Ecg Monitoring System Using Novel Non-Contact Electrodes

Krishna Veni. M 1, Dr. E. Sheeba Percis2, Dr. A. Nalini3, Mr. J. Jayarajan4
1Department of EEE, Dr. MGR E& RI, Chennai, India.
2,3Associate Professor 4 Assistant Professor
Dr. MGR E& RI, Chennai, India.
mkrishnaveni31196@gmail.com.

May 3, 2018

Abstract

ECG electrodes to reduce power consumption and providing the good signal quality. This system based on the communication and computing techniques. This telemedicine system maximum used for wet electrodes. The wet electrodes require skin preparation and conduction gel that can be inconvenient and uncomfortable for users. In order to overcome this problem, a new non-contact electrode circuit were proposed and applied in developing a mobile electrocardiogram monitoring system. The introduced non-contact electrode can measure bio-potentials across thin clothing and allowing normal clothe for users to monitor ECG in daily life. These non-contact electrodes provide the good signal quality for measuring ECG across thin clothes.

Key Words: Non-contact electrodes; Zigbee; Heart rate variability; ECG; microcontroller;
1 INTRODUCTION

Electrical-mechanical system used to MEMS technology. An analog signal processing contains a custom-built, dime-sized circuit board which contains an amplifier, filters, and analog-to-digital conversion [1,12]. The EEG dry contact electrodes were created with micro-nonintrusive methods for simultaneous electrocardiogram and photoplethysmogram measurements. They do not require direct contact between instruments and skin. These methods are applied for heart rate and blood pressure monitoring purposes. These types of electrodes driven-right-leg circuit configuration and recording electrocardiogram information through clothing [2]. To reduce the skin-electrode contact impedance require skin preparation and conduction gel. In order to overcome this problem to used dry foam electrodes and fabricated by electrically conductive polymer foam covered by a conductive fabric, were proposed [3]. ECG device consists of lightweight and power-saving wireless and also built-in automatic warning expert system. This device is connected to a mobile and ubiquitous real-time display platform. The acquired ECG signals are instantaneously transmitted to mobile devices, such as netbooks or mobile phones through Bluetooth [4]. The textile electrodes were required to integrate it in standard clothing. The characterization of electrodes based on conductive textile for an ECG system that monitoring the different human positions and also using the traditional silver (Ag/AgCl) chloride electrodes is presented allowing to demonstrate that ECG measured signal. This type of electrodes for wearable health monitoring application [5]. The system proposed to measure the heart rate of neonatal infants without any direct contact with the patient. The solution proposed is based on the use of standard, low-cost and commercially available digital webcam by which it has been possible to observe defined portions of the patient face [6-7]. This system introduced the remote sensing based on respiratory function at homes and this system establish the overcome the time [8]. The main purpose of this paper is to assess the biological effect of nervous activity. The visual stimulus contains the multichannel of ECG monitoring systems and different heart rate variability [9]. The non-contact electrodes measure the bio-electric signals. This signal is weak signal. So, introduced the challenge this overcome this problem to introduce the ECG sensors
First order of gradiometer measurements of the sensitivity, motion artifact cancellation and human subjects. Second order of gradiometer electrodes is the best performance as to measure the signal to noise plus distortion ratio [11,15]. The first device was designed with contact-electrode ECG and PPG sensors, located on the bicep and the ear; while the second one, which is a wrist-worn device, consisted of a non-contact ECG circuit and a piezoelectric pulse sensor [13]. The main advantage of least mean square to reduce the adaptive noise and adaptive removes the maternal heartbeat signal from the fetal electrocardiogram signal [14].

2 BLOCK DIAGRAM

![Block Diagram](image)

Fig. 1

A. MICROCONTROLLER

Maximum microcontroller will be used because it is performed the control function. Different types of standard contain like CLOCK, ROM, RAM, MICROPROCESSOR, SERIAL PORTS AND TIMERS. Microcontroller is a small device and its used to control objects, process because the microcontroller supports circuits built on. Microcontrollers are used in automatically controlled products and
devices, such as automobile engine control systems, implantable medical devices remote controls, power tools and other embedded systems.

