Madison Delira
October 11, 2023

Laboratory 10-Electrocardiography

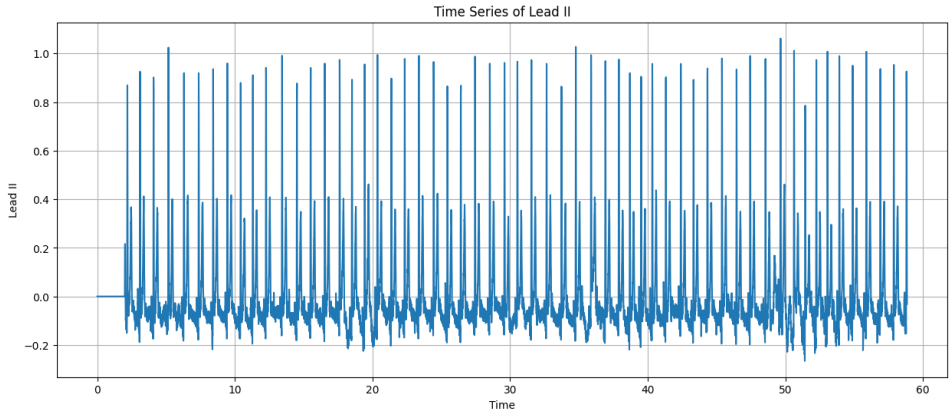
Tuesday Lab

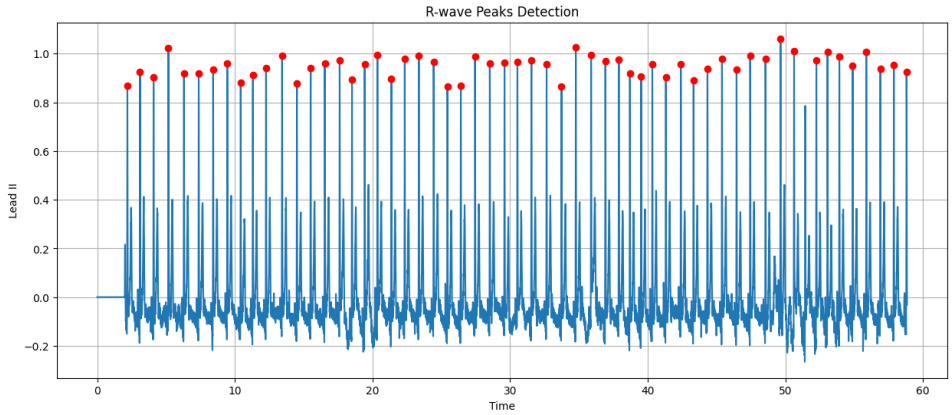
Purpose- Electrocardiography is the study of the electrical activity of the heart. Electrocardiograms (EKG or ECG) are graphical recordings that measure the changes of electrical activity in the heart that come from muscle cells. Willhem Einthoven came up with the equation Lead I + Lead III = Lead II (Einthoven's Law), which states that at any given instant, the potential of any wave in Lead II is equal to the sum of the potentials in leads I and III. He also found that the amplitudes of the R waves to the QRS waves have the same relationship of all three leads. The purpose of laboratory 10 is to use an ECG machine to get readings of the heart's electrical activity and switching wires to get different readings for all three leads.

