Student Project Programme (SPP-2018)
Institute of Scholars (InSc)
Digitla Library of Academic Projects (DLAP)
www.insc.in/dlap

IEAESP2018-220

Project Title: HEART ATTACK DETECTION USING ANTENNA

Guide Details

Guide Name: Dr.T.Jayanthy

Guide Email: jayanthymd@rediff.com

Guide Phone NO.: 7708724818

Qualification : Ph D

Department: Electronics and Communication engineering

Institute name : Panimalar institute of technology

College address : Varadharajapuram, Poonamallee, Chennai, Tamil Nadu 600123.

Students Details

Project Team Leader Name: Nivetha S B

Email: sbnivetha97@gmail.com

Phone No. : 7708724818

Team Members list : Nivetha S B

TITLE: HEART ATTACK DETECTION USING ANTENNA

ABSTRACT

Heart disease is the most common cause of death in the world, and survival rates of heart related events are directly related to the response time of medical personnel. People experiencing myocardial infarction do not seek medical care, on average, for ~1.5-2h after symptom onset. By performing a long term and continuous tracking of the ECGs of an individual, myocardial infarction and other fatal heart related malfunctions may be detected hours before the user would have sought medical treatment.

LITERATURE SURVEY

Design of Printed Antenna for Heart Failure Detection Pranaya Krishna, C. Manoj Reddy, P. Srinivas Reddy and M. Neelaveni Ammal , Research Journal of Medical Sciences,2016

The heart failure is detected using printed array antenna.The size of antenna is 27x35mm.The operating frequency is1to 5Ghz.The gain and directivity of antenna is -11.83dbi and 5.97. The antenna is then integrated with a compact microwave transceiver and an adjustable platform to build a microwave system for heart failure detection. A computing tool is used for signal processing, image reconstruction and display. The integrated system is tested on a artificial phantom of the human torso emulating healthy and sick cases. The designed antenna is used to vertically scan the torso from the backside. The received signals are then process to form an image that indicates any fluid accumulation in lungs

Wideband and Unidirectional Folded Antenna for Heart Failure Detection System S. Ahdi Rezaeieh ,article in IEEE antennas and wireless propogation,2014

In this article wideband folded antenna is used, a planar structure that includes a loop antenna, a dual monopole and a loaded parasitic patch is designed.The folding process is applied on the edges of the planar structure.The size of antenna is 30mm.The gain of antenna is 4.2dbi.The heart failure is detected by monitoring the fluid accumulation in lungs.

Clip-on Wireless Wearable Microwave Sensor for Ambulatory Cardiac Monitoring Richard R. Fletcher, (2010)

In this paper detailed study of wearable sensors based on doppler effect is given. The microwave sensor directly measures heart movement rather than electrical activity, and is thus complementary to ECG.Their circuit incoporates 2.4 GHz Doppler circuit, integrated
microstrip patch antenna, and microcontroller with 12-bitADC data sampling.Microstrip patch antenna was designed .The gain and return loss of antenna is 4dbi and -18 dbm.

Microwave System for the Early Stage Detection of Congestive Heart Failure Sasan Ahdi Rezhaeieeh, and Amin M Abbosh, 2014.

This paper describes about the heart attack detection using ultrahigh frequency antenna.The congestive heart failure is detected based on the fluid accumulation in the lungs ,when heart fails to supply enough blood, pressure increases in the blood vessels near the lungs.Thus there will be gradual increase in the fluid accumulation ,based on this concept heart failure is detected.The antenna designed is F shaped slot with the size of 120x120mm.The gain obtained is 5dbi with the efficiency of 70%.The operating frequency of antenna is 0.95Ghz.

TOOLS

Hardware:

- ECG sensor
- Antenna
- Android
- Microcontroller
- Transceiver
- Electrodes

Software:

