ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com
International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 3, Special Issue 19, April 2016

NFC Based Secure Health Telemonitoring System

[1]P.Muthukumarasamy, [2]P.Andrews Robinson, [3]E.Jenath, [4]J.Kamesh, [5]D.Manikandan

[1]Assistant Professor, Department of ECE, Kings Engineering College,
[2,3,4,5] UG Scholars, Department of ECE, Kings Engineering College,
[1]nellaipmks@gmail.com, [2]andrewsrobinson8@gmail.com, [3]jenath06@gmail.com, [4]kameshj181@gmail.com,
[5]mr.dm.manikandan@gmail.com

Abstract –**This concept utilizes the recent trends in communication technology for monitoring the health status of the patients in hospital. The two most recent trends as stated above are Android and NFC (Near Field Communication). Android is a mobile OS which serves as a most advanced OS for mobile devices. NFC is a short range high frequency communication device used to transfer digital data at higher rates. It can also employ as a passive device to store the digital information such as digital signature. These two technologies are utilized in this project to serve as a most economical and user friendly system for bio medical application. The Doctor will roam around the wards in the hospital to monitor the health status of every patient. This is a time consuming process as it requires a manual check up and provides oral commands to the nurses in the ward. To overcome this, we utilize the NFC and Android Technology. A Doctor's NFC Tag will read the patient's sensor values by using NFC reader in the patient module. These sensor values will then sent to the server PC to monitor the health status of every patients in the ward**

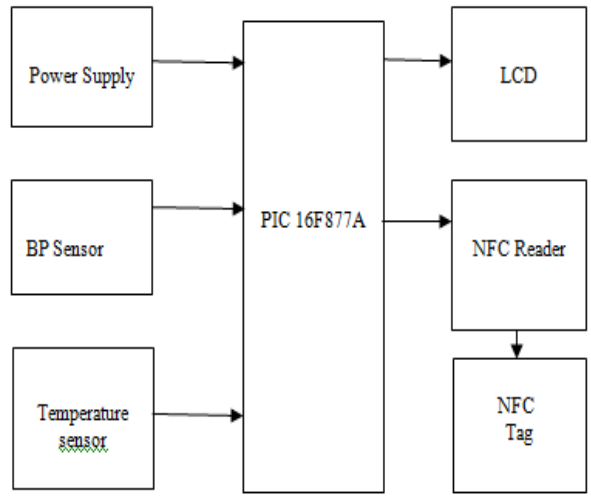
Keywords - Medical image fusion, Multimodality images, Wavelet transform,Framelet transform, Fusion rules.

I. INTRODUCTION

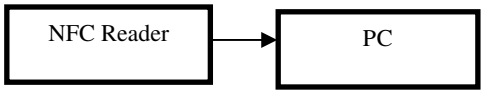
The main objective of the project is to measure the physical parameters of human body continuously. From the sensors, the body temperature and blood pressure values of patients are automatically readed. This makes work less for the doctors to maintain patients health status and records. In the existing system, doctors have to go in rounds to the wards check each and every patient and enter their medical records manually using paper and save the records.There is no proper maintaince of patients health records.There are more chances

of wrong entries, and missing of the records as they are in the form of paper. The manual process of recording patients details consumes more time and that will not be available over long perod of time in that same hospital.The proposed system comprises of a microcontroller, Temperature and Heart Beat sensor, NFC Reader & Tag and a server PC. The patient is equipped with the temperature, Heart Beat sensor and blood pressure connected to a microcontroller and NFC Reader. The doctor with his NFC Tag during the ward rounds retrieves the sensor values from the microcontroller through the NFC reader. After the ward round, in doctor's room with a NFC reader connected to a PC, the patient's sensor values stored in his tag will be sent to the PC to update and check the health status.thus here the mysql database is used to maintain thepatientrecords.Here the data along with th date and the time are recorded perfectly.

