E-Health Card with Patient Monitor Using Wireless Sensor

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Abstract: *RFID is an emerging technology helps us to monitor the status of the patient. Compared to other active Wireless Sensor Network, RFID tags do not need a battery, recharging, and no battery power loss problems. RFID tags are tiny in volume, and can be embedded into different objects. The health monitoring using RFID building a better means of storing and retrieving data. RFID systems are used for hospital information system and it provides information about patient ID, token number and medicines. In this paper we can be proposed electronic based hospital management system .It uses the hardware kit to get the patient id& it will send the serial port of the system. The patient ID can be accessed by the doctor via scanning the RFID card. The doctor can view and update patient's medical records and prescriptions in a particular ID. And prescriptions can be automatically shown in a display with quantity and costs. After that it makes billing process automatically. It mainly deals to monitor the health status of a human body like Blood pressure (BP) and temperature. In Such types of intelligent agents be used for making decision in critical environment without the presence of human being. System will provide intelligent front desk information for the patients at the hospital entrance. The challenges and the associated solution can in this field is discussed with the use cases.*

Keyword: *Billing Method; Hospital Management System; RFID; Temperature.*

1. INTRODUCTION

Patient is one of the most important entities in the hospital because most of the data revolves around the patient such as status, treatment and medication. People generally do not procedures in hospitals. This encompasses paper -based processing as well as data

processing machines. Intelligent system is required to assist them. RFID will also assign the Patient id, and we have identified the key entities in smart Hospital Management system and develop the database model by integrating RFID technology. Patients will initially be in the system with a friendly question and answer menu.

Once registration completed they will select their medical complaints through a software menu. The menu driven software will present the patient with the right department , doctor name, appointment date and time, possible medication and laboratory subject to doctor's confirmation. RFID can provide a communication infrastructure at the radio frequencies between a special tag and reader device. It can detect the tag, and allows establishing communication between devices within the by using RFID technologies, it will be easily possible to identify patients with the RFID card to about the patient. Doctors examine the information provided by the patient confirm the data once they examine the patient condition role [1-2].

After a detailed analysis of patient information doctor can upload a medication details in a particular patient when patient can be moved to pharmacy the particular id can read medicines by id reader and displaying the medicine quantity and costs as well. Further the patient can be buying the medicines as wish. Whether patient can be purchased the required medicine, it will be automatically billed. We compare the current requirement with existing database, if patient symptoms or provided information are fully matched with existing description in database. Database has the record of all patients health issue, medical reports, nursing staff, medical equipment, disease symptoms, Expert agent can only access the intelligent management database.

In this way we can identified the patient problems/disease then to doctor can be recommended. Most of the time people waste their money and resource's without knowledge knowing the root of disease and irrespective prescriber [3].

2. EXISTING METHOD WORKING METHODOLOGY

2.1 The RFID Technology

 The RFID system includes the hardware main components like (tags, readers and antennas) and the software systems. RFID tags can be passive or active, depending on powering techniques. Passive tags can only communicate with the reader when they are sitting in an electromagnetic field of the reader since they do not have battery power; while active RFID tags can power the integrated circuits and broadcast the response signal to the reader.

The RFID reader scans the tag and sends the tag information to the back-end database system that filters,

analyses, and stores the data and then passes on useful information to other enterprise application systems for further processing. The database system can have multiple readers located in different places sending data through wired or wireless networks.

In addition, enterprise application systems, such as hospital information systems (HIS) and supply chain management systems, can connect to the middleware to retrieve tags information via security protocols. In healthcare, RFID systems are usually combined with other technologies such as Bluetooth, mobile devices, and sensors for different purposes [4-5]. Passive RFID tags are primary used for patient identification and drug authentication while active RFID tags are mainly used for the tracking purpose.