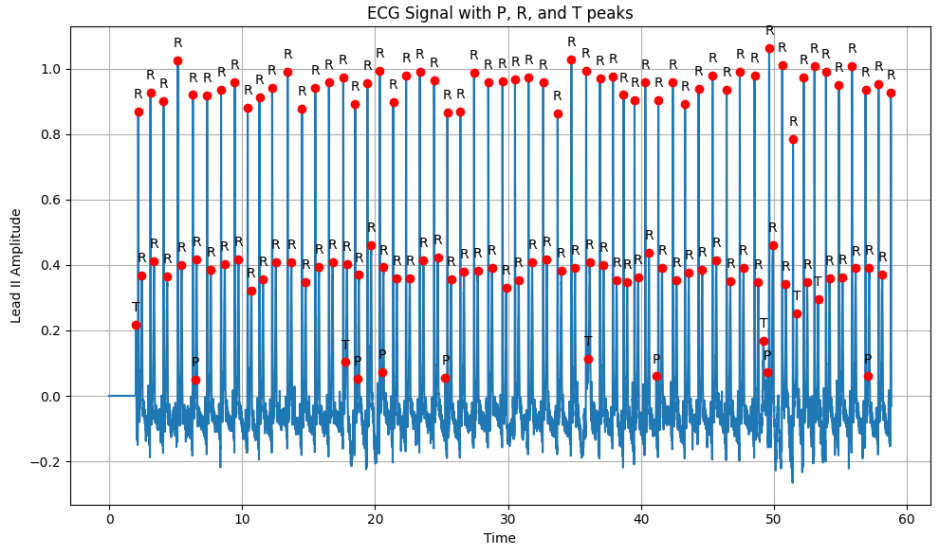
Procedures- The procedure for 10A was to first plug in the IWX/214 unit into the laptop with the USB cable and then plug the C-AAMI-504 EEG cable into the inputs of channels 1 and 2 of the IWX/214. We then connected the green, black, and red wires into the correct color coded lead pedestals of the C-AAMI-504 EEG cable and set the white and brown wires neatly to the side. After everything was connected we booted up the computer to open the Labscribe3 system. We then went to "Settings", then to "Human Heart", and then to "ECG-HeartSounds" to pull up the correct system to get our correct readings. Since the lab was only about ECG we clicked "Hide" to take away the heart sounds readings it would give us. We then removed the disposable ECG electrodes and snapped the green, black, and red wires onto them. We placed the black wired one on our right wrist, the red wired one on our left ankle, and placed the green wired one on our right ankle. After we had those connected we added our name along with Lead II to the top and hit record to get an ECG reading of our heart while we were sitting completely still, after about 30 seconds to a minute we were to stop the recording and observe the reading. The procedure for 10B was to keep the same set up as 10A procedure but we were to take the red wire that was on our left ankle and switch it to our left wrist and get an ECG recording which was our Lead I. We then put the red wire that was on the left wrist back onto the left ankle and we placed the black wire that was on the right wrist onto the left wrist and got an ECG recording of that which was our Lead III. We then were to save all of those recordings as text documents and we made electrocardiogram graphs with the results.