TRANSMITTER SECTION



RECEIVER SECTION



ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com
International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 3, Special Issue 19, April 2016

BLOCK DIAGRAM DESCRIPTION

The block diagram contains microcontroller, NFC Tag&Reader,BP sensor and Temperature sensor. The main heart of the system is BP sensor module which is continuously monitoring the patients Blood pressure level. The information is stored by the controller and the transmitted by the NFC reader to the tag. From the tag the recorded values are transmitted to the receiver using serial port communication. The body temperature can be detected by the Temperature sensor. NFC Tag is having only small memory size(9 bytes).From the tag ,the reader in the doctor's section will read and display the values on pc.

BP SENSOR

Many of Blood Pressure & Pulse reading are shown on display with serial out for external projects of embedded circuit processing and display. Shows Systolic, Diastolic and Pulse Readings. Compact design fits over your wrist like a watch. Easy to use wrist style eliminates pumping.Blood pressure is the pressure of the blood in the arteries as it is pumped around the body by the heart. When your heart beats, it contracts and pushes blood through the arteries to the rest of your body. This force creates pressure on the arteries. Blood pressure is recorded as two numbers— the systolic pressure (as the heart beats) over the diastolic pressure (as the heart relaxes between beats). The unit which measures this is called Sphygmomanometer.Monitoring blood pressure at home is important for many people, especially if you have high blood pressure. Blood pressure does not stay the same all the time. It changes to meet your body's needs. It is affected by various factors including body position, breathing or emotional state, exercise and sleep. It is best to measure blood pressure when you are relaxed and sitting or lying down.

Classification of blood pressure for adults (18 years and older)

	Systolic (mm Hg)	Diastolic (mm Hg)
Hypotension	< 90	< 60
Desired	90–119	60–79
Prehypertension	120–139	80–89
Stage 1 Hypertension	140–159	90–99
Stage 2 Hypertension	160–179	100–109
Hypertensive	≥ 180	≥ 110

High blood pressure (hypertension) can lead to serious problems like heart attack, stroke or kidney disease. High blood pressure usually does not have any symptoms, so you need to have your blood pressure checked regularly.Following are example output readings from sensor. Each reading consist of **15 bytes** at 9600 baud rate. The reading packet's last byte is always enter key character(0x0A in hex and 10 in decimal) so you can view each reading on new line. Also this character can be used to sync in microcontrollers after reach readings.

The output reading is 8bit value in ASCII format fixed digits, from 000 to 255.

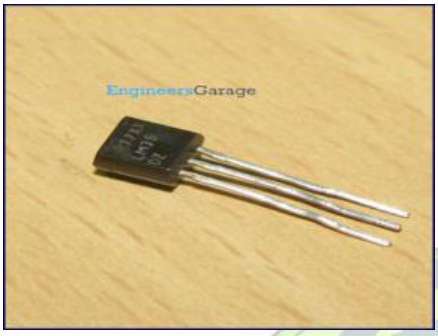
Typical reading will be like below where the three values seperated by comma and space.

- Systolic
- Diastolic
- Pulse

This application note describes a Digital Blood Pressure Meter concept which uses an integrated pressure sensor, analog signal-conditioning circuitry, microcontroller hardware/software and a liquid crystal display. The sensing system reads the cuff pressure (CP) and extracts the pulses for analysis and determination of systolic and diastolic pressure. This design uses a 50 kPa integrated pressure sensor (Freescale Semiconductor, Inc.P/N: MPXV5050GP)yielding a pressure range of 0 mm Hg to 300 mm Hg.. Heart beat is sensed by using a high intensity type LED and LDR. The finger is placed between the LED and LDR. As Sensor a photo diode or a photo transistor can be used. The skin may be illuminated with visible (red) using transmitted or reflected light for detection. The very small changes in reflectivity or in transmittance caused by the varying blood content of human tissue are almost invisible. Various noise sources may produce disturbance signals with amplitudes equal or even higher than the amplitude of the pulse signal. Valid pulse measurement therefore requires extensive preprocessing of the raw signal.

ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com
International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 3, Special Issue 19, April 2016

TEMPERATURE SENSOR



The measurement of temperature is one of the fundamental requirements for environmental control, as well as certain chemical, electrical and mechanical controls. Many different types of temperature sensors are commercially available, and the type of temperature sensor that will be used in any particular application will depend on several factors. For example, cost, space constraints, durability, and accuracy of the temperature sensor are all considerations that typically need to be taken into account.

Various types of temperature sensors are known including liquid-in-glass (LIG) thermometers, bimetallic thermometers, resistance thermometers, thermocouples, and radiometers. Christo Ananth et al. [2] discussed about an eye blinking sensor. Nowadays heart attack patients are increasing day by day."Though it is tough to save the heart attack patients, we can increase the statistics of saving the life of patients & the life of others whom they are responsible for. The main design of this project is to track the heart attack of patients who are suffering from any attacks during driving and send them a medical need & thereby to stop the vehicle to ensure that the persons along them are safe from accident. Here, an eye blinking sensor is used to sense the blinking of the eye. spO2 sensor checks the pulse rate of the patient. Both are connected to micro controller.If eye blinking gets stopped then the signal is sent to the controller to make an alarm through the buffer. If spO2 sensor senses a variation in pulse or low oxygen content in blood, it may results in heart failure and therefore the controller stops the motor of the vehicle. Then Tarang F4 transmitter is used to send the vehicle number & the mobile number of the patient to a nearest medical station within 25 km for medical aid. The pulse rate monitored via LCD .The Tarang F4 receiver receives the signal and passes through controller and the number gets displayed in the LCD screen and an alarm is produced through a buzzer as soon the signal is received.

Pin No	Function	Name
1	Supply voltage; 5V (+35V to -2V)	Vcc
2	Output voltage (+6V to -1V)	Output
3	Ground (0V)	Ground

. SPECIFICATION OF NFC

The technology is built up on the existing RFID standards. However, there are minor differences, and NFC devices cannot interact with some of the legacy systems. Near filed Communication devices are operating **at 13.56 MHz and can transfer data at up to 424 Kbits/second**. Communication between two NFC enabled handsets is started and completed with a simple proximity wave or touch of the two devices to each other The communication can also imply passive parts also in the form of an NFC tag. These tags gains power for the communication from the RF fields emitted by an active NFC device. The real power of NFC relies in combining with contactless smart card infrastructure. The mobile handset user can make transactions just by touching his phone to a NFC credit card reader or ticket gate. Payment information, such as credit cards, loyalty cards, or your travel ticket are securely storedin the integrated smart card chip inside your phone. NFC technology enables all these legacy applications to be used on an mobile phone, providing more convenient , fast , and secure way of shopping or travelling.When using an NFC enabled phone with a NFC tag the phone can read smallamounts of data from the RFID service shortcut tags, so for example the service shortcut contained inside the tag is launched just with a simple touch or tap.

4.2 Key Benefits of NFC

NFC provides a range of benefits to consumers and businesses, such as:

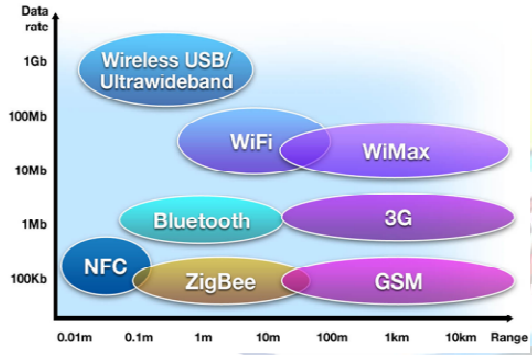
- **Intuitive**: NFC interactions require no more than a simple touch
- **Versatile**: NFC is ideally suited to the broadest range of industries, environments, and uses
- **Open and standards-based**: The underlying layers of NFC technology follow universally implemented ISO, ECMA, and ETSI standards
- **Technology-enabling**: NFC facilitates fast and simple setup of wireless technologies, such as Bluetooth, Wi-Fi, etc.)

ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com
International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 3, Special Issue 19, April 2016

- **Inherently secure**: NFC transmissions are short range (from a touch to a few centimeters)
- **Interoperable**: NFC works with existing contactless card technologies
- **Security-ready**: NFC has built-in capabilities to support secure applications

Bluetooth and Wi-Fi seem similar to near field communication on the surface. All three allow wireless communication and data exchange between digital devices like smart phones. Yet near field communication utilizes electromagnetic radio fields while technologies such as Bluetooth and Wi-Fi focus on radio transmissions instead.

Near field communication, or NFC for short, is an offshoot of radio-frequency identification (RFID) with the exception that NFC is designed for use by devices within close proximity to each other. Three forms of NFC technologyexist: Type A, Type B, and FeliCa. All are similar but communicate in slightly different ways. FeliCa is commonly found in Japan.



Devices using NFC may be **active or passive**. A passive device, such as an NFC tag, contains information that other devices can read but does not read any information itself. Think of a passive device as a sign on a wall. Others can read the information, but the sign itself does nothing except transmit the info to authorized devices.

Active devices can read information and send it. An active NFC device, like a smartphone, would not only be able to collect information from NFC tags, but it would also be able to exchange information with other compatible phones or devices and could even alter the information on the NFC tag if authorized to make such changes.

To ensure security, NFC often establishes a secure channel and uses encryption when sending sensitive information such as credit card numbers. Users can further protect their private data by keeping anti-virus software on their smartphones and adding a password to the phone so a thief cannot use it in the event that the smartphone is lost or stolen.

V. CONCLUSION

In this project we designed a low cost health care monitoring system, which continuously monitors the temperature and pressure and heartbeat of the patients, and stores the records in the NFC TAG .and the doctor which that tag reads the values of that tag and gets stored in the databases .so that this information can be carried to different hospitals around different regions after the longer period of time. so that this databases can be much helpful in giving an medicine to the patients.

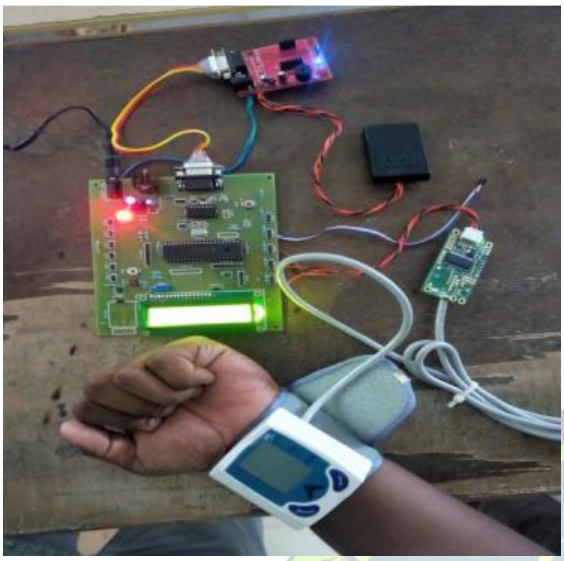
Vi. FUTURE SCOPE OF PROJECT

The proposed system comprises of a microcontroller, Temperature and Heart Beat sensor, NFC Reader & Tag and a server PC. The patient is equipped with the temperature, Heart Beat sensor and blood pressure connected to a microcontroller and NFC Reader. The doctor with his NFC Tag during the ward rounds retrieves the sensor values from the microcontroller through the NFC reader. After the ward round, in doctor's room with a NFC reader connected to a PC, the patient's sensor values stored in his tag will be sent to the PC to update and check the health status.

CIRCUIT MODULE

OVERALL MODULE

ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com
International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 3, Special Issue 19, April 2016



REFERENCES

[1]. A Marcus, G Davidzon, D Law, N Verma, R Fletcher, A Khan, L Sarmenta*Using NFC-enabled Mobile Phones for Public Health in Developing Countries* IRD 2009.

