Implementation and Simulation Results

4.1 Simulation and the results of the heart rate:

This paragraph describes the results of the heart rate when the user enter impulses to the Microcontroller and thus also in it's coming from the amplifier will maximum the signal , then the value will be displayed on the LCD. The figure (4-1) illustrates value on LCD which is 179.9 pulses / minute that means 3.3beats /second.

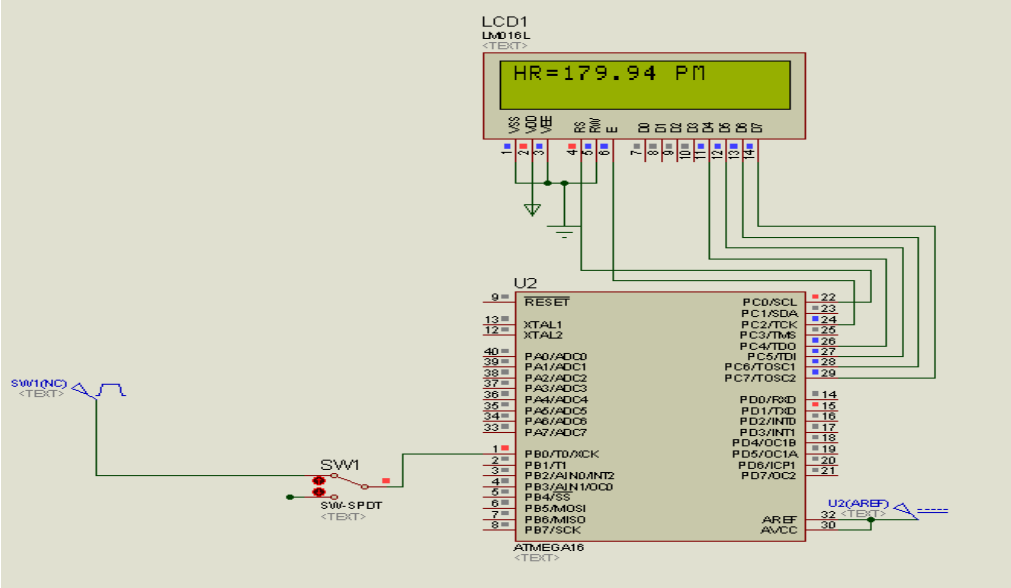


Figure (4-1): Simulation and the results of heart rate (179.9)

First pulse:

1sec —— 15625

2sec —— 2*15625

Time 1 —— TCNT 1 ∴ Time 1 = $\frac{\text{TCNT 1} * 2}{15625}$

Second pulse:

1sec —— 15625

2sec —— 2*15625

Time 2 ——TCNT 1 $\therefore$ Time 2 = $\frac{\text{TCNT 1} * 2}{15625}$

Time all = Time 2 – Time 1 , HR (sec) = $\frac{1}{\text{Time all}}$

$\therefore$ HR (min) = HR (sec) * 60

The figure (4-2) illustrates another value on LCD which is 60 pulses / minute that means 1 beats /second.

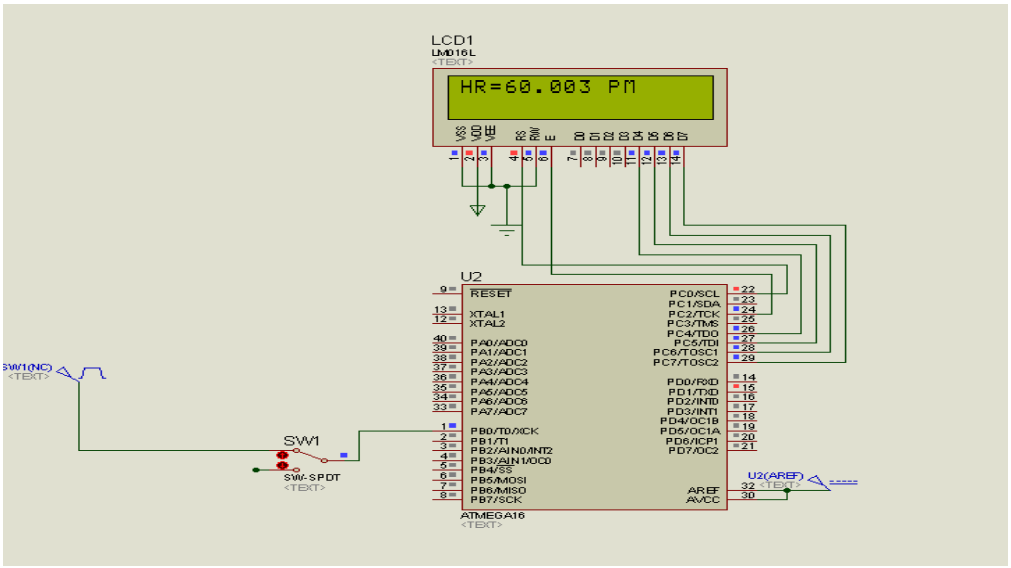


Figure (4-2): Simulation and the results of heart rate (60)

The figure (4-3) also illustrates another value on the LCD which is 120 pulses / minute that means 2 beats /second.