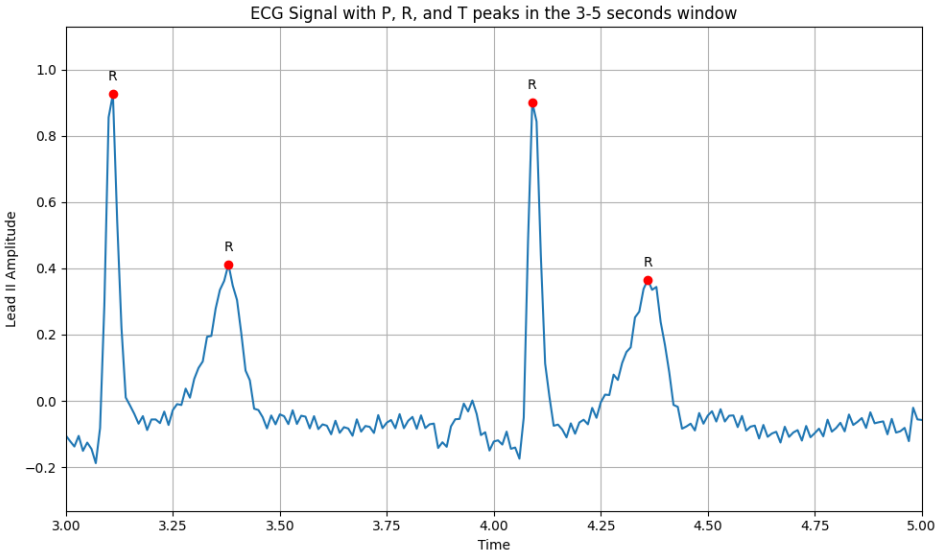
Results-

Madison Lead II Results

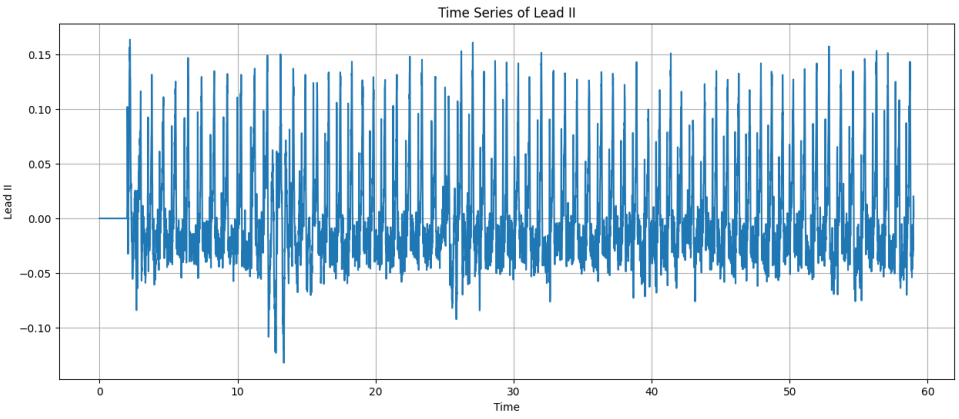

Time Series of Lead II
Lead II
Time

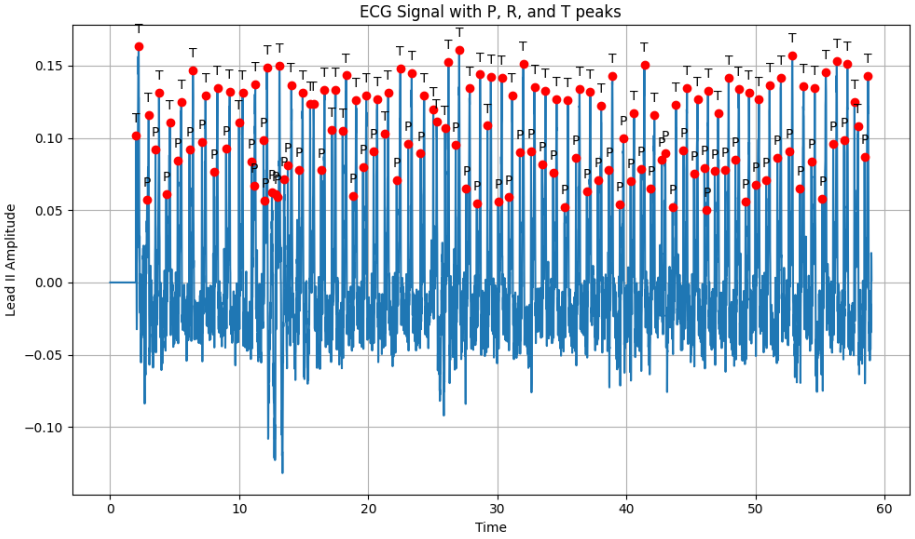

R-wave Peaks Detection
Lead II
Time

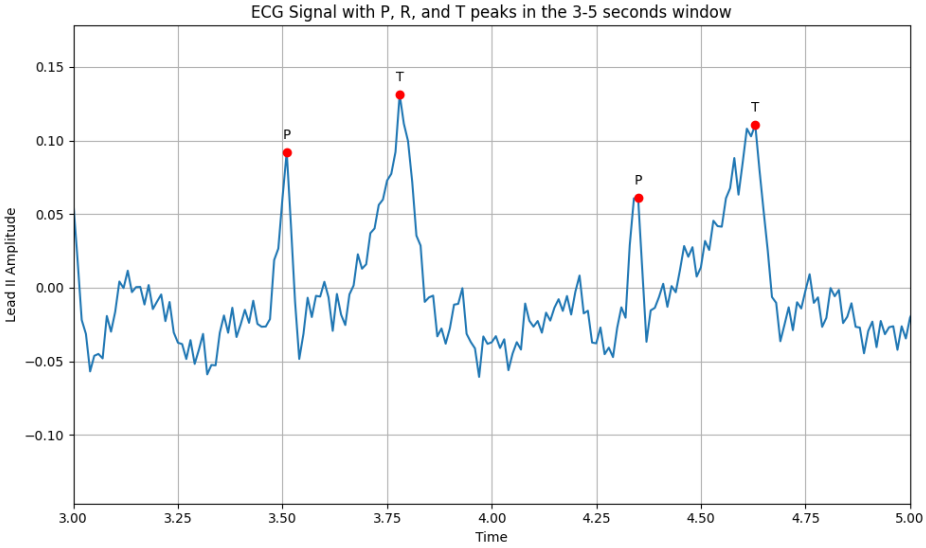

ECG Signal with P, R, and T peaks
Lead II Amplitude
Time



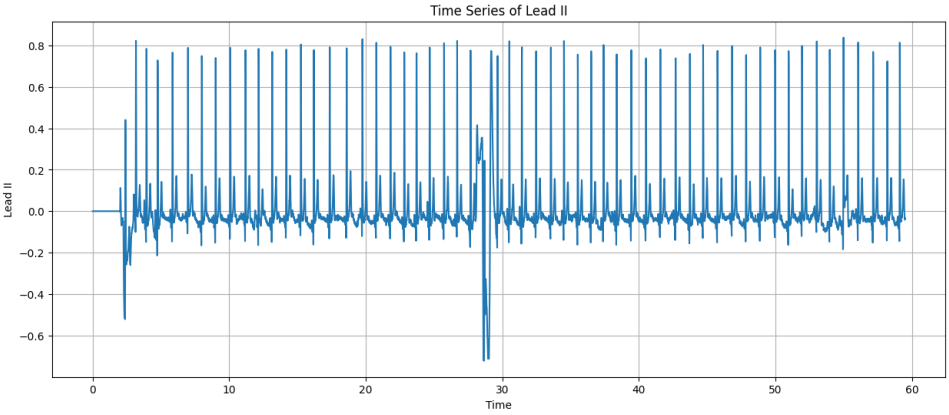
Madison Lead I Results

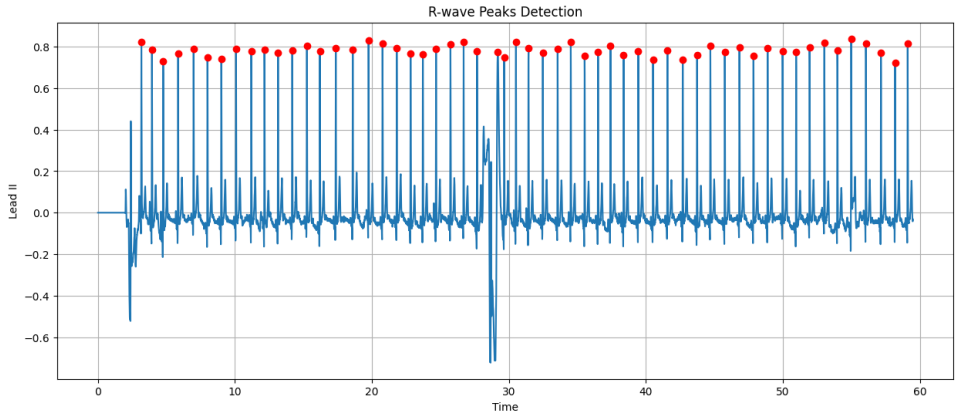


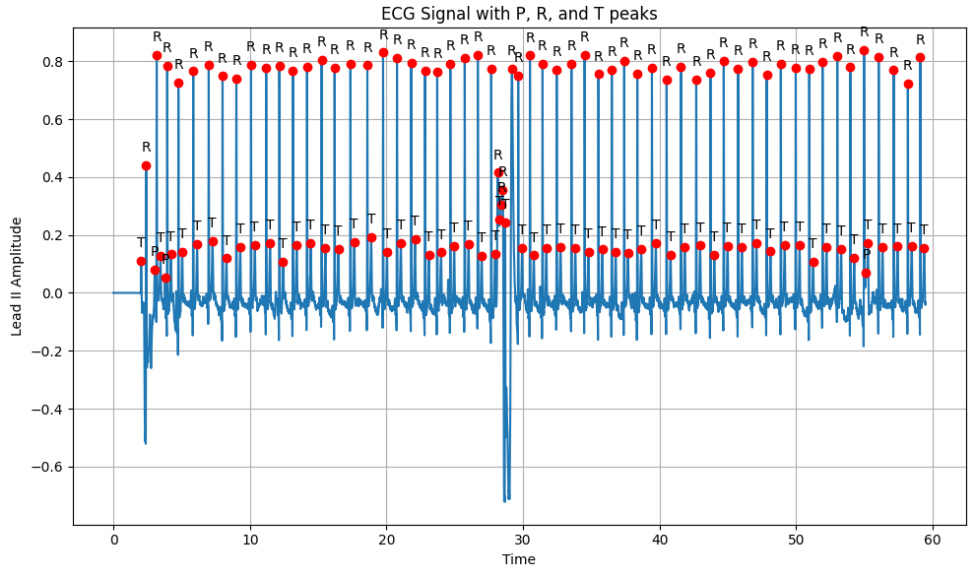