- Advanced Design System

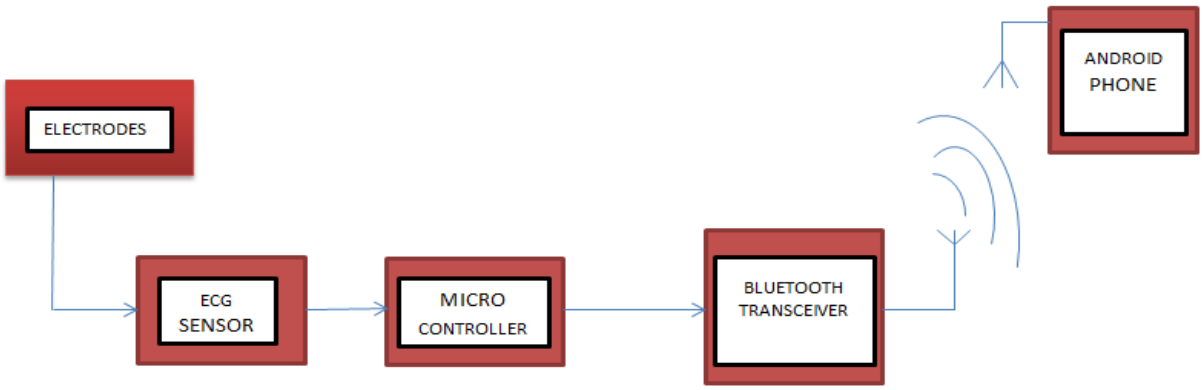

Figure 1.1 Block diagram

The electrodes are connected to the ECG board via standard electrode cables. The microcontroller is connected by a wire to the ECG sensor and attached directly to the transceiver. All of the components, except the antenna and the electrodes, are contained in an assembly box. When using

the system, the electrodes are fastened with adhesive tape to the user's chest, the assembly box is placed in a comfortable position on the user's chest, and the application is downloaded to an Android smartphone and started.

COMPONENT DESCRIPTION

Sensor:

The sensor solution is composed of three electrodes, two for measurements and one for reference. The electrodes are connected to a board with filters and amplifiers specifically created for ECG signals. The signal is processed by an ATmega328 microcontroller. This microcontroller was chosen because it has enough space to fit the code for controlling the transceiver and has low power consumption. The analog-to-digital converter has a 10-b resolution, which is enough to sample an ECG.

Bluetooth:

The integrated-circuit Bluetooth low-energy nRF8001 transceiver has a maximum power output with a nominal value of 0 dBm. It is connected to the UNO board via a Bluetooth 4.0 low-energy shield version 2.1 breakout board .The transceiver communicates with the UNO board using a serial peripheral interface. The transceiver was chosen because it is well documented and has good software libraries.

Android Application*:*

The Android application is made to handle data from the sensor. The application has two modes: one that displays ECG voltage readings and one that shows the signal strength. The modes can be chosen by pressing a button. As the application is launched, it performs a scan for

devices and allows the user to select the ECG sensor. The application then receives and interprets data from the sensor and displays it on the screen as a plot.

ANTENNA DESIGN

The goal when designing the antenna was to create a small micorstrip antenna with good free-space characteristics that would create surface-wave propagation along the body on which it was placed.

