Resting ECG's

Purpose: The purpose of this experiment is to understand how an ECG (EKG) works, how it captures our heart's electrical signals, also to check for different heart conditions.

Procedure: 1.To get things started: Before you turn anything on, be sure the IWX/214 unit is plugged in, and that the IWX/214 unit is connected to the laptop by USB cable. Be sure that theC-AAMI-504 EEG cable is inserted into the isolated inputs of Channels 1 and 2 of the IWX/214. Be sure that the three color-coded lead wires are correctly inserted in the lead pedestal of the C-AAMI-504 EEG cable. Insert the connectors on the red, black, and green electrode lead wires into the color-coded matching sockets on the lead pedestal of the ECG cable. The white and brown lead wires can be removed and neatly placed in the I worx case, you do not need them for Lab 10, but after the week is over, they will need to be replaced. Once everything is connected, FIRST turn on the laptop and allow it to fully boot up before you turn on the IWX/214 unit. Once the Iworx unit is on, the red indicator light on the Iworx unit should light up and you may hear the USB chime from the laptop if the laptop does not default to mute (many are set to default to mute).

2. Open the Lab scribe 3 program by clicking on theLabscribe3iconon the desktop. As soon as the program opens, you should see a window pop-up that says "Hardware foundIWX214:2008-1-24," click "OK."

3. In the second from the top row (the row that says "File Edit View Tools Settings Advanced External Devices Help"), click on the "Settings" tab. About one third of the way down the drop-down window should be a tab called "Human Heart. "Click on that tab and that should lead you to a tab called "ECG-Heart Sounds". The screen should look like this file:

4. Since Lab 10 is about ECG only, we can hide the lower "Heart Sounds" row by clicking on the ▽ symbol to the left of the row label, then clicking on the "**Hide**" tab, and then "**Yes**". The main window will then look something like this:
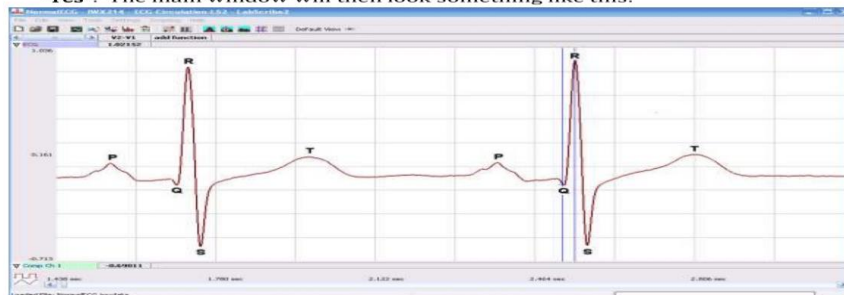
5. Remove the disposable ECG electrodes from its envelope and snap the lead wires on to the electrodes while the electrodes are still on the plastic shield. Instruct the subject to remove all jewelry from their wrists and ankles. Use an alcohol swab to clean a region of skin on the subject's right wrist, and the inside of both ankles. Let the area dry.

6. Apply the black (-1) electrode to the scrubbed area on the right wrist. Repeat Steps 5 and 6 for the inside of the left ankle and the inside of the right ankle, so that the following Lead II is arranged: the black (-1) lead is attached to the right wrist, the red (+1) lead is connected to the left ankle, the green (Cor ground) lead is connected to the right ankle.

7. Instruct the subject to sit quietly with their hands in their lap. If the subject moves, the ECG trace will move off the top or bottom of the screen. If the subject moves any muscles in the arms or upper body, electromyograms (EMGs) from the muscles will appear on the ECG recording as noise.
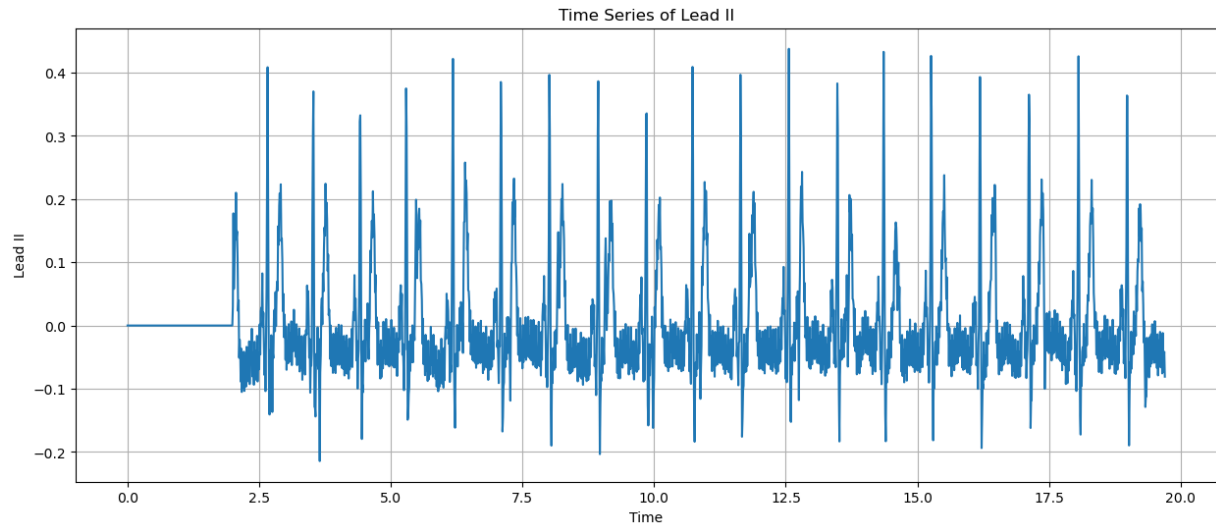
8. Click on the Record button, located on the upper right side of the Lab Scribe Main window. The signal should begin scrolling across the screen. If the ECG appears upside down in Lead II (upside down P, R and T waves), click on the upside-down triangle on the far left of "A1: ECG 0.3-35Hz," then click on the first option "Invert." This should correct the image of your Lead II ECG to be "right side up, "but do this ONLY ONCE.

