Heart Rhythm Diagnoser

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Abstract- Heart Rhythm Diagnoser is a lifesaving instrument which measures the rhythm of heart and diagnoses the activity. Abnormal activity of the heart causes sudden blockage of heart arrest, blood pressure. The early and existing method are portable but they are hard to be carried out. The diagnosed result is in the form of a waveform, which is difficult to be understood by common people. In this paper, we propose an arrhythmia detector where the obtained waveform can be converted into words or terms. The instrument is designed to be portable too. Furthermore, the information of the patient is delivered to the doctor making the diagnosing procedure easier and to be handled anywhere.

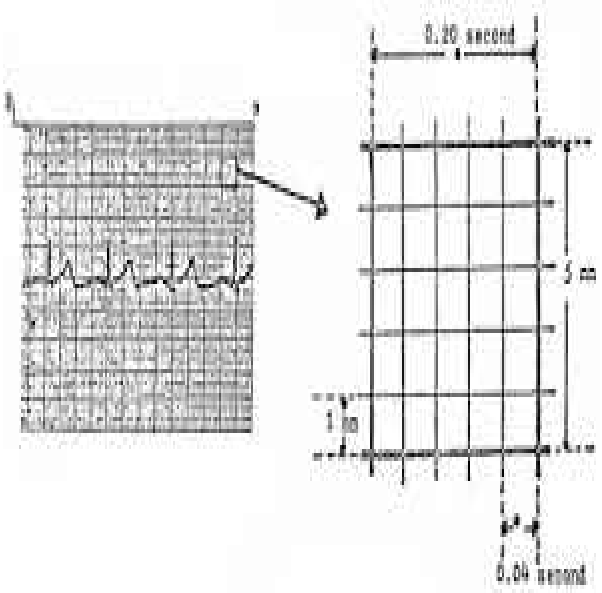
Keywords - Heart, ECG, Diagnosis, Rhythm.

I. INTRODUCTION

The heart is a muscular organ in humans, which pumps the blood through the blood vessels into the circulatory system. The heart pumps a blood with a rhythm determined by a group of pacemaking cells in the sinoatrial node. It generate a current that causes contraction of the heart, traveling through the atrioventricular node and along the conduction system of the heart. The normal rhythmical heartbeat, called sinus rhythm, is caused by the sinoatrial node, the heart's pacemaker. An electrical signal is created and travels through the heart, it causes the heart muscle to contract. Using surface electrodes on the body, it is possible to record the electrical activity of heart. There are five configurations on the ECG: The P wave (atrial depolarisation), the QRS complex (ventricular depolarisation) and the T wave (ventricular repolarisation) of the heart. The electrical signal is known as electrocardiogram. Heart disease is diagnosed by the taking of a ECG, EKG, holter monitor are non-invasive procedures. Other invasive procedures such as cardiac catheterisation can also play a vital role. Everyone could have experienced the heart beat very fast, felt a "fluttering" in their chest or thought that their heart was "skipping a beat." These can be signs of arrhythmia, or abnormal or irregular heartbeat. In arrhythmia detector, the heart rhythm is displayed as a waveform, here the waveform of the heart rhythm is analysed, then converted into words. For simple understanding purpose. The heart rhythm diagnoser is portable and compatible to carry.

II. METHODOLOGY

The methodology to analyse the heart rhythm are as follows. The electrical activity of the heart is generated by the depolarisation and repolarisation of the atria and ventricles. The electrical activity of the heart is extracted by the ECG sensor with surface electrode placed on the surface of the skin, the recorded electrical activity is connected with CRO. The time interval is measurement of the each on the CRO. The wave has certain time period and wavelength are marked on each block on the CRO. It will make fairly accurate measurement of the patient heart rhythm and other measurements by counting blocks up and down on the CRO. The CRO records time sequences (horizontal) and amplitude (vertical) of the electrical activity of the heart. The horizontal line record time interval and heart rate. Each of the small square equal 0.4 seconds of time. 5 small squares equal to 0.20 seconds-fifteen of the 0.20 squares represent 35 seconds.



Arrhythmia: The arrhythmias of the heart rhythm can be defined as normal and abnormal rhythms.

