

Implementation of Wearable RFID Tag Based Wireless Sensing Method for Real Time Ubiquitous Medical Care Survey

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ABSTRACT: With the emerging of newly discovered chronic diseases, the demand of hospital nursing for elderly patients had been increasing significantly. It is a critical issue for health worker to look after the vulnerable patients who are unable to speak or behave for them. This study proposes an innovative, wearable RFID tag which embedded body temperature monitoring sensor, and equipped with automatic identification and localization, real-time emergency notification for health care workers. Additionally, operating with the intelligent backend system architecture, this system can also provide immediate physician advices in case if emergency situation happens without doctor near the site. The result of this study provides a ubiquitous medical care throughout whole hospital, and the new-invented tag may bring a significant change to normal health care process,

Life is precious. Wireless communication is finding is wide applications in almost every field This system can also provide immediate physician advices in case if emergency situation happens without doctor near the site. The result of this study provides a ubiquitous medical care throughout whole hospital, and the new-invented tag may bring a significant change to normal health care process. RFID is Radio Frequency Identification. The RFID consists of the RFID Reader and the RFID Tag. The reader detects any object attached with the RFID tag.

As for the body temperature monitoring, an on-board temperature sensor is embedded in RFID tag structure. The temperature sensor may transfer its signal directly into tag memory and being read by reader together. The combination of physiological sensing device and wireless communication technology can measure a user's body temperature accurately so as to proceed with the application service of physiological signal processing and track the user's health status. And the RFID combined with mobile communications mechanism, and link to the health care information system, which forms the basis of intelligent health care service platform.

KEYWORDS: RFID Tag and reader, sensors, Bluetooth

I. INTRODUCTION

RFID is Radio Frequency Identification. There are various applications of RFID in wireless communications. The RFID consists of the RFID Reader and the RFID Tag. The reader detects any object attached with the RFID tag. FID has its applications in Medical, Institutions, Schools, Buisness, Military, Colleges and many others. Since Wireless communication is more compatible and robust it has been developing widely throughout various fields.

Radio frequency identification (RFID) is a generic term that is used to describe a system that transmits the identity in the form of a unique serial number) of an object or person wirelessly, using radio waves. A RFID tag which stores the identity number consists of a microchip attached to a radio antenna mounted on a substrate. To retrieve the data stored on an RFID tag, you need a reader. A typical reader is a device that has one or more antennas that emit radio waves and receive signals back from the tag. Tag can usually be read by reader automatically, and this information transmitted to computer system in real time. Its advantages are that it requires no human intervention. It enables the error rate becomes low and the speed of business processing increase. On the whole, costcutting effect greatest change. RFID business applications are asset tracking, manufacturing automation, payment systems, and so on.

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To keep track of the internal conditions of the patients and to save precious lives of the patients who are in ICU and paralyzed people. Some major attacks can be saved by monitoring their body temperature, pulse rate, ECG are sensed with the sensors and this data is sent to the doctors mobile phone ,so that when the doctor comes to know any emergency or abnormality can give immediate aid to the patient. This system gives golden minutes to save the patients life ,for example to sense the occurrence of heart attack or brain stroke before it could occur.

II. RELATED WORK

Yeh-Cheng Chen et al [1] proposed “Design and implementation of wearable RFID tag for real-time ubiquitous medical care” where an innovative, wearable RFID tag is embedded with the body temperature monitoring sensor, and automatic identification and localization equipped in it. Here RFID tags and ubiquitous medical care technique is used to measure Blood pressure and ECG data of a patient and applied in Identification and localization of patients. It has advantages of being automatic and used in emergency situation. Disadvantages include that no information is given to the doctor about the patient if the doctor is not available

S.Boncinelli, et al [2] proposed “Real time detection and tracking of gauzes by RFID UWB Technique” presented the implementation of the GUID (Gauzes UWB Identifier) system to control the path of gauzes and other medical instruments during surgical operations. The system

Performs tracking of the surgical devices during the entire surgery and real-time localization of gauzes within the patient’s body. The objective is to improve the patient safety,

And reduce the stress conditions of the surgical staff. Here RFID UWB technique, Localization technique is used and the data used is Path, position of gauzes and other medical instruments. Applications are found in surgeries and advantages are safe surgery. Disadvantage include that the Gauze is usually not subjected to large movements.

Sheng-Ta Hsieh [3] proposed “RFID Medical Information System” where he presented the healthcare application and implementation of RFID (Radio Frequency Identification) system. The RFID tags are introduced to replace the register cards in hospital for exchanging medical data. It provides patients with a convenient way for to accessing medical information and help them to keep their medical quality, such as remind them for taking medicines regularly and correctly and revisit etc. The system was implemented on MSP430 Ultra- EV Board with HF RFID reader (ISO 15693). Data used here are Medical information, such as medical type, color, dosage frequency .Applications of this paper includes Outpatients to maintain quality treatment and avoid errors in the usage of medicine. One disadvantage is Illiterate people cannot use this system.

