to connect net device, which is able to sense and collect useful information.

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