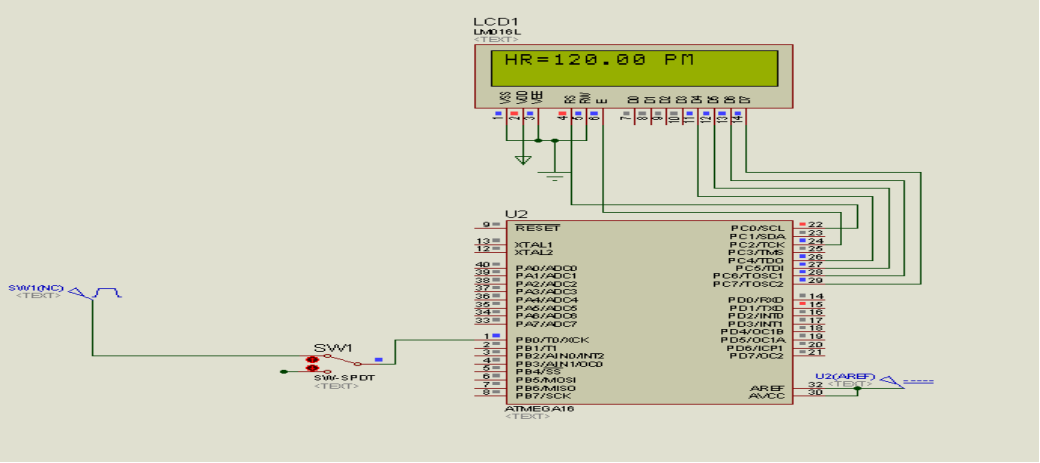


Figure (4-3): Simulation and the results of heart rate (120)

4.1.1 Microcontroller and amplifier:

The figure (4-4) illustrates the Simulator of heat rate, the value 101beats /minute from the 1.68 pulses. (Was conducted by the researcher).

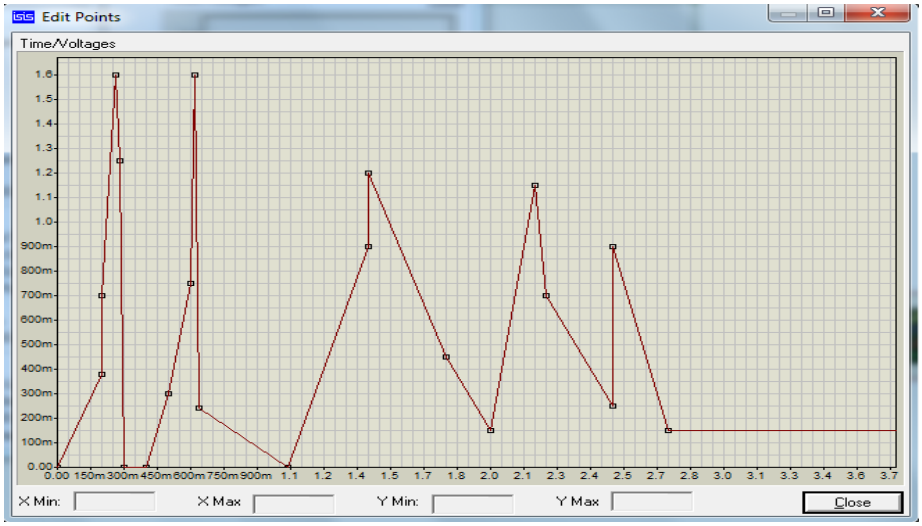


Figure (4-4): Microcontroller and amplifier

The figure (4–5) shows the pulse rate with the operational amplifier, the difference between input and output signal.