Zhenyu Jiang et al [4] proposed” RFID Tag Antenna Based Wireless Sensing Method for Medical Transfusion Applications” where Real-time fluid-level monitoring in a medical transfusion procedure is very important for the safety and satisfaction of patients in hospitals. Wireless sensing technique is used here .Data used here is transmitted power, fluid load, frequency and its applications are in Medical Transfusion applications and it is Feasible and Automatically monitoring.

Mehdia Ajana El Khaddar et al [5] proposed “Modeling and Enforcing Security and Service Control Policies using Flex RFID Middleware” proposed RFID and WSN technologies are widely used in today’s pervasive computing. Techniques used here are Flex RFID Middleware. Data used is the Sensed data and applications are found in Health care scenarios. Advantages are Access control for Security. Disadvantages include no response time testing.

Frank Kuo et al [6] proposed “The implement of RFID in Emergency Medicine”. RFID EMS system is used here to evaluate the benefit from the implementation by quantity and event all makes the disorderly situation and heavy quality methodology. Techniques used here are Flex RFID Middleware and Data used is the sensed data. Applications are Health care scenarios .Advantages include Access control for Security .Disadvantages include No response, time testing.

Ricardo Meneses et al [7] proposed “A Small Note about RFID Technology applied to Public Safety. Part 1: RFID Tag Antenna Design” In order to have strict enforcement of the rules in jails

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And increase the public safety, the implantation of radio frequency identification (RFID) tag into the human body, specifically into the molar tooth of the prisoner, may give an alternative to face the crime problem in Mexico. Techniques used here are RFID EMS (Emergency Medical service). Data used is Emergency call, Patient information .Applications are Emergency medicine .Advantages include Efficient with limited resources.

Anastasis C et al [8] Polycarpou proposed “On the Design, Installation, and Evaluation of a Radio-Frequency Identification System for Healthcare Applications” where the constantly growing passive RFID technology at ultra-high frequencies (UHF), in conjunction with current state-of-the-art information and communication technologies (ICTs), was used for the system design. The end product was installed at an oncology hospital in Cyprus, where it was thoroughly evaluated by medical staff and hospital administrators. Techniques used here are RFID tag Antenna Design. Data used is Prisoner identification, prisoner location, resonance frequency, impedance requirements and bandwidth requirements .Applications are public safety and strict enforcement of the rules in jails .Advantages include that it is very small and easy to carry Disadvantages are that it has to be inserted in the molar tooth which will be disturbing.

Rui Rodrigues et al [9] proposed “Monitoring Intelligent System for the Intensive Care Unit using RFID and Multi-Agent Systems”. In an environment where patients’ lives are at stake, Intensive Care Units (ICUs) are a good scenario for the implementation of Ambient Intelligence, helping medical professionals in their task of retrieving the well-being to patients. Techniques used here are RFID UHF in conjunction with ICTS. Data used is In patient details .Applications are in Health care .Advantages include Privacy, Security of sensitive patient data .Disadvantages include Initial Investment cost is high and time consuming.

Teasing Kim and Howon Kim [10] proposed “Authorization Policy for Middleware in RFID System” where access control policy which can be applied to RFID middleware. This policy can express range of tag data to be provided, readers to be accessed, commands to request, and notification addresses to receive report from middleware. Techniques used here are Ambient Intelligence. Data used is Patient condition details .Applications are Intensive care unit .Advantages include Medical professionals are benefitted .Disadvantages include RFID must be accurate otherwise patient alert system could be shut down.

Zhen-Yu Wu et al [11]proposed “A *secure* RFID authentication scheme for medicine applications “RFID could be applied to merely about every section in hospitals, including blood bag management, medical record management, precious medical equipment tracking, discarded object management, emergency medical care tracking, resident healthcare monitoring, patient identification, operating room management, nursery management, drug logistics management, and entry access control. Techniques used here are RFID Authentication. Data used is Medical data .Applications are Security in medical environment .Advantages include Secure, Mutual authentication .Disadvantages include Complex cryptographic techniques will not be efficient.

Wen Yao et al [12] proposed “The Use of RFID in Healthcare: Benefits and Barriers”. Radio Frequency Identification (RFID) technology not only offers tracking capability to locate equipment and people in real time, but also provides efficient and accurate access to medical data for doctors and other health professionals. Techniques used here are RFID. Data used is Patient information Applications are Healthcare .Advantages include Asset tracking and patient identification .Disadvantages include Cost is very high.

Jong-Hoon Youn et al [13] proposed “WLAN-based Real-time Asset Tracking System” .In Healthcare Environments considering a real-time asset tracking system deployed within a hospital clinic setting, which tracked a set of mobile assets using small Wi- Fi tags. Detailed logs of asset tracking information are available for archival purposes. Techniques used here are Wi-Fi technology. Data used is Asset data .Applications are Health care. Advantages include Asset tracking and are feasible.