We assume only one RFID reader is located on the bottom of the Smart Drawer, and each medicine bottle has a single RFID tag. We also assume all the pill bottles are normally stored in the smart drawer, and a dose of medication can only be taken after its container leaves the drawer.
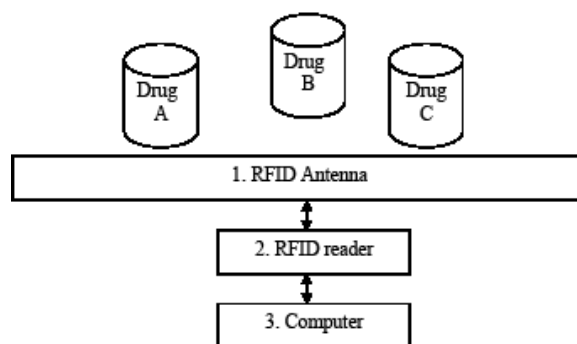

Figure 2.1 Smart Drawer System Architecture [1]

RFID technique is focused on reduction in time consumption and improves security performance over the existing technique. RFID R/W is the special type wireless card. The inbuilt embedded chip represents the 12 digit card number. In the R/W card we can read as well as write the information on the card. R/W reader is the circuit which generates 125KHZ magnetic signal. The magnetic signal is transmitted by the loop antenna connected along with this circuit which is used to read and write the information on the RFID card. The RS232 is used to convert TTL logic to RS232 logic. When the holder shows the RFID R/W card in the reader, the reader will read the card number and other information from the card and send to microcontroller [12].

Then the card is valid the microcontroller transfer the card information to PC. Through PC we can access the application which will display the information about that person. The information held by the chips is the same as that on the first page of a patient health condition, via name, date-of-birth, gender,

place-of-birth, date-of-issue and treatment already done. If the patient token number near than the microcontroller give intimation to patient through GSM modem SMS. At the same each hospital we fixed pulse sensor regularly find patient current condition. The Heart Beat sensor is used to measure the heart beats of the patients then the output signal is given to signal conditioning unit in which the signal is conditioned.

Then the signal is given to pulse shaping circuit. Here the signal is converted into square pulse. The converted square pulse signal is given to microcontroller. In these particular sensors if any one used mean than the corresponding output of the microcontroller is given PC through Zigbee transceiver [6] [13]. In PC, we can monitor those parameters using database with date and time. It is very useful doctor to identify the patient health condition.

The propose system is if the any one monitored parameter is more critical, then the intimation for text to doctor PC and relation is given through Zigbee modem. The block diagram of hospital and patient side.
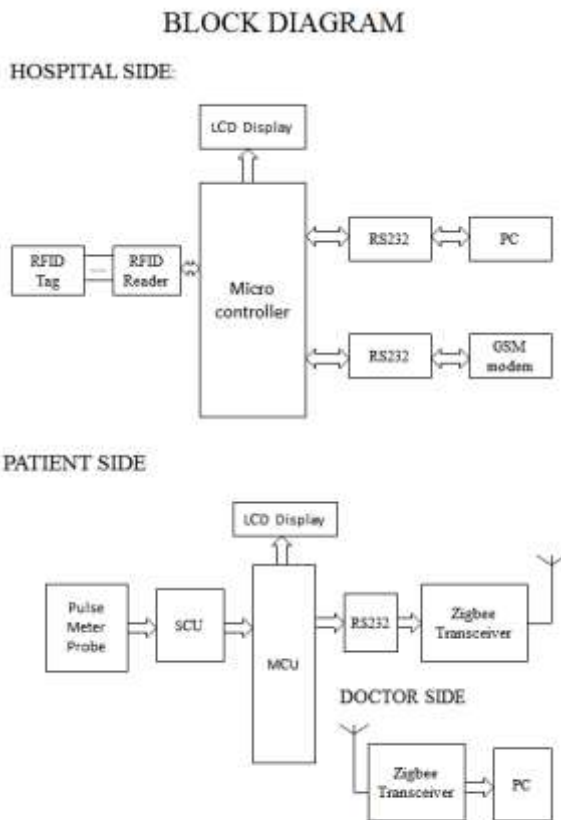
BLOCK DIAGRAM

