IEESE International Journal of Science and Technology (IJSTE), Vol. 1 No. 4, December 2012,16-22
ISSN : 2252-5297

Visual Information for ECG Recording of Measure The Interval Between Deflection

Muhammad Ashar[1,], Irmalia Suryani Faradisa[2,], and Dwi Cahya Pratowo[3]

[1]Department of Electrical Engineering - Universitas Negeri Malang – Jl.Semarang 5 Malang
[2,3]Department of Electrical Engineering - Insitut Teknologi Nasional Malang – Karanglo Km 10 Tasikmadu Malang
Indonesia
Author Email : ashar@um.ac.id; irmaliaf@yahoo.com

Abstract. Heart diagnosis in the calculation of the RR interval, QRS interval, PR interval and ST segment interval is used to speed the process of converting data into a graphical visualization electrocardiogram. The normal range of deflection which resulted data recording process through the acquisition of ECG data using signal electrodes connected to a PC soundcard. The process of recording data by the primary inputs using the ECG module and put the electrodes in accordance with bipolar (Lead I, Lead II and Lead III) on the patient's body. The interval between the secondary run private deflection presented by changing the recording ECG signals into graphic form by the application windows. Calculation of the interval between the deflections obtained effectively with the flexibility to measure the interval between the deflection, magnification edit graphics, and inter-deflection calculation is automatically displayed as visual information.

Key-Words: *Electrocardiogram, Deflection, Visual Information*

1. Introduction

ECG based paper recordings to find the information quite difficult, it takes experience and knowledge about the symptoms of the heart disease . first of all, manual extraction of important information in the ECG signal is extremely inefficient because the number of data that must observated .Transformation manual system of recording ECG data into the system important digital computer designed to accelerate heart diagnosis heart. The prototype of this application can help patients and physicians to provide appropriate information on heart conditions and ease of reading the ECG recordings. Form of graphical visualization is obtained by converting analog recordings of heart by electrocardiogram signals to graphical form through the soundcard-based PC programming windows.

The heart's electrical signals generated in the ECG in general is a time domain signal recording in the paper called an electrocardiogram. Usefulness of the electrocardiogram is very useful to know the patient's heart condition, making these devices as standard equipment for all hospitals Pratondo Busono et al, [1].

ECG building pre-amplifer (gain 1000) with High Pass Filter (to reduce noise and artifacts), digital notch, and butter-worth filter using matlab input signal by the microphone inside the electronic circuit on the PC Sound Card capable of minimizing electronic circuits, cost and power consumption electricity. Function in Matlab is used as an ECG signal generators that generate polynomial coefficients are stored in files to be transmitted to the server via the Internet jack on the sound card. Saleh M. Al-Qaraawy et al [2].

PR interval is the distance between the beginning of the P wave until the beginning of the QRS complex. PR segment is the distance between the end of the P wave until the beginning of the QRS complex, so is the PR interval. QT interval represents the time required for depolarization and ventricular depolarization. QT interval was measured from the beginning of the Q wave until the end of the T wave ST segment is a horizontal line which is sometimes a little curve between the end of the S wave and the beginning of T wave Samuel Kristiyana [3]

One way that many do is to use computer assistance to determine the characteristics of the signal on the ECG. In this way, the detection of signal (P, QRS, T), the interval that separates them, the duration, the fluctuations can be done more carefully. Acquisition of high-quality ECG recordings are very important to detect the emergence of symptoms of arrhythmias (heart disorder) in a sudden heart attack. Above difficulties can be overcome by designing a software that can analyze online and offline waves in the ECG and then diagnose it so that the probability of illness can be known. Waslaluddin, et al [4].

2. Research Methode

Determination of the interval between the ECG signal deflection begins with designing the syntax program interfaces, applications access data collected in the buffer, the application decoding device drivers as the process of storing data into the buffer.