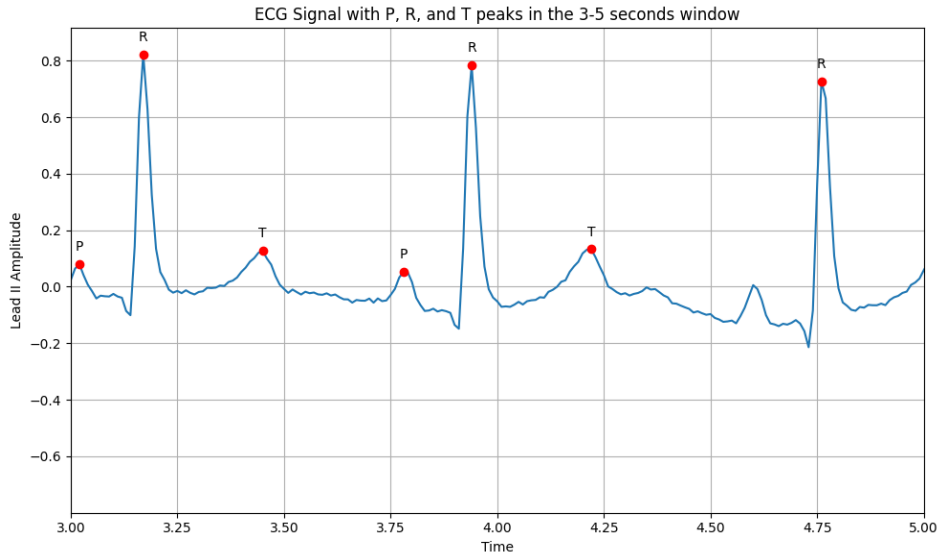


Madison Lead III Results

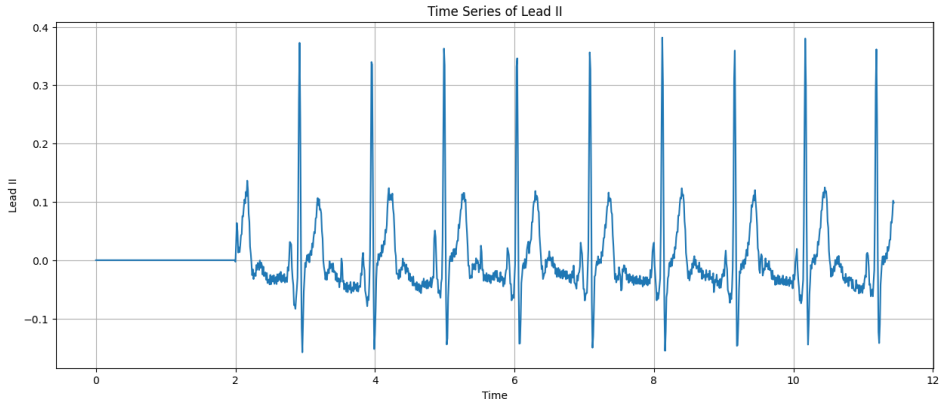




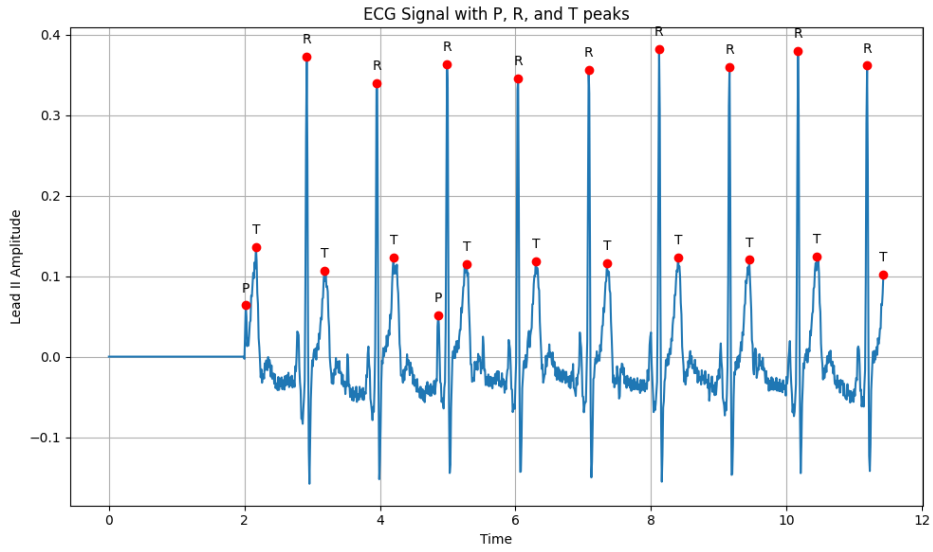


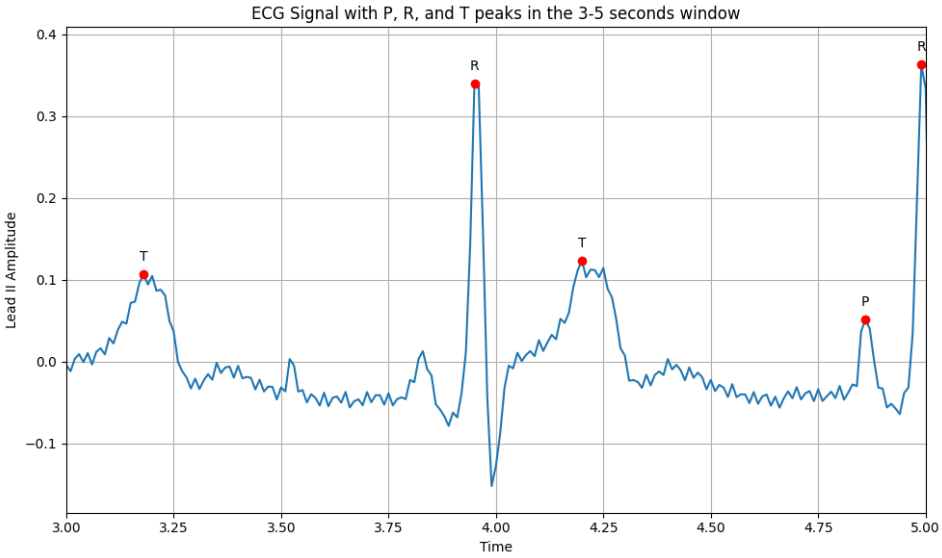


Delanie Lead II Results

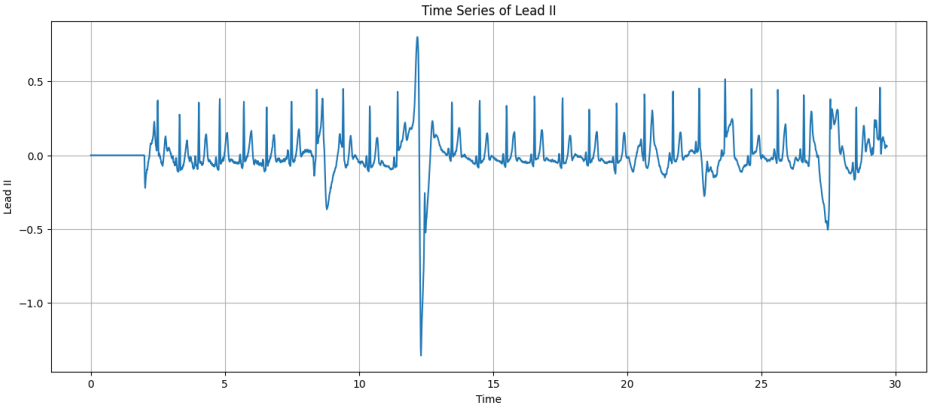

Time Series of Lead II
Lead II
Time

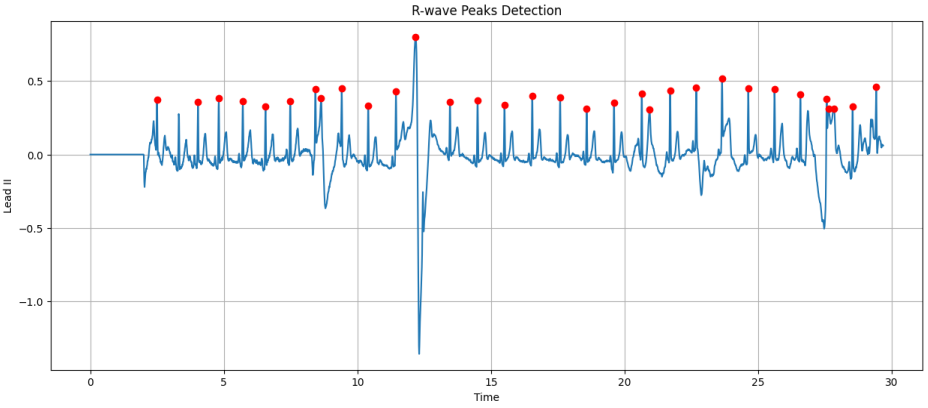

R-wave Peaks Detection
Lead II
Time

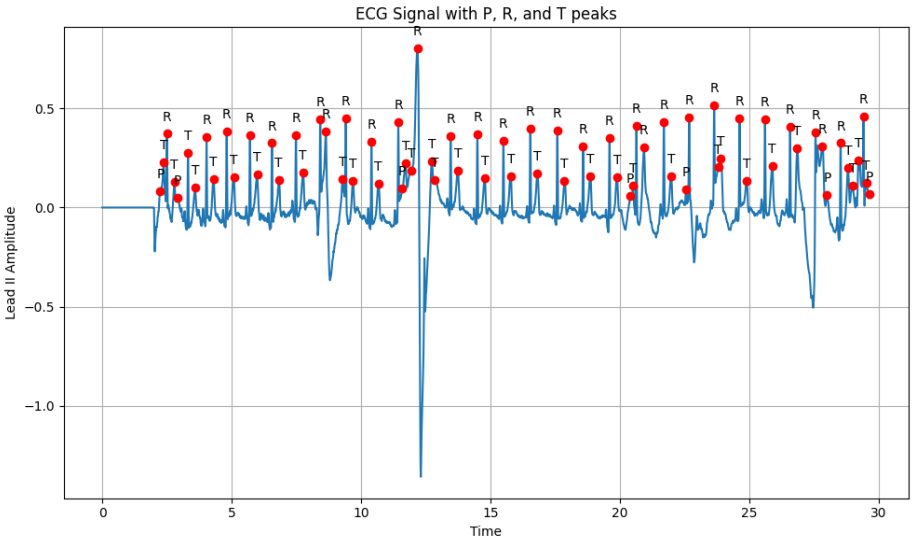

ECG Signal with P, R, and T peaks