HOSPITAL SIDE:

PATIENT SIDE

Figure 2.2 The Needs of RFID in Healthcare [12]

Now a day's hospitals are currently facing challenges of improving patient safety and reducing operational costs, which are often compromised by human and systemic errors. The Institute of Medicine (IOM) estimated that between 44,000 and 98,000

deaths per year were related to medical errors, showing the desperate need to improve the patient safety in U.S. hospitals mean while; achieving high operational efficiency in healthcare is another essential goal for organizational performance evaluation.
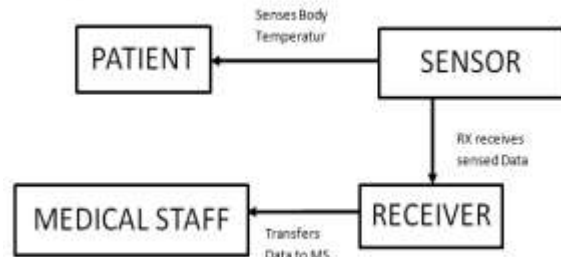

Figure 2.3 Shows the block diagram of E-Health Monitoring System [7]

This sensor is made up of silicon which contains a micro-battery. When monitoring the system it can be administered into another sensor after the pill has passed. The core temperature sensor is accurate to 0.1 degree centigrade which is also cleared in FDA. Once the pill is swallowed or ingested the crystal sensor vibrates at a frequency relative to the body internal temperature and hence produces a magnetic flux in it and also allows the sensor to transmit a low frequency signal through the patient body. This sensor will be there in human body in between 20-40 hours duration and it will start working in a normal rate without harming the patient body.

It can also consist of quartz crystal, communication protocol, insulated coils and circuit board. In wireless sensor network to transmit the data for the core body temperature in an E-Health monitoring system passes through the digestive tract. In this sensor the signal can locate through body of the core temperature and the data recorded by the sensor immediately sends signal to display screen through computer or laptop or any other digital signal. It is specifically designed for human use only 262 kHz. The sensor wirelessly chooses a signal for the conversion of analogue signal to digital signal by using processor technique system.

The display of temperature in a real time bases and storage of data for the analysis of the system is done by using monitoring devices. This type of monitoring system is reliable, flexible, easy to use, quick response and data storage. The occupation safety of sensor node mainly concern the hot environment around it with the heat stress is very important issue for workers and it should contributes to higher safety incidents, lower worker productivity, negative economic impact and morale. The frequency for the hot accidents in hot surrounding can cause more moderate environmental conditions.

The core body temperature is the most objective measure of heat stress where the system delivers the data to the monitor with the highest degree of accuracy, comfort and ease of use. The absorption of this thermometer pill has a silicon coated exterior with a small battery which is made up of a quartz crystal temperature sensor which can be spaced in a system being used and with the help of circuitry the thermometer pill can react or measure the body temperature in 3 seconds and sends the signal to the system in a short particular of time.

This thermometer pill is harmless to human body as like once the pill is swallowed the sensor vibrates at a frequency relative to the body temperature sensor and transmitting low frequency signal through the body within 24 hours of time the pill passes safely from the digestive system without harming the human body [7].

3.PROPOSED METHOD WORKING METHODOLOGY

The use of RFID technologies in healthcare sector is ranging from hospital supply chain management, asset tracking, tracking of movable devices, medication, medical and clinical errors and it can provides better solutions for many problems. The proposed RFID technique is focused on reduction in time consumption and improves security management performance over the existing technique [8].

RFID R/W is the special type of wireless card we can read as well as write the information on the card which is used to read and write the information on the RFID card. The RS232 is used to convert TTL logic to RS232 logic. When the patient shows their RFID R/W card to the reader, the reader will read that card number and other information and it sends to microcontroller. If the card is valid the microcontroller can transfer the card information to PC.