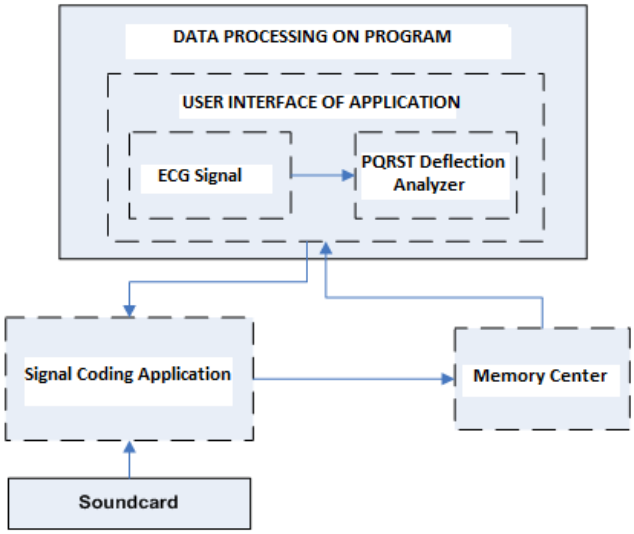

Figure 1. Design interfacing determination of the interval between deflection the ECG

The next step is the formation of the signal along with the required parameters for the decoding algorithm in decoding applications via the signal processing thread.

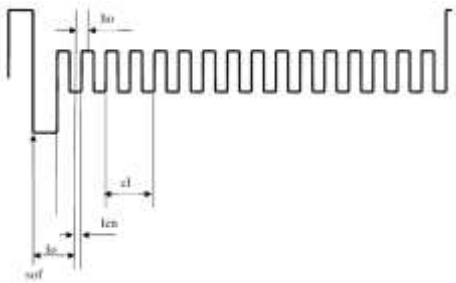

Figure 2. Signal wave of the decoding variable[11]

if the signal is represented in Figure 2 produces discrete data that can be stored in a variable array with the name of the buffer, then the amount of signal in the channel

$$offset + Gain \times \left(\frac{\sum_{i=0}^{len} buffer[sof + lo + ho + (cl \times n) + i] - \sum_{i=0}^{len} buffer[sof + lo + (cl \times n) + i]}{len} \right)$$

Sof = start frame index,
lo = offset (the number of data that must be passed) to retrieve the data phase of "low" calculated from Sof,
ho = offset (the number of data that must be passed) to retrieve the data phase of "high" is calculated from (Sof + lo),
len = number of data points that will take the average value, cl the number of data points for each channel the number of channels used in the design manufacture of application = 1 (cl = 1)

Determination of deflection wave is done by checking the data buffer is then transferred into a temporary variable, the ighest value of the data is expressed as R and the lower deflection is deflection S. Determine step wave deflection Automatic Deflection which is easy to find Q, R and S, due to deflection R is the highest value, deflection Q is the lowest value first and deflection S is the second lowest value.

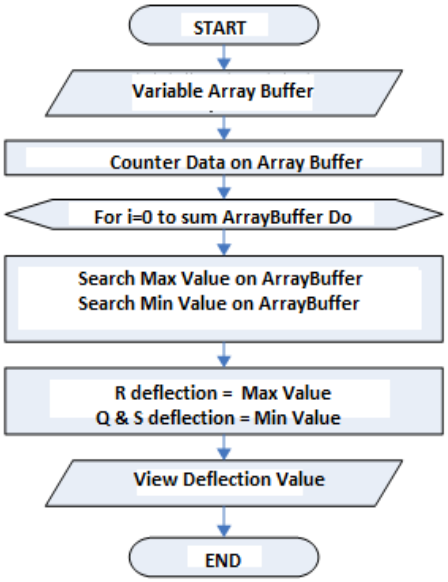

Figure 3. Automatic determination of deflection Flowchart

In determining the deflection Q, R and S, the application is required for some functions to display the deflection of the data obtained. Some of these functions can be seen in the following syntax;

Function for R deflection :

```
function Tfrm_EKGMonitor.FindR(X, Y :integer): integer;
begin
```

Function for S deflection :

```
function Tfrm_EKGMonitor.FindS(X, Y: integer): integer;
begin
```

Function for Q deflection :

```
function Tfrm_EKGMonitor.FindQ(X, Y: integer): integer;
```