[2] Christo Ananth, S.Shafiqa Shalaysha, M.Vaishnavi, J.Sasi Rabiyathul Sabena, A.P.L.Sangeetha, M.Santhi, "Realtime Monitoring Of Cardiac Patients At Distance Using Tarang Communication", International Journal of Innovative Research in Engineering & Science (IJIRES), Volume 9, Issue 3,September 2014,pp-15-20

[3] . Johan Sidacn, V Skerved, J Gao, S Forsstram, H Nilsson, T Kanter, M Gulliksson*Home Care with NFC Sensors and a smartphone* ACM Proceeding ISABEL '11 Article No. 150

[4] .Hillukkala Mika, H Mikko, Y Arto, *Practical implementations of passive and semi-passive NFC enabled sensors*First International Workshop on Near Field Communication,2009

[5] *.www.ams.com* date of visit- Janury 2014

[6] . Wei Chen, SibrechtBouwstra, SidartoBambangOetomo and LoeFeijs *Intelligent Design for Neonatal Monitoring with Wearable Sensors, Intelligent and Biosensors* Vernon S. Somerset (Ed.), ISBN: 978-953-7619-58-9,2010.

[7]. M. AhsanulAdeeb,*A Class E Inductive Powering Link with Backward Data Communication for Implantable Sensor Systems* Ph.D. Thesis, The University of Tennessee, Knoxville, 2006.

[8]. C. M. Zierhofer and E. S. Hochmair, *Geometric approach for coupling enhancement of magnetically coupled coils*,IEEE Trans. Biomed. Eng., vol. 43, no. 7, pp. 708714, Jul. 1996.

[9]. S. S. Mohan, M. M. Hershenson, S. P. Boyd and T. H. Lee, *S*imple Accurate Expressions for Planar Spiral Inductances,IEEE Journal of Solid-State Circuits, Vol. 34, No. 10, 1999, pp. 1419-1424. doi:10.1109/4.792620

[10]. E. B. Rosa*Calculation of the self-inductances of single-layer coils* Bull. Bureau Standards, vol. 2, no. 2, pp. 161187, 1906.

[11] . H. Greenhouse,*Design of Planar Rectangular Microelectronic Inductors*, IEEE Transactions on Parts, Hybrids, and Packaging, Vol. 10, No. 2, 1974, pp. 101-109. doi:10.1109/TPHP.1974.1134841

[12]. F. W. Grover, *Inductance Calculations: Working Formulas and Tables.* New York: Van Nostrand, 1946.

[13]. A. Balakrishnan, W. D. Palmer, W. T. Joines, and T. G. Wilson, *The inductance of planar structures*, in Proc.8th Annu. Appl. Power Electron. Conf. Expo., Mar. 711, 1993, pp. 912921

.[14]. U Jow, M Ghovanloo*Design and optimization of printed spiral coils for efficient transcutaneous inductive power transmission*.IEEE Transactions on Biomed Circuits and Systems. 2007 Sep;1(3):193202. [15]. Islam Ashraf B; Islam Syed K; and Tulip Fahmida S *Design and Optimization of Printed Circuit Board Inductors for Wireless Power Transfer System*, 2013.

[16]. THOMPSON:*Inductance Calculation Techniques — Part II: Approximations and Handbook methods Power Control and Intelligent Motion*, December 1999

[17]. Daly D A, Knight S P, C Martin, Ekholdt R *Lumped Elements in Microwave Integrated Circuits," Microwave Theory and Techniques,* IEEE Transactions on , vol.15, no.12, pp.713,721,December1967 doi:10.1109/TMTT.1967.1126571

[18]. *http://www.ti.com/lit/an/slyt451/slyt451.pdf* date of visit- June 2014

[19]. *http://www.linear.com/products/powermanagement* date of visit- June2014

[20]. *http://www.collinsdictionary.com/dictionary/english/recharger* date of visit- June 201480