9. When you have a suitable trace, type <Subject's Name> Lead II in the Mark box to the right of the Mark button. Press the Enter key on the keyboard after the recording has started to attach the comment to the data.
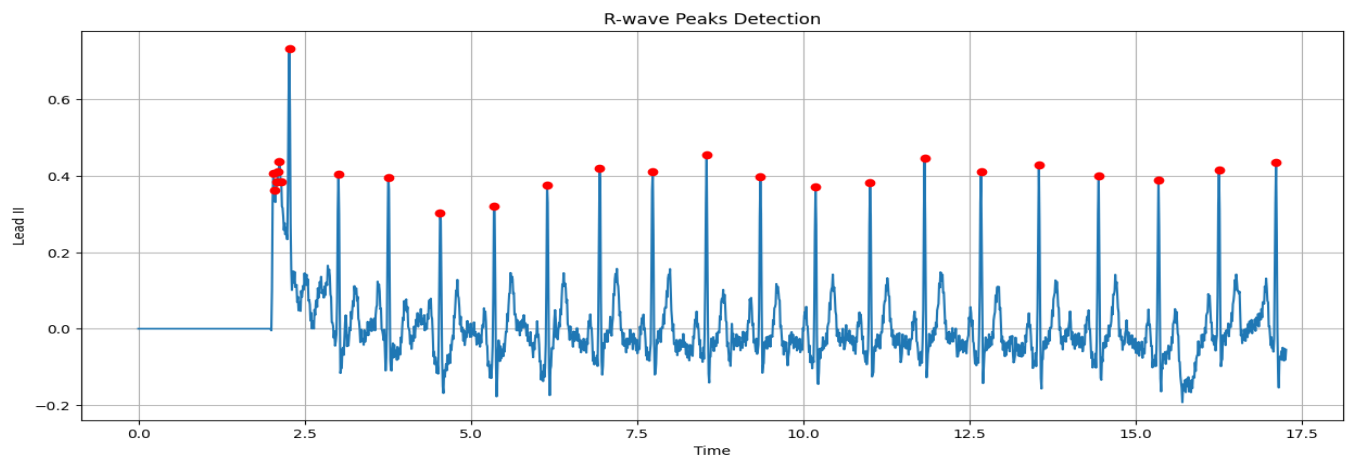
10. Click on the Auto Scale tab at the upper margin of the ECG channel (look for the row that says on the left "A1: ECG 0.3-35Hz" the Auto Scale tab is the second icon after "Hz,". Your recording should look like the figure in step #4. If the ECG waves appear too compressed (too close together), consider clicking the tab above the "Mark" tab that looks like a snow-capped pyramid. When the mouse is on top of this tab, it will say "Half Display Time." Clicking this tab will spread out your ECG patterns for step 11 If you overdo that last step, reverse it by clicking on the tab that looks like double pyramids ("Double Display Time") just to the right of the Half Display Time tab.
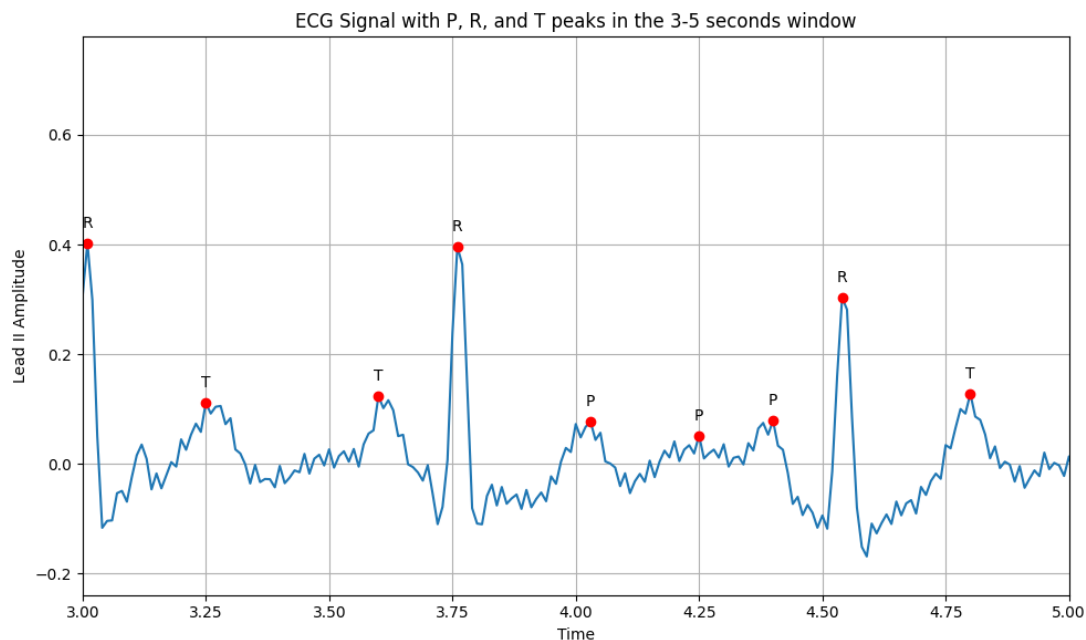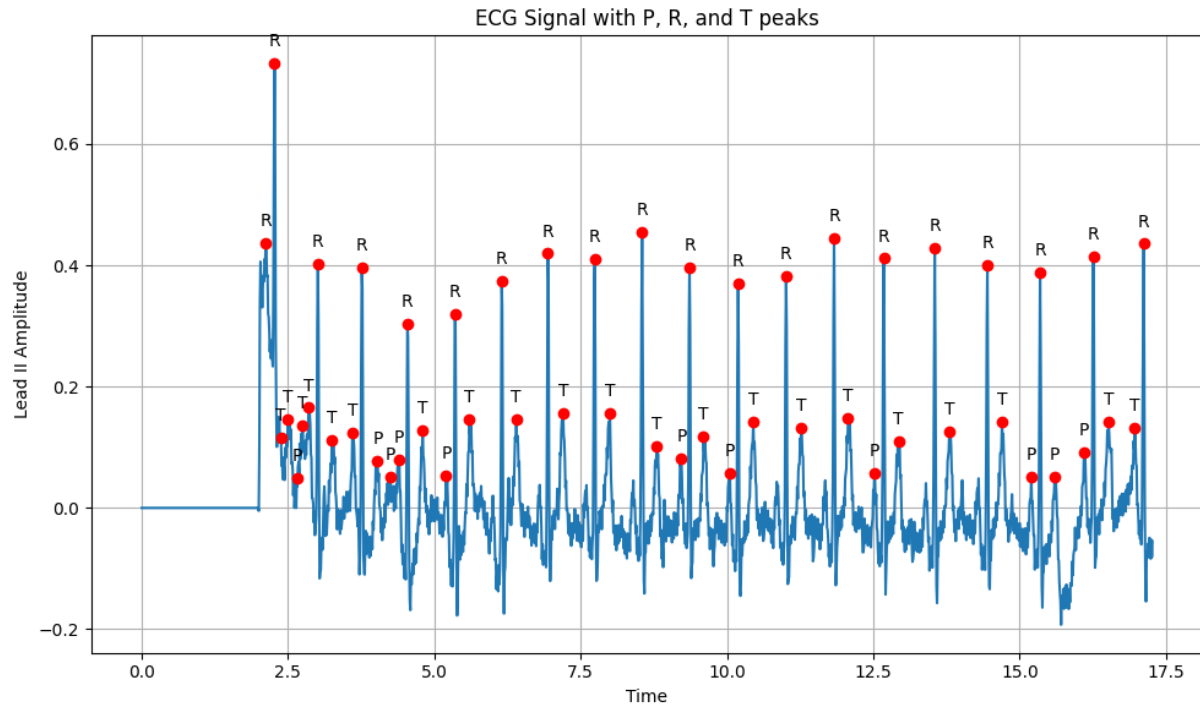
11. Record for approximately one minute and then click Stop to halt recording. Label one set of the five ECG waves (P, Q, R, S and T). Notice that every cycle is similar but not identical, and the distances between the QRS complexes may alter slightly.

Results:

Time Series of Lead II

Average RR interval: 0.91 seconds
Heart rate: 66.18 BPM

R-wave Peaks Detection

ECG Signal with P, R, and T peaks

ECG Signal with P, R, and T peaks in the 3-5 seconds window

Discussion: The results show an ECG reading, the leads were placed as instructed and we got a reading. The reading for Average RR interval: 0.91 seconds and Heart rate: 66.18 BPM, the RR intervals and the heart rate at 66.18 BPM, which per Mayo Clinic it falls into the average category. The heart rate was on the lower side, due to having a busy workday, although there could be different factors that play in the ECG reading. In this ECG reading, it did not show the QS waves, it could mean that the leads might not have been placed correctly. The lab experiment itself was easy to do and the readings were able to be visible and ready to be read.

Conclusion: This experiment concluded that the PQRST waves play a big role in reading our heart rate and to find out if there are any underlying heart conditions, in certain situations we might not even know we have them. ECG's are important, because they are vital to knowing any heart conditions that might need intervention, before it is too late.