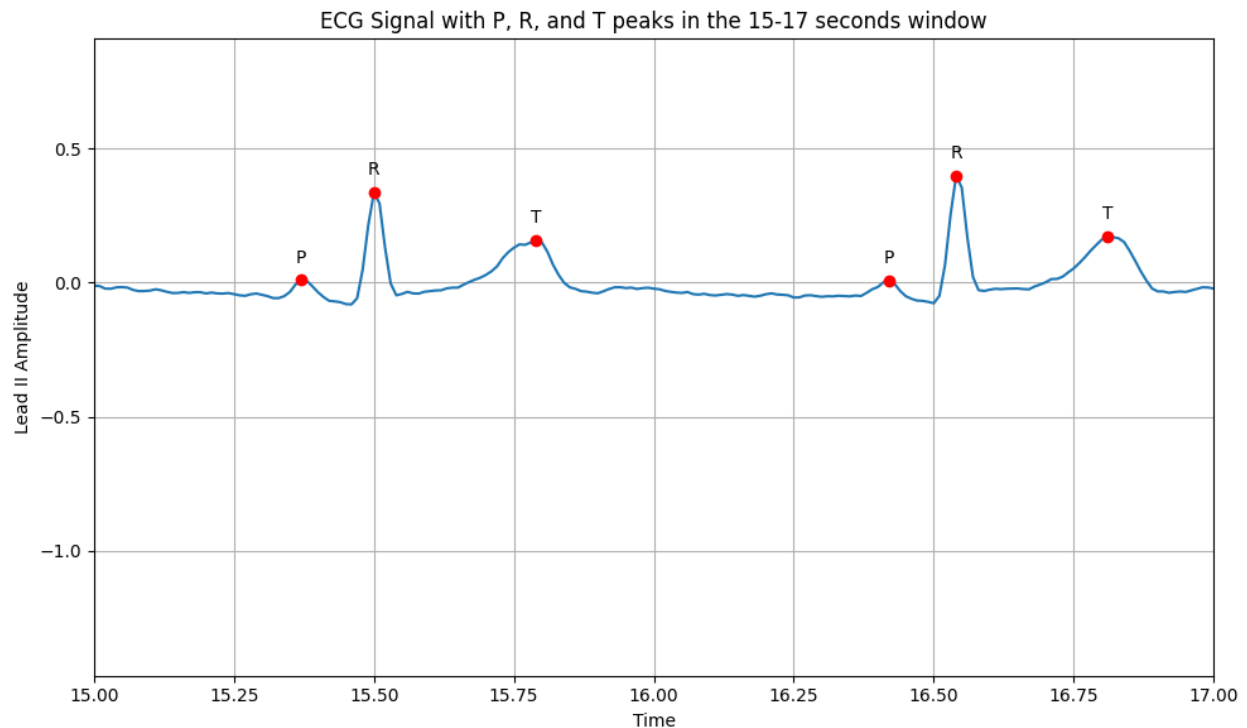


## Laboratory 10: Electrocardiography

**Purpose:** The purpose of this lab report is to provide an understanding of electrocardiography (ECG) principles, Einthoven's Law, and the recognition of abnormal ECG patterns. Also to make sure the fundamental concepts of ECG are understood to be able to analyze the data. Learning the practical aspects of setting up ECG equipment, attaching electrodes, and recording ECGs will be prompted. The focus for this lab is to obtain clear traces and understand lead-specific wave patterns. Also understanding the clinical importance of recognizing abnormal ECG patterns for diagnosing cardiac conditions, thereby reinforcing the practical utility of ECG in healthcare settings. Therefore, fostering the ability to recognize conditions such as sinus bradycardia, sinus tachycardia, and other cardiac anomalies.

**Procedure:** Ensure that the IWX/214 unit is plugged in and connected to the laptop via a USB cable. Confirm the C-AAMI-504 EEG cable is inserted into the isolated inputs of Channels 1 and 2 of the IWX/214. Check that the three color-coded lead wires are correctly inserted into the lead pedestal of the C-AAMI-504 EEG cable. Connect the red, black, and green electrode lead wires to the corresponding color-coded sockets on the lead pedestal of the ECG cable. Optionally, remove the white and brown lead wires and place them neatly in the Iworx case. Turn on the laptop first and allow it to fully boot up before turning on the IWX/214 unit. Confirm the Iworx unit is powered on by checking for a lit red indicator light on the Iworx unit. Open the Labscribe3 program by clicking on the Labscribe3 icon on the desktop. If prompted, click "OK" when the window says "Hardware found IWX214:2008-1-24." In the "Settings" tab (found in the row labeled "File Edit View Tools Settings Advanced External Devices Help"), select the "Human Heart" tab. Within the "ECG-HeartSounds" tab, locate the "Main Window" by closing the PDF file that may open automatically. Prepare the subject by removing any jewelry from their wrists and ankles. Clean a region of the subject's right wrist and the insides of both ankles with an alcohol swab and allow the area to dry. Attach the black (-1) electrode to the cleaned area on the right wrist. Repeat the cleaning process for the left ankle and the right ankle. Attach the red (+1) electrode to the left ankle and the green (C or ground) electrode to the right ankle. Instruct the subject to sit quietly with hands in their lap to minimize muscle movements. Click on the "Record" button located on the upper right side of the Labscribe Main window to begin recording. If the Lead II ECG appears upside down, click on the upside-down triangle next to "σA1:ECG 0.3-35Hz" and choose "Invert" to correct the orientation. Type the subject's name and "Lead II" in the Mark box to label the data. Record for approximately one minute and click "Stop" to halt recording. Click on the "AutoScale" tab to adjust the ECG display for better visibility. Review the recorded data, observing the P, Q, R, S, and T waves, and note any variations in the distances between QRS complexes. If needed, use the "Half Display Time" or "Double Display Time" options to adjust the spacing of ECG patterns for better analysis.

**Results:**

**Discussion:** Electrocardiograms play a role in diagnosing and monitoring various cardiac conditions. By providing a visual of the heart's electrical activity, ECGs offer valuable insights into the heart's health and functionality. ECGs allow for real-time monitoring of the heart's electrical activity. Continuous monitoring is especially crucial in critical care settings, enabling healthcare providers to promptly respond to any sudden changes in cardiac function. ECG interpretation is a skill that healthcare professionals must master. Educational exercises, like those found in lab procedures, contribute to the development of this skill, ensuring accurate diagnosis and effective patient care. I've had multiple family members who have had open heart surgery and ECGs was a method used to track and diagnose their symptoms and disease.

**Conclusion:** To wrap it up, the analysis of the recorded ECG data, with a highlight on the V2-V1 amplitude, allowed for an understanding of Einthoven's Law. The correlation between theoretical predictions and practical observations reinforced the significance of lead configurations in obtaining accurate and clinically relevant ECG readings. The intentional placement of electrodes on the right wrist, left ankle, and right ankle, mirroring Einthoven's Triangle, not only facilitated the recording of Lead II but also emphasized the strategic configuration necessary for capturing distinct perspectives of the heart's electrical activity.

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