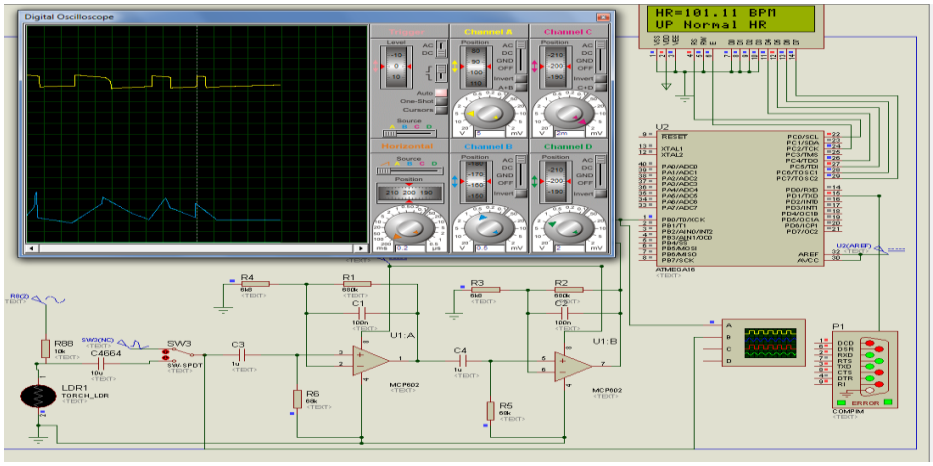


Figure (4-5): operational amplifier input and output signal

The Figure (4-6) shows operational amplifier functions convert reference to signal square, sine wave pulse 1 pulse /second, that means 60 beats /minute.

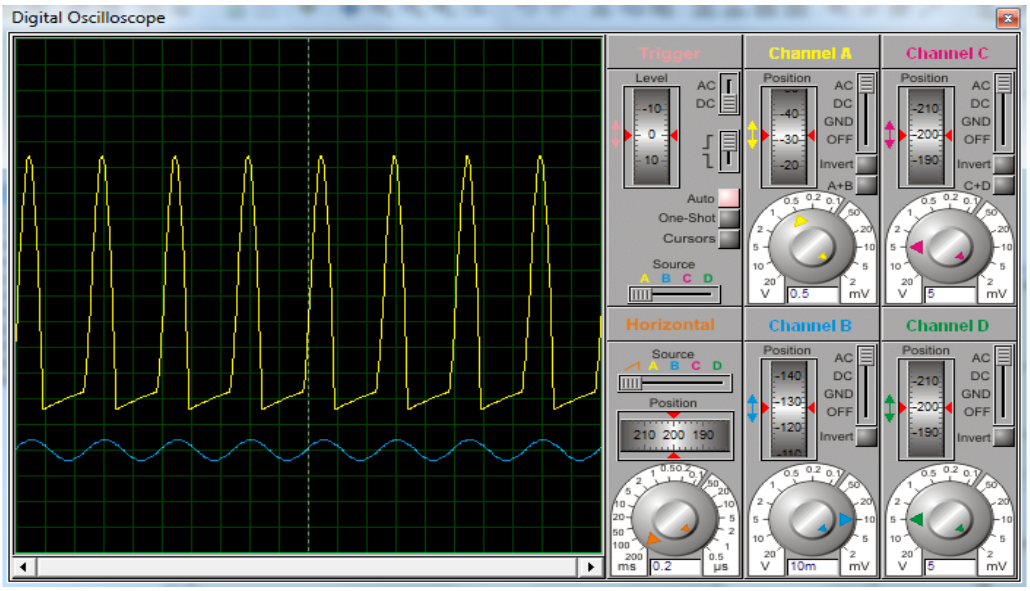


Figure (4-6): operational amplifier to signal square

The figure (4-7) shows resulting value on the screen frequency of 1 Hz.

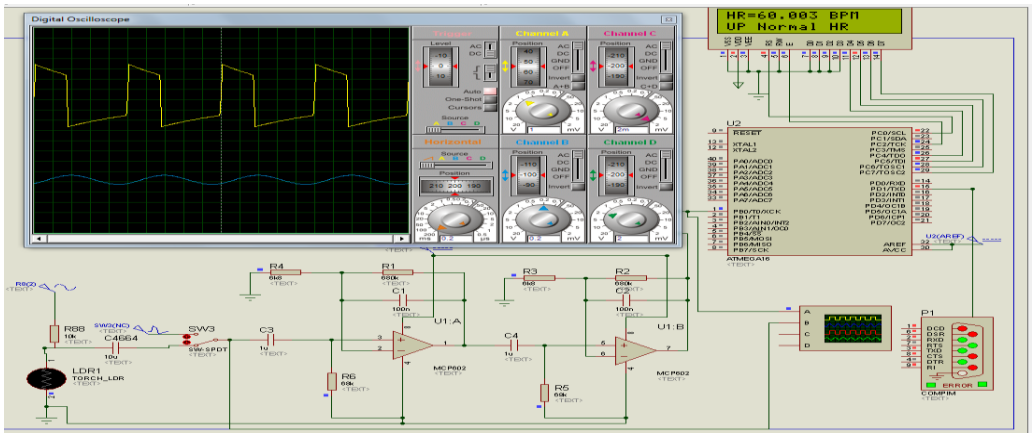


Figure (4-7): operational amplifier frequency of 1 Hz

4.2 Temperature measurement outputs:

The figure (4-8) shows the Temperature on the LCD, the value 22.9 degrees Celsius this means abnormal.

