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Research Article

Nfc Tag Resources For Accessing Fitness Information Using Ewebehr

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ABSTRACT

With the help of microcontrollers, sensors and transceivers the computing process with each physical object are said to be equipped and also it authorize the communication and moreover it is built with the suitable protocol stakes. It helps for the interaction process with each other and it communicates with the users. This computing process is termed as Internet of Things (IoT). To analyze a large amount of data in the several new forms and to communicate the real–time medical information to the cloud are said to be activated with the help of context-based mechanisms. The continuous existing medical information can be accessed with the help of the internet and additionally it is also connected to the existing device. The IoT used in each device is limited with battery power. The power consumption needs to be enhanced for the life of the health care system in a proper manner using NFC card reader. The use of NFC tag is introduced in health care domain for monitoring patients health process and maintaining records. In a regular monitoring process the IoT technology needs to be authorized with the other existing devices simultaneously for the purpose of further enhancement with good quality. The data collection that is stored in the form of paper records are completely reduced along with analysis cost and it is actively engaged in the following process.

Keywords: IoT health, Patient health tracking, Health records, Health care management, NFC technology.

1. INTRODUCTION

Employing the sensors, microcontrollers, transceivers or empowering the communication is considered to be the mandatory process. For the interaction process and for communicating with the users this above feature becomes an unavoidable part of the internet. At the current situation, the impact of the Internet seems to be very high more than the expectation. The potential of the Internet has a unique deep impact on others in day to day life on a regular basis. It is very highly effective when compared to the other various medium. Here several types of applications has been developed based on IoT [2] whereas every physical object is connected to the internet which is said to be employed with the following sensor devices.

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The healthcare dependency present in IoT [7] is rapidly increased step by step, day by day up to the mark for its own further enhancement for the purpose of strengthening the quality of care and simultaneously to reduce the cost.

The personalized healthcare is nothing but it is said to be the healthcare, patient support and combined practice of the well being. It depends on the individual unique biological, behavioral and cultural characteristics respectively. By following all the basic principles and the rules of the healthcare system this particular utility empowers the every individual in a genuine manner. "For the right person at the right time suitable and essential care is taken". This leads to some unexpected and desirable results to satisfy in making the healthcare process cost-effective. With the proper prevention, the early pathology detection and the healthcare need to be fulfilled. Here a very advanced and effective healthcare process needs to be implemented instead of a high cost-effective healthcare system.

By ensuring IoT the personalization details of the patients with digital identification need to be maintained in the healthcare services. Due to the non-availability access to the healthcare system, many types of health problems have been undetected. The patient data can be very easily monitored and analyzed with the help of pervasive, powerful IoT based system, and also non-invasive etc. The real-time medical information to the cloud needs to be gathered and distributed with various devices for the purpose to store, collect and analyze the big data streams in many types of new forms, therefore activated with the help of context-dependant alarms. With the help of innovative data acquisition paradigm, the corresponding medical device can be accessed from any of the following connected devices.

2. LITERATURE SURVEY

With the introduction of information technology of India, the improvement in the healthcare delivery, different medical centers, are to be observed carefully with the help of a survey that has been already conducted successfully. In a proper and accurate manner the patient records in the hospital need to be maintained but here this is not achieved. Whereas in other hospital the patient record are completely arranged based on the paper document which is already submitted regularly? The healthcare quality was inefficient where the essential facilities were not available according to the required estimation of the patient's history. With the help of Electronic Health Records (EHR), the healthcare facilities can be improved as well as associated with information technology. The paper proposed in a simple and sensible manner, therefore, results in EHR (EEHR), also called WebEHR. The reason behind this is nothing but the usage of EHR is very less and considered as a failure because of the complexity associated with it. By simplifying and sharing the data the web-based connection among various healthcare centers with a specific approach have been fulfilled. This web based patient health information system WebEHR is accessed using smart medium using NFC tag for storing and accessing patient health information system. The vast information's of health data's are stored in private health cloud that are accessed by the physicians and provided access using NFC Tag reader to view the individual updated patient health information periodically.

The healthcare is said to be the most important and basic fundamental need for any person at any time. Generally the physicians are not said to be transparent at all in many times in terms of care and the money with each and every patient based on the need. In this healthcare system, one more problem is associated is nothing but to provide very effective treatment for the

patient based on their complete medical history. Therefore to make more efficient the following healthcare system need to be optimized and it is considered to be very mandatory. All the essential hospital records from small size to larger size need to be integrated with the help of cloud computing process or approach in a smooth manner. To ensure the healthcare facilities, it needs to be analyzed based on the patient community.