From the existing data in the buffer (array type) to find the deflection R by comparing the greatest value from the array to 1 to the value of the n array, and looking for deflections Q and S by comparing the smallest value from the array to 1 to the n is the buffer. In search implementation on the data written to the following syntax.

```
SetLength(BeamEKG,round(PlotPtsPerFrame)-3);
ValyR := BeamEKG[0].Y; ValyS  :=  BeamEKG[0].Y;
while i <= PlotPtsPerFrame-4 do
    begin
     inc(i);
     inc(BeamI);
     BeamEKG[BeamI].X:=x;
     BeamEKG[BeamI].Y:=ChScale(p^[i]) + trOfsCh.Position;
     if ValyR > BeamEKG[BeamI].Y then begin
       ValyR :=  BeamEKG[BeamI].Y;  ValxR :=  BeamEKG[BeamI].X;  ValyQ :=  BeamEKG[BeamI 10].Y;
       ValxQ :=  BeamEKG[BeamI - 10].X;  ValyS :=  BeamEKG[BeamI + 7].Y;  ValxS :
       BeamEKG[BeamI + 7].X;
     end;
     {If ValyS < BeamEKG[BeamI].Y then begin
       ValyS :=  BeamEKG[BeamI].Y;  ValxS :=  BeamEKG[BeamI].X;
     end;}
     Inc(x,xinc);
    end;
 //    unit frm EKG_Monitoring
//=========================================================
   frmEKGMonitoring.DataBeam(BeamEKG);        frmEKGMonitoring.FindR(ValxR,ValyR);
   frmEKGMonitoring.FindS(ValxS,ValyS);        frmEKGMonitoring.FindQ(ValxQ,ValyQ);
//=========================================================
```

In the application design determine the interval between P wave deflection of the QRS complex and T, which is required is the interval (distance) from one another deflection to deflection. Beginning the process that must be done is to determine the size of the pixels of the image (here the wave is displayed in the form of drawings), after it determines how the value of the coordinates (x, y) for the deflection of the first and second deflection. Values obtained coordinates of pixels size to be changed into a form mm.

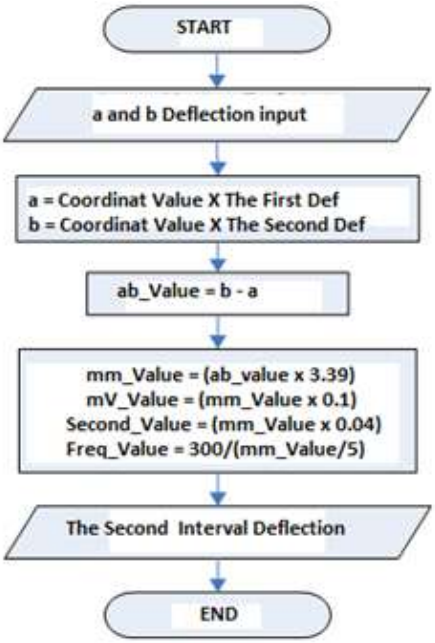

Figure 4. Determination of deflection Flowchart

3.Results And Analysis

3.1. Calculation of The Interval Between The ECG Deflection Manual

ECG recordings deflection P, Q, R, S, T obtained manually can be analyzed through the calculation of inter-deflection intervals by drawing a line automatically show the next RR interval information, the frequency and rate [image 5.6]. ECG application windows can be easier in the calculation of deflection through the determination of inter-point deflection with visualization tools that can be enlarged or zooming graph