Lead II Amplitude
Time
P
T
R

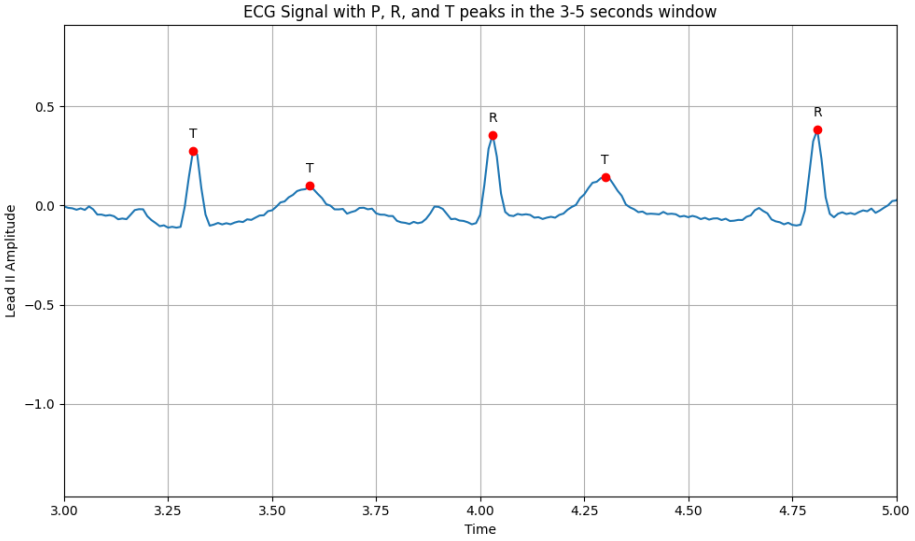


Delanie Lead I Results

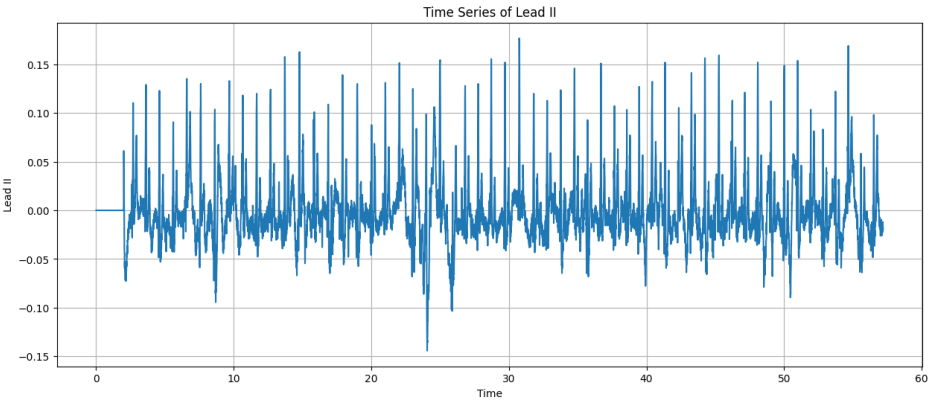


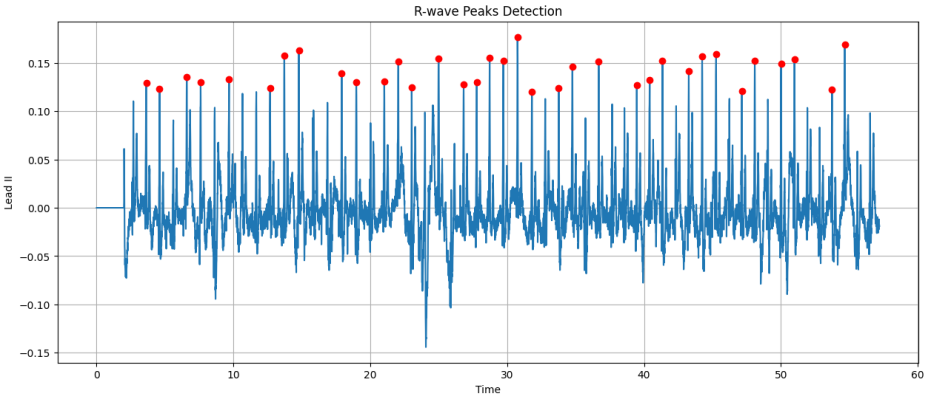


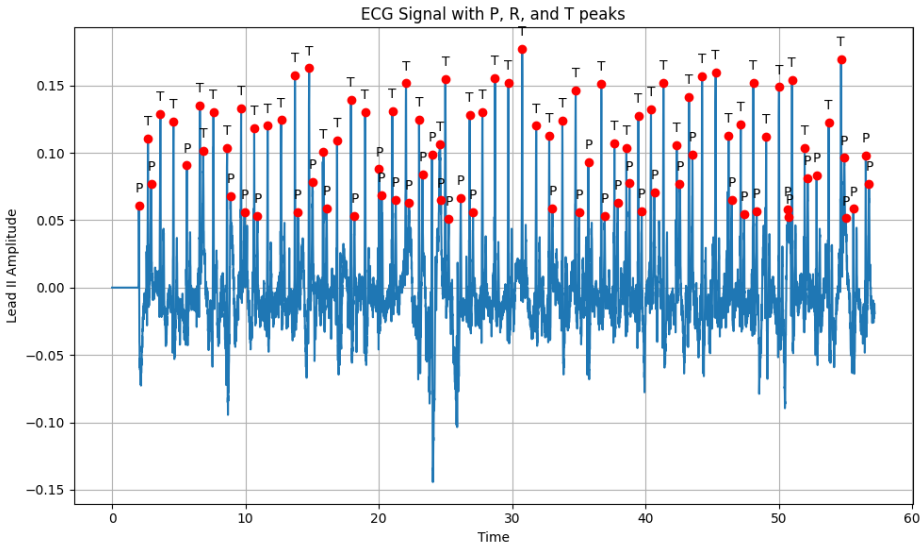


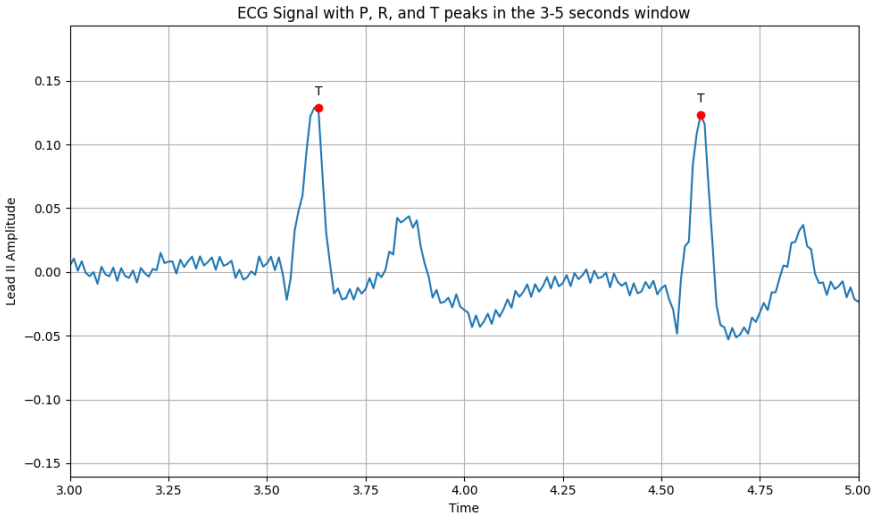


Delanie Lead III Results









Discussion- Doing the experiments in laboratory 10 was very interesting to do because it was really cool to see our heart's electrical activity readings and compare our results to our partners

results. After looking at both mine and my partner's results I could see differences in the number of lines of our readings. My results were a lot more crazy looking with a lot more lines and my partners had a lot less. It could have been because we recorded mine for a much longer time or simply just because my heart rate was a little higher than hers. The experiments in laboratory 10 reminded me of the experiment in laboratory 9 when we were getting our muscle movement readings. I feel like this experiment went a lot smoother than in the last lab because we already had an idea of how to set up the laptop system and the machine to get our graph readings. Overall these experiments were very helpful in allowing us to gain more knowledge of electrocardiology and see exactly how Einthoven's law really works.

Conclusion- The results of laboratory 10 allowed us to view our electrocardiograms using an ECG machine and putting together graphs to show our PQRST (P=Atrial Depolarization)(QRS=Ventricular Depolarization)(T=Ventricular Repolarization). To record each lead in the experiment, wires were changed so it gave off a distinctly different reading each time. In conclusion it was important to do the experiments in laboratory 10 to gain the knowledge on how the muscle cells affect the electrical activity of the heart and compare the results to Einthoven's Law.