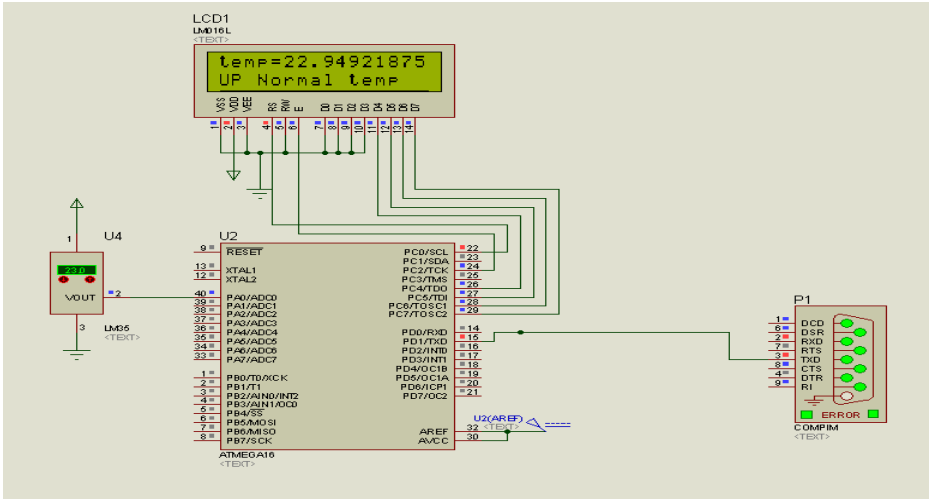


Figure (4-8): Temperature outputs up normal

The figure (4-9) shows the Temperature on the LCD, the value 28.3 degrees Celsius this means normal .

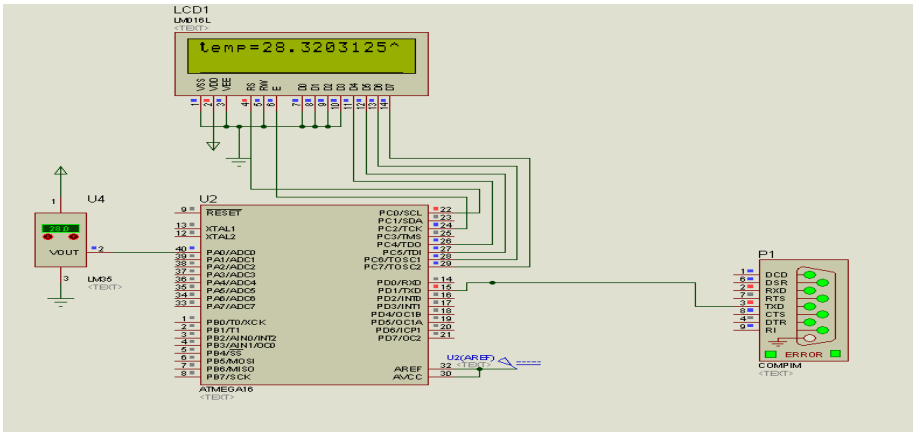


Figure (4-9): Temperature outputs normal

4.3 Blood pressure measurement outputs:

The figure (4-10) shows the blood pressure and the form of reference.

The oscilloscope illustrates the input signal in Microcontroller, the output format from amplifier.

The signal interference for Microcontroller and be a valuable blood pressure as shown in the LCD of 89.7 mmHg.

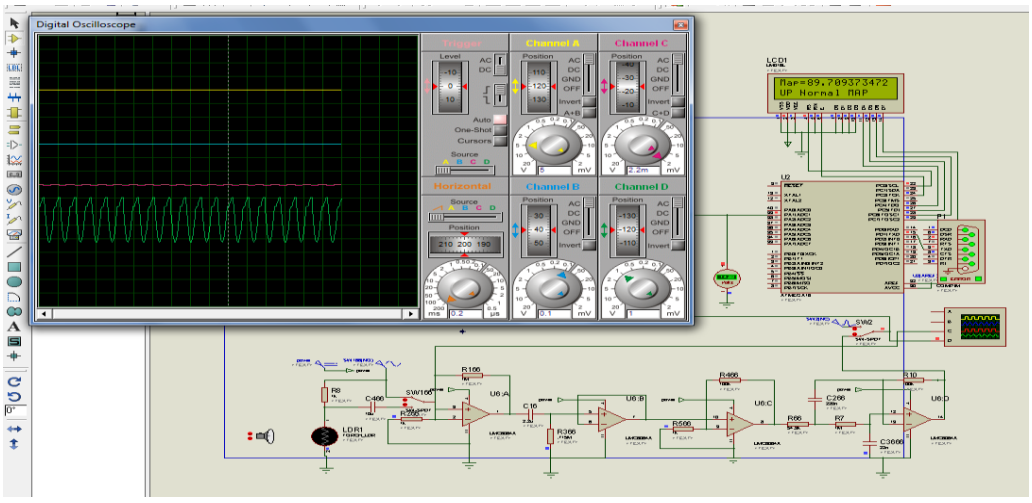


Figure (4-10): Blood pressure outputs (89.7)

The figure (4-11) shows the blood pressure and the form of reference. The oscilloscope illustrates the input signal in Microcontroller volt, output format from amplifier. But the signal is small compared with the previous signal.