Through the PC we can access the application which will display the information about that particular patient. The information can hold by the chips that on the first page as patient health condition, via name, gender, date-of-birth, place-of-birth, date-of-issue and treatment have already done. If the patient token number is near, then the microcontroller gives intimation to the particular patient through GSM modem via SMS. At the same time we can fix temperature and heart beat sensor regularly to find patient current conditions then the output signal is given to signal conditioning unit in which the signal is conditioned.

Then the signal is given by pulse shaping circuit. Here the signal is converted into square pulse. The converted square pulse signal is given to microcontroller. In these particular sensors if any one used mean than the corresponding output of the microcontroller is given PC through Zigbee transceiver. In PC, we can monitor those parameters using database with date and time.

It is very useful doctor to identify the patient health condition. When the patient moved to medical by with their RFID card, the reader can be placed in the pharmacy to automatically read the card and to showing their medical items in placed LCD with their quantity and costs and it can be automatically billed [9][11].
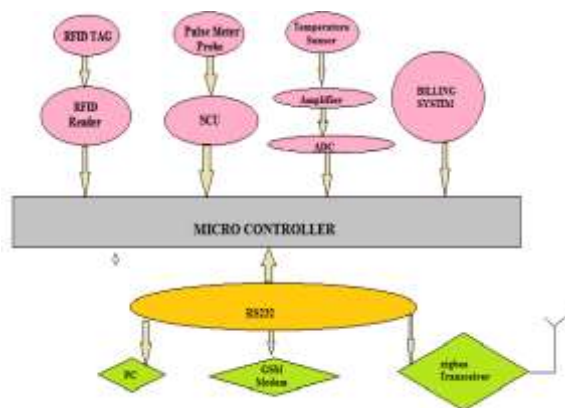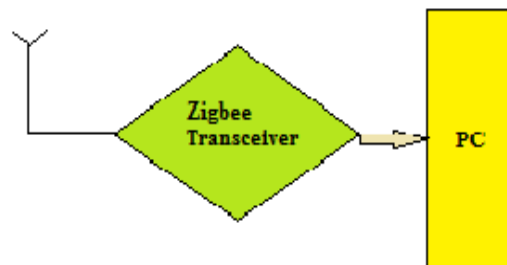
BLOCK DIAGRAM

Figure 3.1 Hospital Side

Figure 3.2 Patient Side

4. MATERIALS&METHODS
4.1 RFID Tags

RFID tags that contain their own power source and it have more memory to read at greater ranges is known as active tags and those without a power source named as passive tags and it is briefly activated by the radio frequency (RF) scan of the reader [10].

The electrical current is small generally to transmission of an ID number. Increasingly, RFID tag is used in the bar code technology. Although more expensive to use than the bar code stickers, RFID tags don't get dirty an unobstructed line-of-sight between the tag and the reader. Injectable ID chips have been used to track wildlife for over a decade. An injectable RFID tag called the Veri Chip can be used to help medical personnel identify a patient who is unable to speak and even provide access to the person's medical records.

Figure 4.1 RFID Tag

4.2 RFID Reader

RFID reader is an device, which is used to gather the information from an RFID tag. RFID tag does not have to be scanned directly. The RFID tag it must be within the range of an RFID reader, which ranges from 3 to 300 feet, in order to be read. RFID is a technology which is similar to the bar codes. RFID technology allows several items to be quickly scanned and enables fast identification of a particular Operation, even when it is surrounded by several other items. RFID tags have not to be replaced by bar codes because of their cost and their needs to individually identify everything.

Figure 4.2 RFID Reader

4.3 PIC

The microcontroller that has been used for this Paper is from PIC series. PIC microcontroller is the first RISC based microcontroller fabricated in CMOS (complementary metal oxide semiconductor) that uses separate bus for instruction and data allowing simultaneous access of program and data memory. Various microcontrollers offer different kinds of memories [14]. EEPROM, EPROM, FLASH etc. are some of the memories of which FLASH is the most recently developed, so that data is retained even when the power is switched off. Easy Programming and Erasing are other features of PIC 16F877.