The clinical deterioration is said to be an most important problem for In-hospital patients. The wireless monitoring of in-patients inside the office premise is obtained from this paper. To gather patient health information the wireless system need to be implemented with the help of patient on regular basis. With the help of WSN present in the hospital the obtained paper gives only he essential information for the further improvement process using upcoming technology like NFC.

The quality of the healthcare are said to be improved with the help of some major precautionary steps which is subjected to be taken for the further enhancement process. Here the medical equipment safety measures need to be taken into consideration. This is done based on the health analysis done based on the health information retrieved using health Tag.

For various types of chronic disease the wide area occurrence and the population need to be increased with the help of development of the tele-health systems. In general for the remote healthcare system [6] which is said to be present in the wide-ranging manner? Here with the help of wearable technology, wireless communication and with the multiple sensors the tele-home patient monitoring [5] system is to be implemented. The sensor concepts is replaced using NFC concepts that holds patient health information after storing patient diagnosis information into cloud system. Therefore this is considered to be the basic idea to identify and overcome any kind of issues occurs here. Therefore here any type of small healthcare monitoring system needs to be provided or taken as per the procedure based on the earlier medical records of the patients. The entire patient health history is found in the NFC tag updated periodically and accessed then and there once there is any change in medical records. The total physiological parameters such as pulse, rate, temperature, etc need to be taken into account in order to diagnosis patient health and their improvements. The doctors can be made alert by identifying their health situation and its progress.

The wireless sensor access in the form of NFC tag for ePatientHealthcare uses a low powered network system need to be enabled. Therefore majorly the healthcare need to be safeguarded without any hindrance and additionally it is also related to the privacy of the medical data. Moreover the types of challenges involved here in WSN are taken into the consideration for the completion of the process in a smooth manner.

2.1 Research Challenges

In M-Health the communication technologies, medical sensors, mobile computing all are combined together. The different types of wireless technologies which is used in the m-health namely Bluetooth, GPRS, ZigBee, WLAN are said to be used in a wide range and it is said to be examined properly from the healthcare point of view. This work deals with NFC tag for monitoring and accessing Patient health information's.

The following healthcare application which is said to be represented in a significant manner and this feature is implemented here with the help of the eWebEHR which rapidly grows

in a very huge manner. The medical devices are not available and not suitable for the human body.   To wear the medical devices by integrating ECG, SP02 sensors [9], an accelerometer is accessed as a single device [10]. Internet of Things is nothing but it is termed as computing process, The Internet of things easily identifies some applications like controlling the data, smart health access and monitoring, security surveillance, smart metering, from the key user's standpoint. The internet works have been revolutionized with the help of the Internet of things. Without the human interference billions of devices are said to be connected and communicated with each other and also it is able to control different types of devices in remote manner. But unfortunately, it suffers from two problems i.e. latencies and the limited battery power has been associated. This all above features will appear as early as possible in the future.

When discussing about IoT concept using cloud [3] the main objective is nothing but it must be connected with all the things information with the help of the internet. In the Internet of things there are various descriptive models which is said to be present here based on its features. For all the internet applications these models are considered to be the same and it can also be used for developing IoTs in a specific manner. The term "Future Internet" is nothing but it is called the Internet of things. Here IoT is in the form of system which connects the unique address physical objects along with the internet. The different components of IoT and its applications, as well as the key benefits to the society, have been discussed in detail.

In general the gateways are used in large quantity WSN data can be easily connected to it. Here the connectivity between the WSNs and the internet is provided with the help of Internet Protocol (IP). This work introduces access mechanism for accessing information from the unique card allotted to patient to view their health information. To make IoT the work pertained within the standard and solution is nothing but to obtain WSNs. Nowadays the ZigBee protocol is said to be widely used for the applications such as healthcare, smart home , automation etc. With the help of Internet of things the ZigBee protocol is used in a wide range of manner for the purpose of implementation takes place in all different fields. Very mainly ZigBee is used for the wireless protocol area network consist of low data rate and it can be operated in a very low power as well as at a very low cost. In case if the device present in the sleep mode operation of the end devices the reason behind this is nothing but due to very low power consumption that takes place here. This work gives an alternative mechanism for ZigBee data communication for information access to deal with patient health information. It is done with NFC technology as an alternative to WSN technology.

For healthcare applications, many types of technology-based alternatives do exist in IoT [8]. Based on the constraints the optimal way needs to be determined and also prioritizing particular opportunities from the corresponding available solutions. To build cost-effective Health-IoT platforms a new type of structured system engineering methodology need to be analyzed in detail. Moreover, the clinical care, corresponding medical services [4], and remote monitoring must respond to all without any difficulties. Therefore, here a new type of challenge exists of its own and its is done using NFC technology.