The signal interference for Microcontroller and be a valuable blood pressure as shown in the screen of 189.9 mmHg.

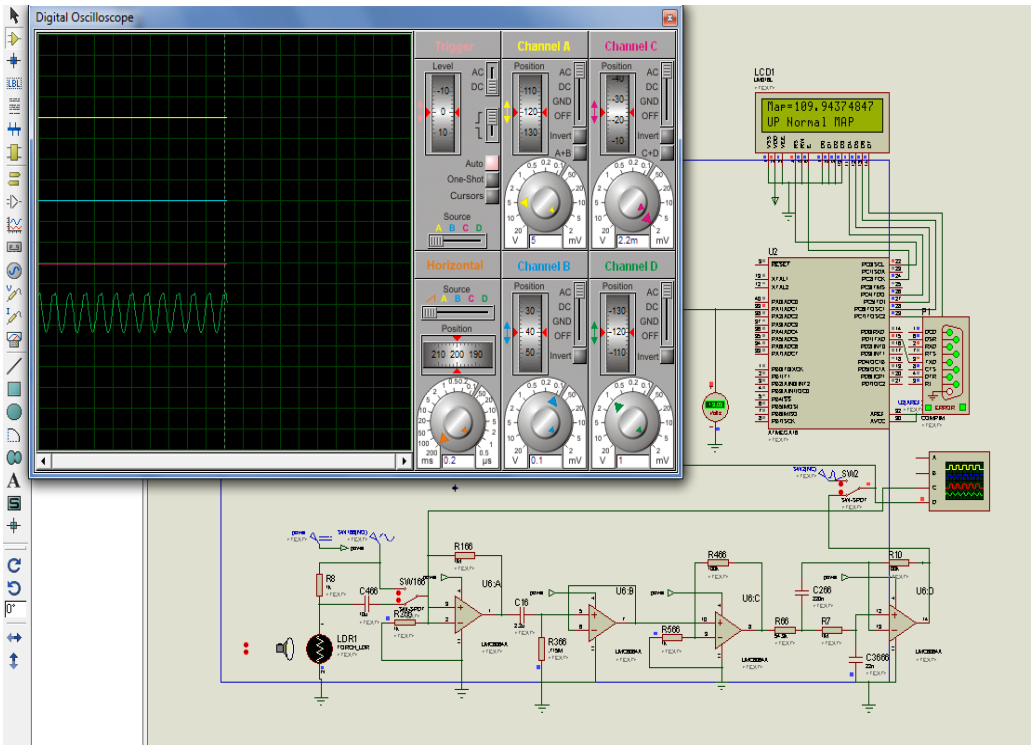


Figure (4-11): Blood pressure outputs (189.9)

The figure (4-12) shows the blood pressure and the form of reference. The oscilloscope illustrates the input signal in Microcontroller volt, output format from the Department of amplifier. But the signal is max is 2.5 and min is 1.5 volt compared with the previous signal.

This signal interference for Microcontroller and be a valuable blood pressure as shown in the screen of 189.9 per cent.