Hyun-Seok Kim et al [14] proposed “UHF RFID Antenna: A Printed Dipol Antenna with CPS Matching Circuit and Inductively Coupled Feed” where The paper presents simulated and measured results of the UHF RFID antenna

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realized with dipole matched to a CPS (coplanar strip line) and inductively coupled with small rectangular loop. Such design of the antenna enables easy achieving and controlling high values of the inductive reactance that is necessary for obtaining good matching of antenna to ASIC (Application Specific Integrated Circuit) chip. The antenna is characterized by simple and robust design which results in low-cost realization.

Hyun-Seok Kim et al[15] proposed “The Design and Verification of RFID Authentication Protocol for Ubiquitous Computing “where The growing use of Radio Frequency Identification (RFID) technology to enhance ubiquitous computing environments has only begun to be realized. It allows for the identification of objects and/or subjects remotely using attached RFID tags via a radio frequency channel, hence identification is achieved in a contactless manner. This paper presents issues concerning security and privacy of RFID Systems which are heavily discussed in public and introduces Authentication Protocol for a RFID security protocol which serves as a proof of concept for authentication an RFID tag to a reader device using the vernam and standard encryption as a cryptographic primitive. To verify our protocol, we use model checking methodology, that is, Casper(A Compiler for Security Protocol), CSP(Communicating Sequential Processes) and then verify security properties such as secrecy and authentication using FDR(Failure Divergence Refinement) tool.

III. EXPERIMENTAL RESULTS

In this survey paper we have listed many approaches based on RFID Technology with RFID tag and reader. It has its applications in many aspects and fields. A simple and cost effective and limited time consuming approach which is very useful. These approaches are found to be useful in medical, Industries, institutions, public places, shopping malls etc. 24x7 Surveillance of patients details is available which helps to gather information of the patients for the doctor. Helps the Physically Challenged people such as dumb by monitoring the details and matching what they think or need. With some details of the patient which are abnormal, reaching the doctors mobile phone can help the doctor to arrive to the correct patient with the help of the RFID reader to identify the patient and give emergency aid to help the patient such as like oxygen supply. Provides satisfaction to the family members to view the heart rate readings of the patient in ICU in the mobile phone so that they do not have to wait in panic to hear from the doctor on the patient’s condition. The range of the values of body temperature ,pulse and blood pressure are shown here.

Parameters	Normal ranges				
		Oral	Rectal	Tympanic	Auxiliary
Body temperature	Male	98 deg F/36.7 deg C	98.6 deg F/37 deg C	97.7 deg F/36.5 deg C	97.3 deg F/ 36.3 deg C
	Female	97.2 deg F/36.2 deg C	98.6 deg F/ 37 deg C	97.9 deg F/37 deg C	97.3 deg F/36.3 deg C
Pulse rate	About 70 to 80 beats per minute at rest (similar as heart rate)				
Respiratory rate	12.18 breaths a minute				

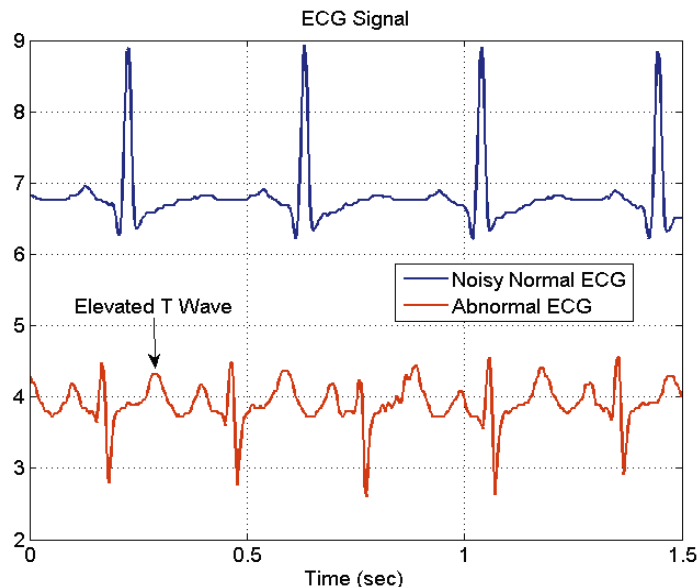
FIG2: TABLE RANGING THE VALUES OF BODY TEMPERATURE , PULSE RATE AND RESPIRATORY RATE

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FIG 3: COMPARISON BETWEEN THE ECG GRAPH OF A NORMAL PERSON AND AN ABNORMAL PERSON



This graph shows a normal and abnormal signal.

IV. CONCLUSION

This survey paper has provided a comprehensive overview of the various implementations of RFID technology. A survey on medical applications of RFID is given in detail. In this paper we have reviewed several existing method and technologies of RFID Technology.

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