Figure 4.3 PIC

4.4 Pulse sensor

The Pulse Sensor can be connected to a PCB (printed circuit board) board .The front portion of the sensor is the pretty side with the Heart logo. This is the side where it makes contact with the body. On the front there is a small round hole, where the LED shines through from the back, and there is also a little square just under the LED.

The square is an ambient light sensor, exactly like the one used in cellphones, tablets, and laptops, to adjust the screen brightness in different light conditions. Top of Form The signal is amplified, inverted and filtered, in the box. By graphing this signal, the heart rate can be determined. The pulse sensor digital output is standard and analog output is available.

Figure 4.4 Pulse Sensor

4.5 Temperature sensor

A thermistor is a type of resistor whose resistance is depended on regulating heating elements (Positive Temperature Coef, cient or PTC type typically), in-rush current limiters, temperature sensors (Negative Temperature Coefficient or NTC type typically), self-resetting overcurrent protectors. Thermistors are differ from the resistance temperature detectors (RTDs) because of the thermistor is generally makes as ceramic

or polymer. The temperature range, typically as −90 °C to 130 °C.

Figure 4.5 Temperature Sensor

4.6 Billing

Electronic billing payment methods are presented in a company, organization to send its bill over the internet. Customers pay the bills electronically and also provide the ability to electronically settle payment for goods or services. Medical billing is a payment practice health system by provider submitting, and follow up on, claims and insurance in order to various progress.

Medical coding reports are detailed about what the diagnosis and treatment were, and prices are applied accordingly. The service is also supported by the customer service representatives (CSRs), which may be contacted directly to produce substantial savings for traditional print & mail billing and payment remittance to for better result.

Figure 4.6 Billing

4.7 GSM

GSM (Global System for Mobile Communications) is a standard developed and mobile telephony system that is widely used in all over the world. GSM variation of the time division multiple access (TDMA) and is the most widely used of the three digital wireless telephony technologies (TDMA, GSM, and CDMA). It operates at either in the 900 MHz or 1800 MHz frequency band.

Figure 4.7 GSM

4.8 Zigbee Module

Zigbee is a low-cost, low-power, wireless mesh network and has low-latency communication. It have targeted at battery-powered devices in wireless control and monitoring applications with the chips of typically integrated with microcontrollers and radios. Zigbee operates in the scientific, industrial and medical radio bands. Zigbee Device Objects (ZDOs) and manufacturer-defined application objects are responsible for some tasks, including keeping track of device roles, managing requests to join a network, as well as device discovery and security.

Figure 4.8 Zigbee Module

4.9 RS-232 converter

RS-232 is a standard for serial communication transmission and commonly used in computer serial ports of data information for signals connecting between a DTE and DCE or data communication equipment. An RS-232 serial port was a standard

feature of a personal computer. It is used for the connections to modems, printers, data storage, uninterruptible power supplies, and other peripheral devices. The standard defines the electrical characteristics at the meaning of signals, timing signals, and the physical size.RS-232is compared to later interfaces such as RS-422, RS-485 and Ethernet, it has the lower transmission speed, short maximum cable length, large voltage swing.1973

Figure 4.9 RS-232 Converter

5. CONCLUSION

RFID tags are today placed in hospitals and other medical facilities. To easily find all details of patient in the hospital by using RFID r/w card and also we are monitoring the body temperature and pulse meter of the patient using pc through zigbee transceiver anywhere of hospital. To the particular patient by means of massage ongoing research and will include further for experimentation to asses. The RFID chips in the new health card store all the information typically contained in conventional patient condition, besides they can be scanned by chip Usage of RFID helps the patient to visit the doctor at a in the way of using GSM, which is linked with the RFID.

This analysis is also being implemented and extended to particular time instead of waiting for long time. It is just possible by giving alert readers at any hospital. The information held by the chips is the same as that on the first page of a patient health condition, via name, date-of-birth, gender, place-of-birth, -of-issue and treatment already done Patient doesn't need to keep the record of his/her report. They just need to remember the allocated id (patient id). All records of patients are digitally managed in secure way.

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