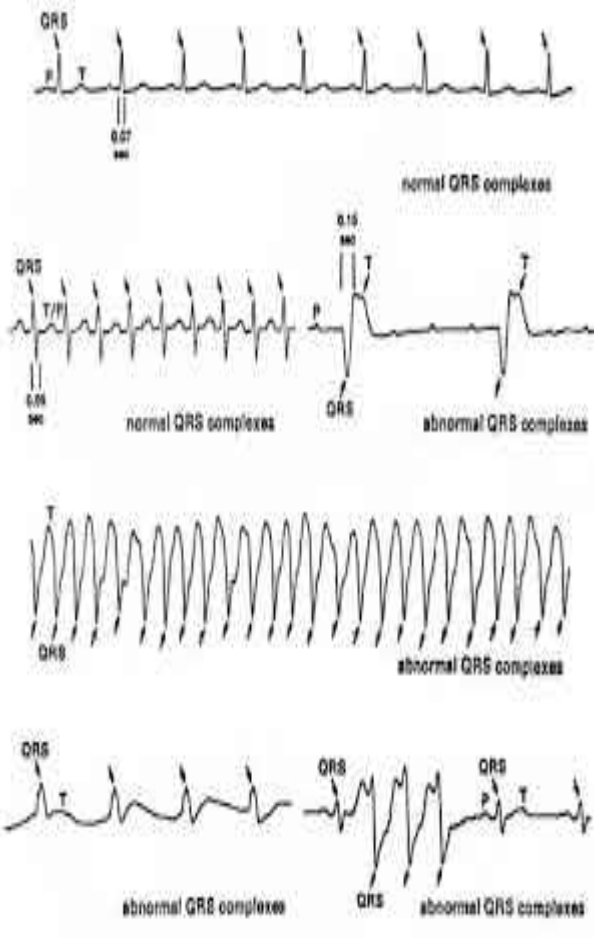
Normal rhythm: In normal sinus rhythm a resting heart rate 60 - 100 bpm. In normal arrhythmia the ECG wave consists of QRS complex. In the P-R interval should be 0.12 - 0.20 seconds.

P Wave: A normal sinus P wave indicates that the electrical impulse responsible for the P wave originate in the SA node. The P wave duration is 0.10 seconds or less. The amplitude of the P wave is 0.5 - 2.5 mm high. The shape is normally smooth and round.

QRS complex: In the QRS complex, the width of the QRS should be less than three Small Square or less than 0.12

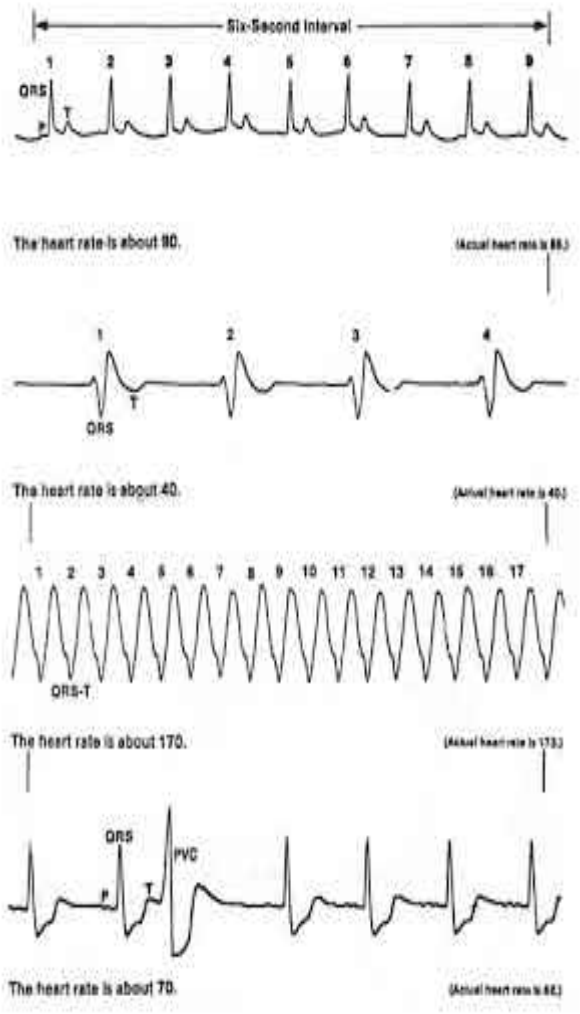
seconds in duration. In normal P wave represents the depolarisation of the right and left atria.

T wave: T wave represents ventricular repolarisation the duration of the T wave is 0.10 - 0.25 seconds or greater. The amplitude of the T wave is less than 5mm.