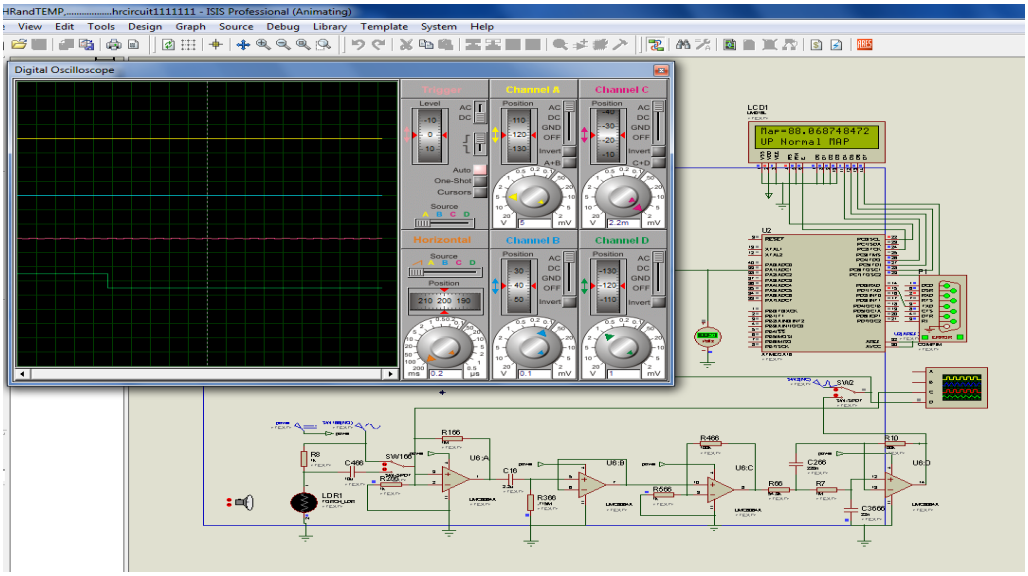


Figure (4-12): Blood pressure outputs (max & min volt)

The Figure (4-13) shows the shape of the signal which got into the Microcontroller amplifier.

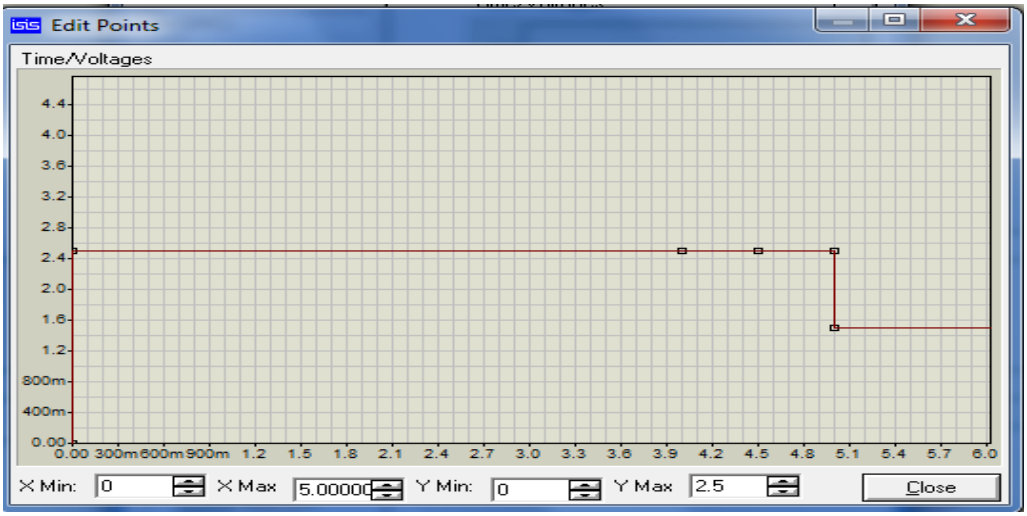


Figure (4-13): Blood pressure outputs (into Microcontroller Amp)

The figure (4-14) shows all the sensors are working in a united system and oscilloscope shows the input and output, also shows the messages going to the (SMS) by virtual terminal.

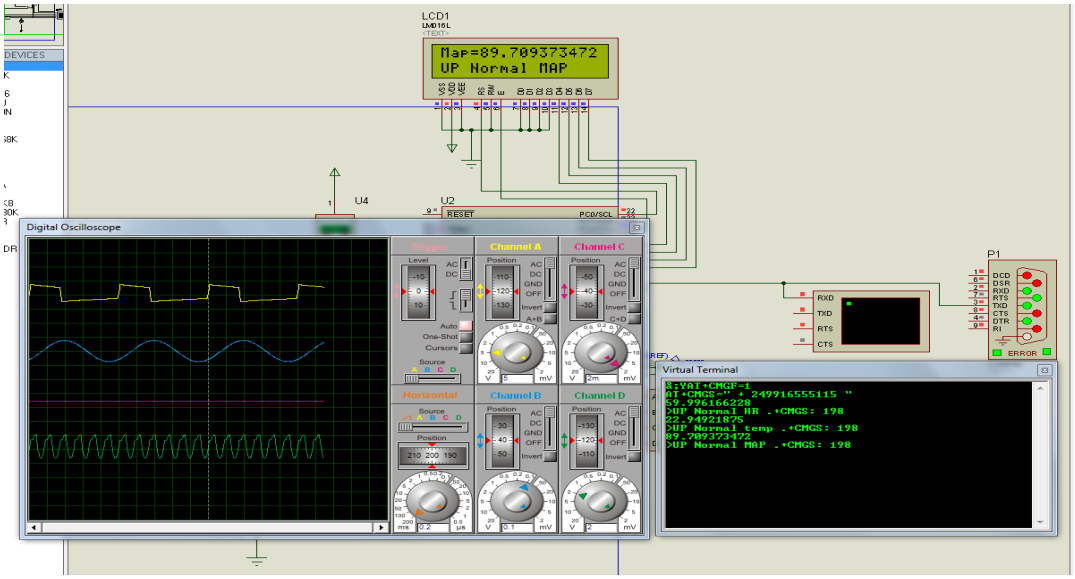


Figure (4-14): Blood pressure outputs (SMS)

The figure (4-15) shows all the sensors on the display by GUI and also the database.