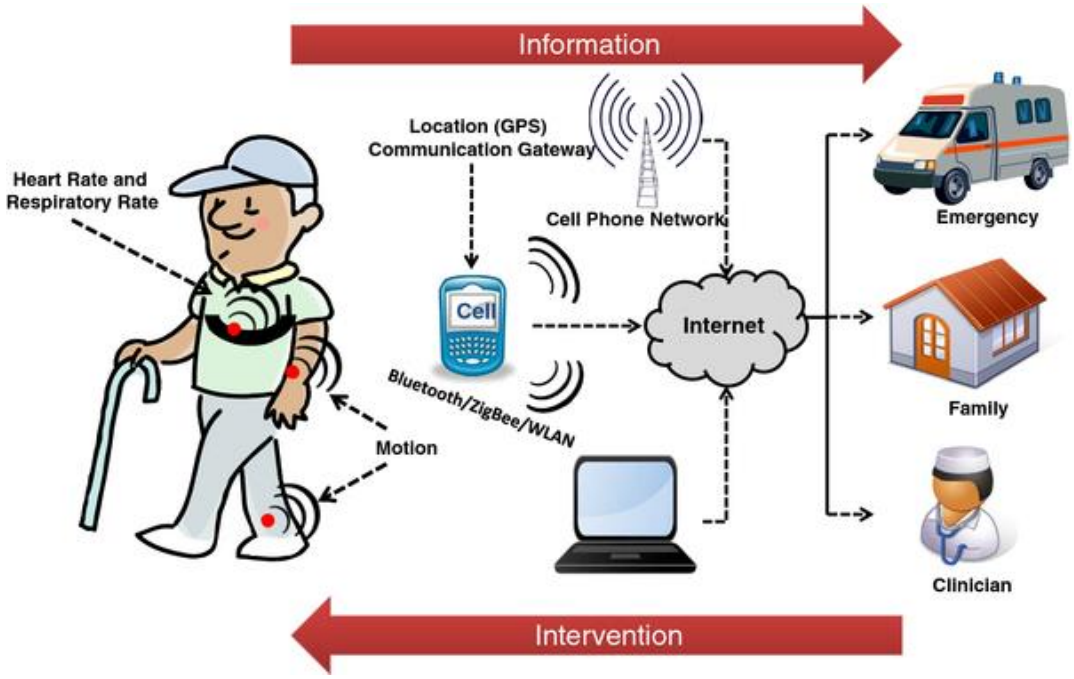

Figure 1.2 Smart system

INVERTED F PATCH ANTENNA:

The anenna is designed by using ADS (Advanced Design Software).The inverted F antenna is of size 43x32mm.The operating frequency is 2.4Ghz which is the ISM band frequency.The gain and return loss obtained is 4dbi and -13dbm.The substrate used is FR4 having the dielectric constant of 4.6 with 1.6mm thicknes.The FR4 substrate is chosen due to its ease of fabrication. The patch antenna is chosen because of its light weight, low profile and capability to support multiple band frequencies.