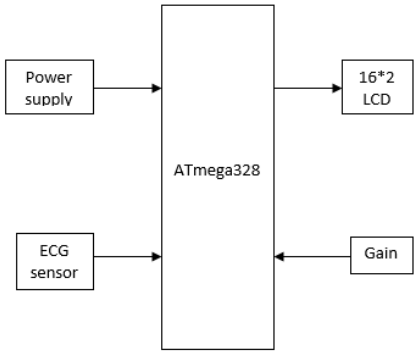
Abnormal rhythm: An abnormal ECG is usually classified as due to slow or fast heart rate or an irregular beat. The abnormal heart beat the QRS complex are irregular. The QRS identification lead to figure out the abnormal waves as followed as the QRS complex duration and shape of the QRS complex may be normal or abnormal waves are identified by following the range 0.15 seconds or less wide are normal, then abnormal waves are greater than 0.10 seconds wide and bizarre appearance.

Heart rate:The abnormal wave has irregular QRS complex. It causes difficult to identify the waves, so the heart rate calculations are used to determine the rhythm of the heart. The heart rate calculations are done by measuring the ECG wave in CRO is the number of ventricular depolarisation or beats occurring in one minute. To calculate the heart rate is quite simple. The duration between two identical points of consecutive ECG waveform such as R - R duration, the duration and divide into 60.To determine the heart, rate the P - P interval length is measured in the rhythm strip and multiply by 10 to get the bpm. This method is more effective; the heart rhythm is irregular.



Number of Small Spaces:	Rate Per Minute
30	50
29	52
28	54
27	56
26	58
25	60
24	63
23	65
22	68
21	72
20	75
19	79
18	84
17	88
16	94
15	100
14	107
13	115
12	125
11	136
10	150
9	167
8	188
7	214
6	250
5	300

III. SYSTEM DESCRIPTION



The detector made use of a user friendly, portable and easy to handle are design and development perspective. In the system consists of a micro controller board, ECG sensor, transformer, bridge rectifier, input capacitor 7805 for regulated power supply 16*2 LCD.

Bridge rectifier: A bridge rectifier is a common part of the electronic power supplies a bridge rectifier is a convertor in which convert AC to DC inputs.Bridge rectifier is used for the power supply configuration. The four diode makes the circuit very simple, a secondary winding transformer is requested for the care saturation, is perfectly resulting in an efficient AC to DC convert.

Voltage regulator: The voltage regulator reduces the impedance of the power in which used to reduce or regulate the voltage, voltage fluctuation that occur as a function of current demand fluctuations in which has to control over. The job of the regulator to keep the output, steady, when the input is steady. The regulator is widely used in many application.

ATmega328: The ATmega328 is a single chip (micro controller) is used in project, it is a simple, low-powered, low-cost micro controller is needed. The Atmel 8-bit AVR RISC- based micro controller combines 32 kb ISP flash memory with read while write capabilities. The ATmega operates between 1.8 - 5.5 volts. It supplies the low voltage to the system. The ATmega achieves the output throughout the approaching in 1 MIPS/MHz

LCD: The LCD display the number of ECG waveform is displayed in words from the extraction of ECG sensor through electrode ECG sensor:The ECG sensor is connected with surface electrode, mounted on the body surface. The electrical activity from the heart (SA node) is extracted. (The rhythm of the heart is recorded) The heart rhythm is measured and determined the arrhythmia of the heart. The ECG waves are figured out in terms of words into 16*2 LCD display. The displayed output is (useful for) easy to understand for common people. The identified waves are make the diagnosing process simple and determination of the heart rhythm in portable form.

IV. DISCUSSION

The rhythm detector aid for diagnosing the heart patients, and common to people. The portability of the system makes easy to carry everywhere. The diagnose become very simple and easy understand to everyone. This technology is an enhance methodology of previous technique as it enable the (disorder) people to understand .This project provides good precision in measuring the heart rhythm.

V. RESULT

This paper has described the development of a technique training kit used to diagnose the patients with ECG sensor and surface electrode. The arrhythmia of the heart can be easily measured. The simple and compact of the system made the system to be portable and to diagnosing the heart rhythm.

VI. CONCLUSION

We upgraded the heart rhythm diagnoser by using the ECG sensor, which makes both the patient side and doctor side more comfortable and convienient. A simple circuit using a microcontroller can do a lot in the field of cardiology.

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