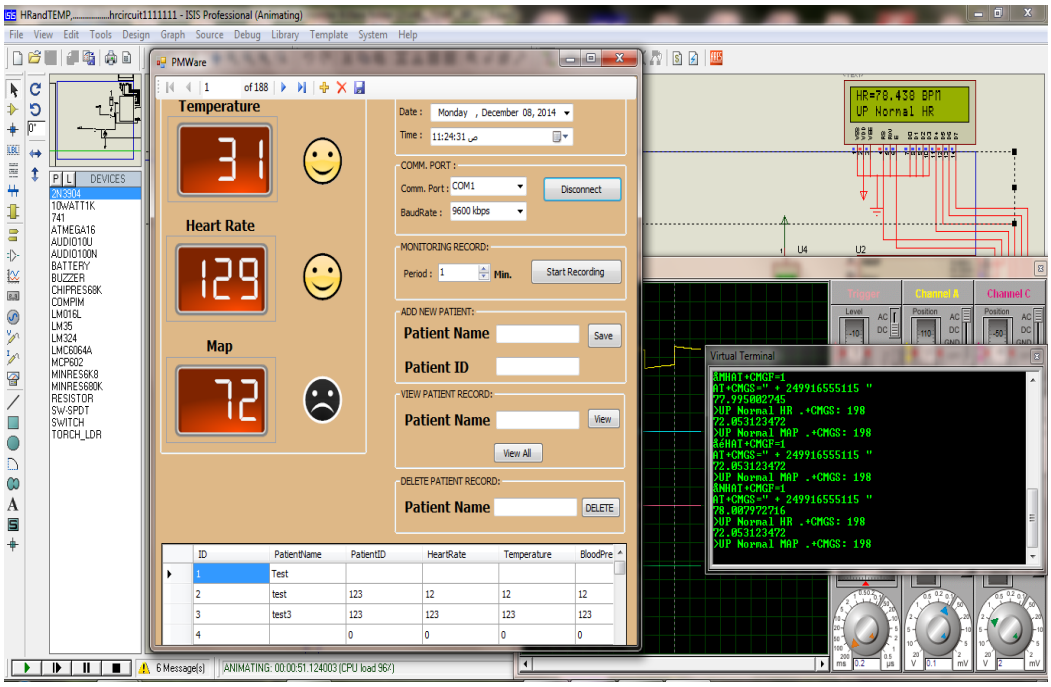


Figure (4-15): Blood pressure outputs (GUI)

In this project, Visual C#. 2010 software is used for monitoring, recording and saving all patient data in the PC. For software design, the GUI display Heart rate, Blood pressure and Temperature reading comes from Microcontroller atmega16.