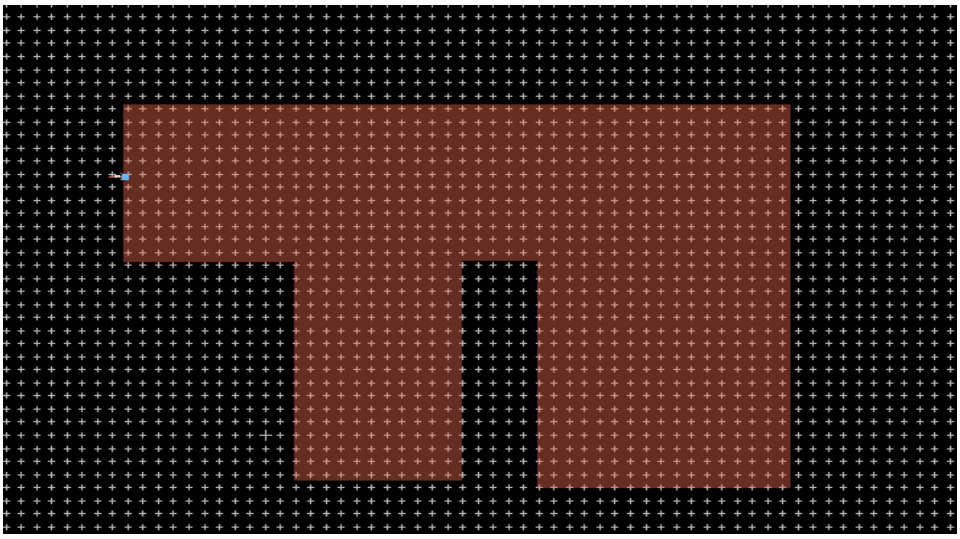

Figure1.3 Inverted F patch antenna

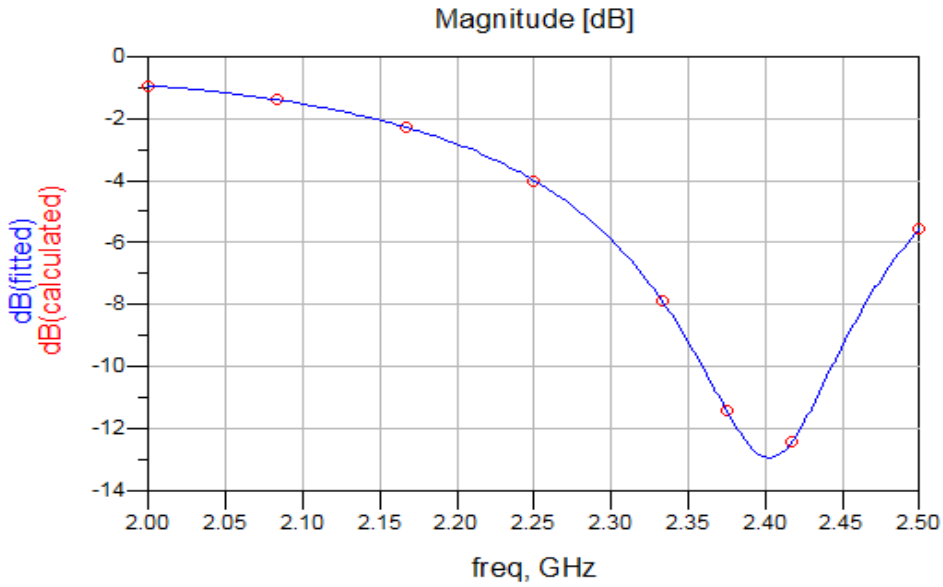

Figure 1.4 Return loss

INVERTED L PATCH ANTENNA:

The proposed antenna is of size 48x32mm. The operating frequency is 2.4Ghz which is the ISM bandfrequency.The gain and return loss obtained is 2.87dbi and -40dbm.The substrate used is FR4 having the dielectric constant of 4.6 with 1.6mm thicknes.The feed is attached at one end of patch.Due to low returnloss it is chosen for fabrication.

Figure1.5 Inverted L patch antenna

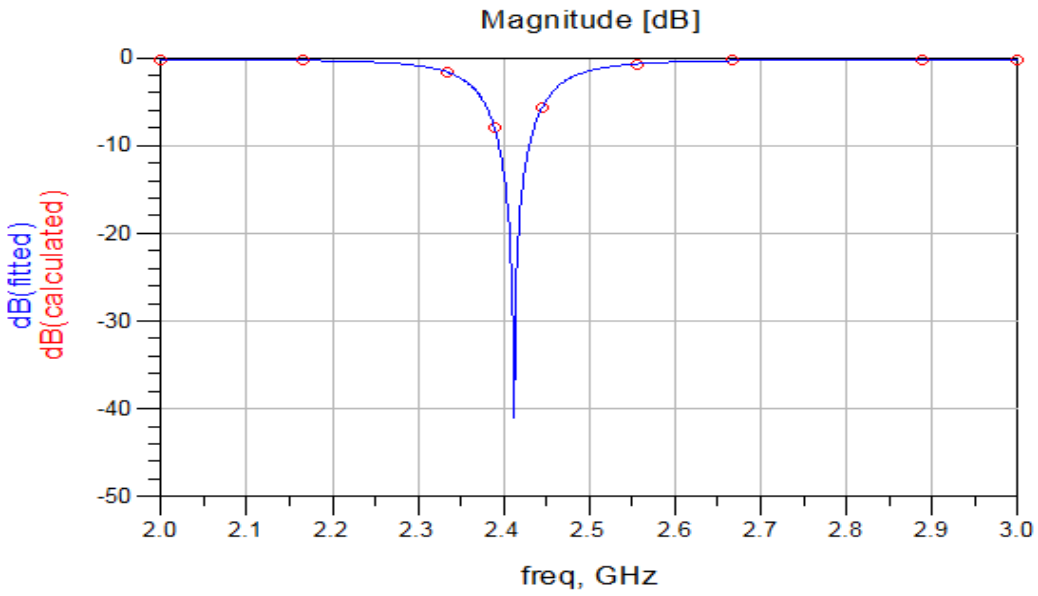

Figure 1.6 Return loss

SI. no	Shape	Frequency	Return loss	Gain
1	Inverted F	2.40	-13dbm	4dbi
2	Inverted L	2.41	-40dbm	2.87dbi

Table 1.Comparison of patch antenna

CONCLUSION

The goal is to provide early heart attack detection so that the patient will be given medical attention with in the first few critical hours, thus greatly improving his or her chances of survival.

Our devices will detect the heart attack when the symptoms which starts in the body, this information will spread to **other members and hospitals simultaneously** self-awareness of the patient is possible when this medical devices is wore by the respective person

BASE PAPER

Wireless body Area Network for Heart attack detection by Karl F Warnick,IEEE Journal,2015.

This article describes a body network for measuring an electrocardiogram signal and transmitting it to a smartphone via Bluetooth for data analysis.The wireless body area network uses a specially designed planar inverted F antenna.The size of antenna is 30x30mm.The gain obtained is -1dbi.The return loss obtained is -40dbm.In proposed system inverted L patch antenna is designed the gain obtained is greater than the existing one.