Generally the dependency of the healthcare is increasing day by day based on the requirement and the amplification of the quality care, access to care are need to be improved in a genuine manner and also reduction of cost of care also to be taken into the consideration. The applications of IoT plays vital role in the personalized healthcare process to achieve excellent

healthcare at a very minimal cost for the welfare of the patients. This is said to be the most important feature for the patient's life for the further improvement among the others.

To implement the desired healthcare applications the record accessing techniques need to be combined along with IoT functions. This following work has been explained in a brief manner. In the growth of medical information systems, IoT plays an unique vital role along with the existing healthcare systems completely. For the further enhancement of this process, the healthcare system need to be checked with these following steps such as accessing the patient's medical records, diagnosis, medical record periodic tracking. Especially among these monitoring the patients need to be deal with much care. The advanced medical technologies with all available tools are present here but if insufficient healthcare situation persist the obtaining result will not be perfect or accurate in any of its kind.

In IoT many types of applications have been used in this Medical care is considered to be the major part because it has been prioritized among all the other medical resources. The technological improvements present in IoT based healthcare need to be discussed along with the reviews. Here a detailed analysis is most importantly needed for the industry trends, different network platforms, applications etc for its further enhancement in this process.

To connect an open network source like internet along with medical device there are said to be n number of solutions do present in the current market. Here the other big problem faced is nothing but to preserve the security of the medical data, this particular feature is taken into consideration. It also presents along with several opportunities and limitations, IoT based eHealth services. The clinical environments present here have been listed out for the specific purpose which is said to be related to mHealth and as well as eHealth. The various types of wireless communication technologies are also to be available for further process. To check the existing current health status NFC is exclusively allotted in order to identify and analyze the exact status of the patient on daily basis. Here the Bluetooth technology has been used for any kind of further process by collecting the data in the same location. The device which is used here namely NFC card reader is used here for the purpose to check the status even if it is present in any location and also in any hospital.

For any type of further enhancement some types of IoT based healthcare devices such as tablets, smart-phones etc plays a vital role in every manner. Here in this corresponding current system the application environment in a different manner can be used for the purpose of minimal enhancement process i.e. the user can interact internally by using the smart-phone. This feature is said to be considered as one of the biggest advantage when this is compared to the other unknown applications.

On a periodic basis a well-mastered healthcare professional monitoring [1] is required here in order to measure the periodic parameters of the In-patient in a regular manner. For any further analysis, the medical professionals need to communicate through wireless service. Moreover, used to store the corresponding data, analyze the cloud, gateways and used to monitor the system sensors. To enhance the quality of care with regular monitoring process on daily basis the technology named as IoT is used for all essential requirements and it also reduces the cost of

care without expecting any medical professional support present in regular intervals as well as engage in a very active manner for the purpose of data collection and analysis in advance.

3. HARDWARE DETAILS

3.1 NFC Reader and Writer

To communicate the following data with a cloud, it needs to be run with the help of a web server and needs to be processed to receive the data for a gateway. It is compatible with windows, Mac OS, Linux and Android. The NFC is compatible with ISO/IEC 14443-3, ISO 18092, NFC Forum types 1-4, NTAG, NXP MIFARE which uses Classic, DESFire, Plus, and Ultralight. The API used in this work PC/SC and CT-API.

Here Figure 1 represents the Intel Galileo Generation 2 microcontroller board and the Table 1 also provides all the main features of the board.

Figure   1:   NFC Reader/Writer

With the help of Linux software stack, Aurduino IDE is said to be used here to develop the essential sketches where it is used in a collective form for the purpose of enhancement of the process and additionally the programming applications for the sake of Galileo generation 2 is also to be programmed here. Here a gateway needs to be activated in order to connect 6 pins FTDI serial cable on the Galileo board in the host system supported by the available socket. The FTDI drivers need to be installed for any further access as well as the Galileo board need to be influenced in a proper manner respectively.

The sensor network which is said to be configures automatically them as well as route the data into the gateway as per already scheduled process. In order to fulfill the above step the Galileo board is needed and the board must be developed further and must be downloaded with all the necessary programmed application. Finally this is said to be connected to the internet with the help of the web server therefore the users can easily verify and access the following data through a remote successfully.