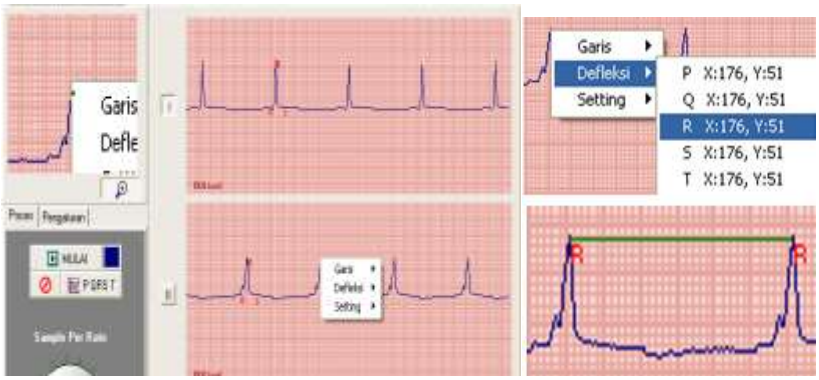

Figure 5. Result of determination interval deflection from windows application

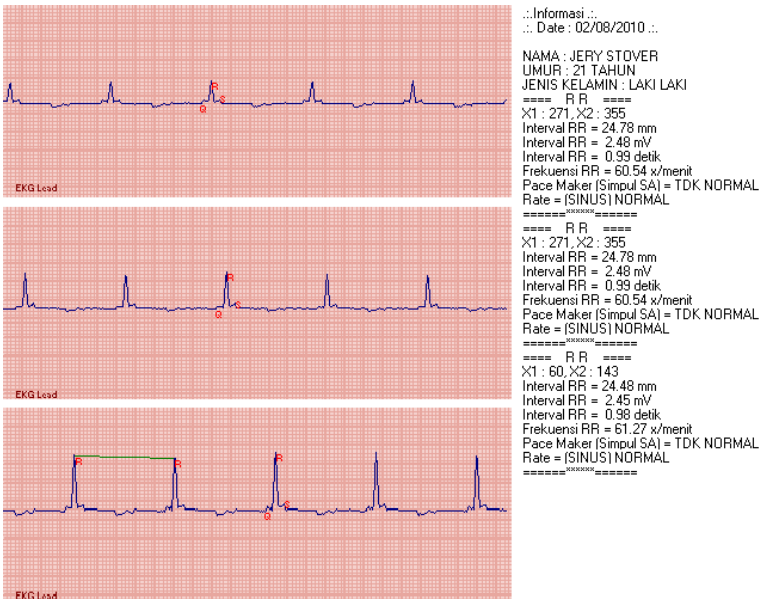

Figure 6.Result of ECG recording from windows application

3.2. Comparison of ECG Recording With Windows Application

Table.1. Comparison of ECG recording with windows application

Human	ECG Manual			ECG Automatic			Error
	Heart Rate						
	L.I	L.2	L.3	L.1	L.2	L.3	
M.Farid (23 years old/man)	58	58	64	70	69	69	0.18
D.Cahyo (21 years old/M)	79	79	83	71	70	69	0.11
Jeri Stover(22 years old /M)	61	61	60	60	60	61	0.01
M.Ali Jaunary(20 years old /M)	84	84	80	84	84	84	0

Calculation of heart rate obtained [Table 1] shows the first two patients had significant differences in variation between the deflection measurement interval of each lead, while the next 2 patients almost has the same calculation by ECG and manual windows application so that the total error obtained by heart rate close to zero.

4. Conclusion

Application windows are applied to the ECG graph diagnosis to determine the interval between the deflection calculation of P, Q, R, S, and T with bipolar (L1, L2, and L3). Tools that are designed to have accuracy and similarity calculation significant heart rate between ECG manual used by cardiologists or contained in the hospital.

References

[1]. Busono, Pratindo., Susanto, Eddy.,Wiewie., Sadeli Yuliana Algoritma untuk Deteksi QRS Sinyal ECG. Prosiding Semiloka Teknologi Simulasi dan Komputasi serta Aplikasi.2004

[2]. Samuel Kristiyana, Reduksi derau dengan menggunakan tapis adaftif, jurnal teknologi technoscientia, vol 1 no 2 Februari 2009,ISSN : 1979-8415

[3]. Waslaluddin,Wawan setiawan, Klasifikasi Pola Sinyal Elektrik Jantung pada EKG Menggunakan JST berbasis Backpropogation, Jurnal Pendidikan Teknologi dan Komunikasi, Vol 1 no 2 Desember 2008, ISSN: 1979-9264

[4]. Saleh M. Al-Qaraawy ,Hamid Mousa Hasan, Maher Faik Esmaile, Remote ECG Signal Monitoring Via Internet, Eng. & Tech. Journal,Vol.27, No.7, 2009