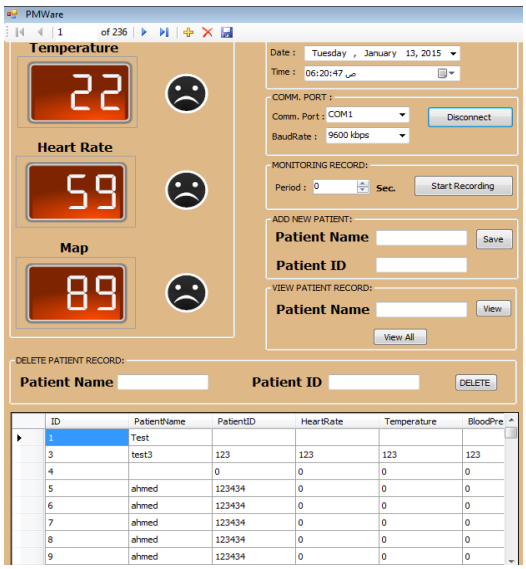


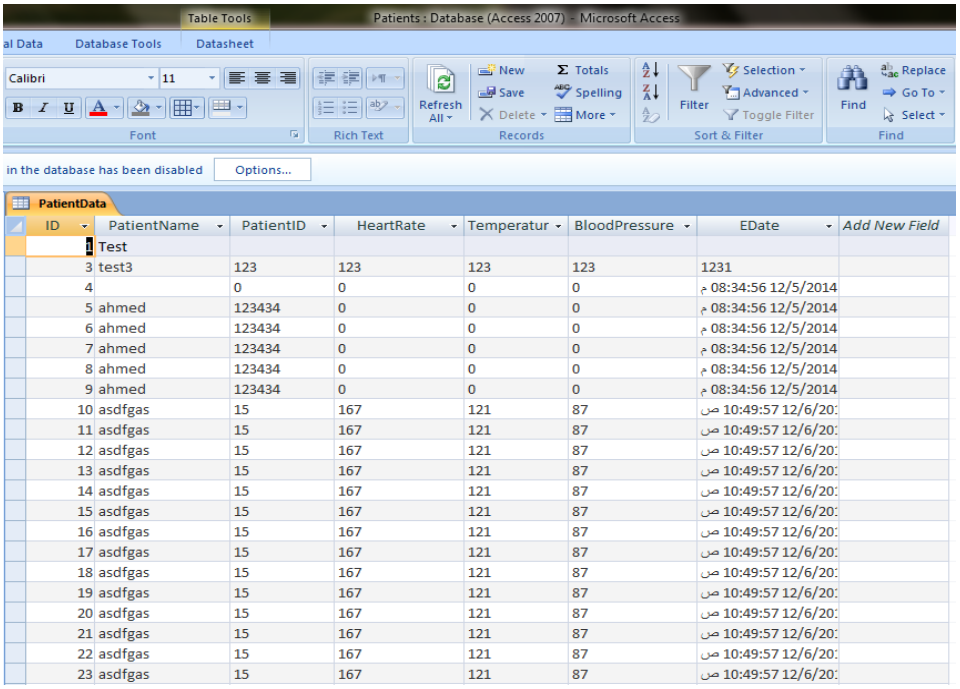
Figure (4-16): GUI Display for Heart rate , Blood pressure and Temperature

Figure (4-17): GUI for heart beat reading

The Figure (4-16): shows the GUI for heart beat, Blood pressure and Temperature reading which will be taken from atmega16 circuit wirelessly, while the Figure (4-17): shows the GUI for heart beat reading only.

In the Figure (4-16) shows Example No (1) which illustrates the number of the heart beat which is 59 Beat/min and the patient status is Abnormal. In this system, the value of heart beat reading is set for three parts, abnormal low for heart beat from (0 – 60), normal (61 – 100) and lastly abnormal high is more than “100”, Example No (2) which illustrates the grade of the temperature which is 22 $^{C^{o}}$ and the patient status is Abnormal.

In this system, the value of temperature reading is set for three parts, abnormal low for heart beat from (0 – 35), normal (36 - 39) and lastly abnormal high is more than "39". Example No (3) which illustrates the measure of the Blood pressure which is "89 mm/Hg" and the patient status is Abnormal. In this system, the value the Blood pressure reading is set for three parts, abnormal low for heart beat from (0-92), normal (93-105) and lastly abnormal high is more than "105". The GUI will display the same reading at the LCD from hardware. Every changing of heart beat, Blood pressure and Temperature reading will update the GUI. As the result, this system is very effective to monitor all patients every minute. This system also designs to save all patient data in the PC. The Figure (4-18) illustrates the patient data which save in a PC. This data will be saved in Access format with date, time and the time to record the monitoring patient condition and the reading of heart beat, Blood pressure and Temperature.



ID	PatientName	PatientID	HeartRate	Temperatur	BloodPressure	EDate	Add New Field
1	Test						
3	test3	123	123	123	123	1231	
4		0	0	0	0	م 08:34:56 12/5/2014	
5	ahmed	123434	0	0	0	م 08:34:56 12/5/2014	
6	ahmed	123434	0	0	0	م 08:34:56 12/5/2014	
7	ahmed	123434	0	0	0	م 08:34:56 12/5/2014	
8	ahmed	123434	0	0	0	م 08:34:56 12/5/2014	
9	ahmed	123434	0	0	0	م 08:34:56 12/5/2014	
10	asdfgas	15	167	121	87	ص 10:49:57 12/6/20	
11	asdfgas	15	167	121	87	ص 10:49:57 12/6/20	
12	asdfgas	15	167	121	87	ص 10:49:57 12/6/20	
13	asdfgas	15	167	121	87	ص 10:49:57 12/6/20	
14	asdfgas	15	167	121	87	ص 10:49:57 12/6/20	
15	asdfgas	15	167	121	87	ص 10:49:57 12/6/20	
16	asdfgas	15	167	121	87	ص 10:49:57 12/6/20	
17	asdfgas	15	167	121	87	ص 10:49:57 12/6/20	
18	asdfgas	15	167	121	87	ص 10:49:57 12/6/20	
19	asdfgas	15	167	121	87	ص 10:49:57 12/6/20	
20	asdfgas	15	167	121	87	ص 10:49:57 12/6/20	
21	asdfgas	15	167	121	87	ص 10:49:57 12/6/20	
22	asdfgas	15	167	121	87	ص 10:49:57 12/6/20	
23	asdfgas	15	167	121	87	ص 10:49:57 12/6/20	

Figure (4-18): Patient Data Result