Table 1   :   ACR122C NFC READER/WRITER

Parameter	Value
NFC Standard	ISO/IEC: 14443A/B, 18092

Commodity Code (HS)	84716099
Operating Frequency	13.56 Mhz
Read/Write speed	up to 424 kbps
Read/Write distance	up to 50 mm
Operating Temperature	0 - 50°C
Peripherals	User-controllable bi-color LED

The NFC reader access the NFC tag. The reader fetches the information from the tag. The information stored in the Tag will be in the form of URL. The URL stores patient health information. The information's stored in tag gets period updates based on the patient visit to hospital for check up.

The allocated URL for patients gets linked with cloud servers that are kept at hospital, operates for storing and retrieving patient health information from the server. Since the operation is unique the information is accessed in flash without any network delay. The security is also enhanced as it work on private cloud.

3.2 NFC – Ethernet Access

NFC Ethernet access is wireless smart card reader used for accessing information stored in the smart card. The information's are accessed as a relay that works based on TCP protocol stack. It works with ISO Type 14443 and 15693 standards. The connection is done with the help of power enhancement that connects card and Ethernet.

The stand alone web client is deputed for NFC Ethernet link. There is no need for system as the communication accessed between Ethernet link and web client. Various integration of language is done with single web client that allows multiple integration of service.

Figure 2:   NFC Ethernet link

The NFC Ethernet link module specifications are given in the Table 2

Table 2: NFC Ethernet link Specifications.

Parameter	Value
NFC Standard	ISO/IEC: 15693
Flash Memory	SD Card Slot
EEPROM	11 KB
Clock Frequency	400 MHz
Supply Voltage	Ethernet (PoE)
TX Current Consumption	40 mA
RX Current Consumption	40 mA

3.3 NFC SMART CARD

To connect the broadband the XBee modules are arranged specially in order to connect the computer USB port and an adapter is required for this process. With the suitable parameters XBee modules are said to be configured in a proper manner. After connecting the XBee modules the FTDI drivers are said to be installed. Table 3 represents all the essential features of the XBee series 2 modules respectively.

Table 3: XBee Series 2 Features

Parameter	Value
Transmit Power	3 dBm
Receiver Sensitivity	-96 dBm
Indoor Range	40 m
Outdoor RF LOS Range	120 m
Firmware	ZigBee Mesh
Analog Input Pins	4
Digital Input / Output Pins	11

Figure 3 : NFC SMART CARD
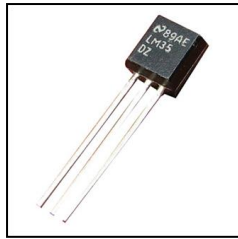
3.4 LM35 Temperature Sensor

Figure 4 : LM35 Temperature Sensor

Here LM35 is nothing but it is said to be the accurate IC temperature sensor providing its output compared with the temperature. With the help of degree Kelvin, the edge over linear temperature sensor needs to be calibrated without any hurdles. To obtain the required Celsius temperature the particular voltage constantly need to be deducted but it is not essential. The temperature sensor characteristics are shown in the following Table 4. The data's collected using LM35 is stored in the health database and it's then accessed from the health cloud for NFC health information access of the patients. A separate column of access is maintained for every patient for storing their temperature information. Earlier work of patient health information uses LM35 for hardware patient accessed system and it does not hold any web based accessed system for storing permanent records.

The concept of eWEBEHR stores hardware information system in the form of web based accessed system. This will make the data's available permanently using web based accessed system.

Table 4: LM35 Temperature Sensor Specifications Operation

Sensor Model	LM35
Manufacturer	Texas Instruments
Supply Voltage	4 – 30 V
Accuracy	±0.5 ◦C
Operating Temperature	−55 ◦C to 150 ◦C
Sensitivity	10 mV/ ◦C
Output Max Current	10 mA
Output Impedance	0.4 Ohm

To estimate the hotness or the coldness of anybody, the temperature sensor has been used. Using the temperature sensor data, the patient health condition can be estimated in the case of the healthcare process. The physician, therefore, can be alerted regarding with a suitable treatment for the patient, if the temperature crosses particularly a threshold.