B. PIC

PIC is the main part of the microcontrollers and its the first RISC semiconductor-based CMOS. It is used microchip technology. The main advantage of PIC is low cost, wide availability, larger user base, serial programming and re-programmable flash-memory capability. The block diagram is shown in figure 1. PIC is low power consumption and its very small pin count. Different types of memories contain such as EEPROM, EPROM, FLASH etc. and its used to flash technology. They contain different types of units occur such as SI units or CGS as primary units and English units are secondary units. The English units (secondary units) are used to identifiers in trade, such as disk drive. To avoid the SI and CGS combining units, such as current in amperes and magnetic field in oversets. This often leads to confusion because equations do not balance dimensionally.

C. PIN DIAGRAM OF PIC 16F877

![PIC 16F877 Pin Diagram]

TRISA bit (=1) corresponding the data register get the PORTA pin is input and TRISA bit (=0) corresponding the data register get the PORTA pin is output. The output pin is high impedance mode. PORTB is an 8-bit wide bi-directional port. TRISB is the data direction register mode. The corresponding high input impedance of TRISB bit (=1) and get the result of PORTB pin is input and
another corresponding high input impedance of TRISB bit (=0) and get the result of PORTB pin is output. The output pin is selected pins. The special features section of three pins such as RB3, RB6, RB7. A single control bit can turn on all the pull-ups and its disabled on a power-on reset. PORTC is an 8-bit bi-directional port. TRISC is the data register mode. TRISA bit 9=10 corresponding the data register get the PORTC pin is input and TRISA bit (=0) corresponding the data register get the PORTC pin is output. The block diagram is shown in figure 2.

3 EXISTING SYSTEM

An electrocardiogram is record to electrical activity of the heart and over the time period. The ECG monitoring systems contain the different component such as isolation circuit, PW demodulation, notch filter and amplifier. This project is used to the Bluetooth method. The record the electrical activity of the heart function and record the bio-potential. The recording system only used to the short distance method. The disadvantage of this system long-time period, short distance, low accuracy level and potential level. The overcome this problem to introduce this proposed system used ZigBee technology. It is used the long-distance measurement of the ECG monitoring system. The block diagram is shown in figure 3.
A typically electrocardiograph runs at speed of 20 mm/s.

4 PROPOSED SYSTEM

The manufacturing process consists of two methods; print and etch, and usually made from the print and edge method of single sided PCB and also mated from the print edge of double side plate at hole PTH board. ECG monitoring used only short distance will be used. The maximum measurement of biopotential electrodes only used to Bluetooth. The disadvantage of this system short distance measurement, long time interval low accuracy level and potential change. So, this project introduced to the ZigBee method. The waveform is used to the ECG waveform ids good signal quality and accuracy potential.

APPLICATIONS

- This system is used in telemedicine technology.
- Home monitoring system.
- Mobile ECG monitoring system.

ADVANTAGES

- High signal quality.
- Low power consumption.
- Wide range compared to Bluetooth.
• Lead I - negative electrodes placed on the right arm (white) and positive electrodes placed on the left arm (white). Lead II - negative electrodes placed on the right arm (white) and positive electrodes placed on the left leg (red). Lead III - negative electrodes placed on the left arm (black) and positive electrodes placed on the left leg (red).

They are containing the three limb leads such as aVR, aVL, and aVF. Augmented vector left is positive electrode on the left arm that is black color and negative electrodes placed on the right arm that is white color will be used. The left led electrodes placed on the strength of signal passed through on the left arm and that is black color electrodes will be used. Lead aVF (augmented vector foot) is used positive (red) electrodes placed on the left leg. The negative electrodes (white) placed on the right arm and block electrodes placed on the left arm. The block diagram is shown in figure 5. The augmented limb leads aVR, aVL, and aVF form the basis of the reference system, which is used to calculate the hearts electrical axis.

5 CONCLUSION

The progress in science and technology is a nonstop process. New things and new technology are being invented. As the technology grows day by day, we can imagine about the future in which thing we may occupy every place.

The proposed system based on Atmel microcontroller is found to be more compact, user friendly and less complex. This can readily
be used in order to perform several tedious and repetitive tasks. Though its designed keeping in mind about the need for industry, it can have extended for other purposes such as commercial and research application. Due to the probability of high technology used this PIC BASED NON-CONTACT ELECTRODE system is fully software controlled with less hardware circuit. The feature makes this system is the base for feature systems.

References