3.5 Basic principle to calculate Temperature

The temperature sensor is nothing but it is p-n junction diode and it is manufactured with ISFET method embedded along with CMOS technology. The p-n junction diode therefore used by the forward current is illustrated in equation 1.

$$I_f = \frac{\exp qVf}{nkT} \qquad (1)$$

When the temperature sensor is subjected to a constant source, the created voltage is proportional to the temperature. In the p-n junction diode, the voltage drop happens across the existing temperature, given in equation 2.

$$V_f = \ln (I_f) \qquad nkT / q \qquad (2)$$

Finally, in equation 3 the generated voltage is proportional to the measured temperature.

$$T = q \times {}^{Vf} / \qquad nk \times \ln I_f \qquad (3)$$

4. FUNCTIONING OF THE HEALTHCARE SYSTEM

Using ADC pin the XBee modules are connected to the temperature sensors and here the existing temperature is therefore sampled by 10-bit ADC pin. According to the configuration the sample present here is transmitted through the gateway at a time of every 5 seconds i.e. sample rate. The core responsibility of the gateway is to collect these transmitted samples and therefore additionally the required calibrations have to be performed to obtain the temperature value which is default corresponding to the already transmitted ADC value. The gateway runs the existing web server in order to serve the temperature data to the cloud. The LM35 temperature sensor is therefore interfaced with the XBee module.
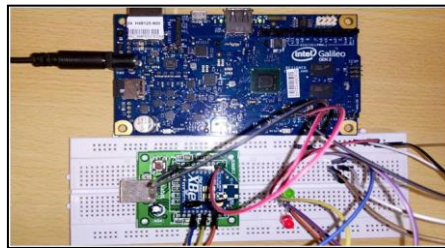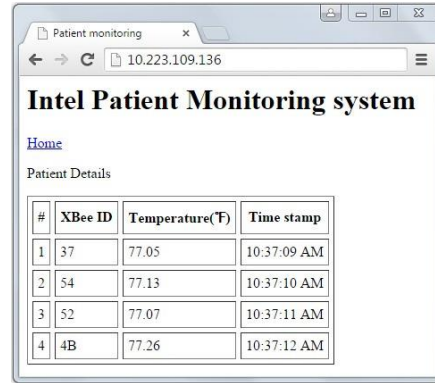

Figure 5: Experimental setup for a Healthcare based IoT device

5. HEALTHCARE APPLICATION

As a part of healthcare application the hospital monitoring system has been implemented in In-Patient system based on IoT technology.

Figure 6: Patient Monitoring System

5.1 In-patient Hospital Monitoring System

To measure the physiological parameters of In-patients in the hospital a well trained as well as advanced professionals need to be required on a periodic basis. By providing a monitoring system using the sensors, gateways, cloud to analyze the healthcare professionals arrive at the time of regular intervals without any hurdles. In order to store the data the physicians are subjected to communicate wirelessly for the further analysis. Here the IoT eliminates for the implementation of all the above process.

A patient's data can be accessed from anywhere by the physician through the internet using dedicated url allotted to patients. The URL is generated based on initial patient health check up or their first visit to hospital. With the help of appropriate medical management which has been already prescribed and analyzed, the patient complete track record can be made enable with the help of devices such as a tablet, smart phone, PC etc. Fig 6 represents that the web page can be accessed by the physician. Our earlier work uses NFC technique for storing patient health information URL [11] and are tapped for accessing their information as hospital premises using dedicated NFC reader.

6. RESULTS AND DISCUSSION

The XBee S2 module is said to be connected with the Intel Galileo Generation 2 board act as a gateway for the overall healthcare system. Here IoT based medical device is said to be used it is nothing but it is the combination of the LM35 temperature sensor which is said to be interfaced along with the XBee S2 module, therefore it is considered as a vital part in this complete healthcare system when compared to the other systems. With the help of specified gateway which is discussed and be used for the further process such as to gather, to store, to analyze, and to communicate the existing data which is present in the cloud. Also it forms a secure connection in order to prevent the most valuable data in a proper manner.

7. CONCLUSION

To communicate with different objects and different types of technologies some sort of additional features are essential such as types of devices need to be used, multiple objects need to be interact, usage of a miscellaneous range of a piece of equipment, used to certify majorly with a combination of various technologies. The combination that we have discussed above along

with various types of advanced technologies on whole it is called IoT. Nowadays in different types of advanced technologies by using IoT is really considered to be one of the highest advantages for the welfare of the mankind because this specific technology has been evolved in various department in the society of its own.

In a wide area range of network a very large amount of information found on the internet is therefore identified, analyzed, and supplied by human beings. With the help of human beings this utility has been supplied all over the world and therefore this task fulfills the expectation of each on whole based on the specific requirement. The smart objects provide information based on the IoT requirement. The primary focus of this specific task needs to be implemented as per the requirement that is previously discussed and this is purely based on IoT technology. The interconnected smart devices have been largely utilized to establish an IoT network for the welfare of the healthcare system of the patient. This system is highly targeted and primarily focused on healthcare analysis, monitoring the patients, and also identifying automatically about the situation where the corresponding physician has been involved in an appropriate manner respectively.

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