Outline

Intro paragraph:

* Talk about what persistent atrial fibrillation on a basic level.
* The effect based on the population like how many people deal with it and more just basic stats etc.
* Basic explanation of what catheter ablation is and what the goal is.
* Stats to show hoe the treatment is effective for people with paroxysmal af as opposed to worse performance to
* Basic outline of the study and its goals

A deeper dive into Atrial fibrillation

ECG and its role in atrial fibrillation:

* This will all contain the explanations of the basics of what an ecg is
* Explain what the ecg signal means.
* Describe what and ecg look like in the case of AF.
* Describe how and why an ecg reading may differ from a reading from catheters within the heart.

What is pulmonary vein atrial fibrillation:

* Explain procedure in more detail.
* Focus on explaining the process where the catheters go and what they measure describing pulmonary vein isolation in more detail.
* Introduce what we are looking for and why which would lead onto explain af phenotypes in the sense of how different drivers can express themselves differently.

What are af phenotypes:

* Describe how different clusters of people with AF have different phenotypes.
* Cite and explain papers that have clustered and may have identified specific clusters with certain phenotypes like certain cardiovascular risk factors.

Deep learning role in Pheno grouping persistent afib

Models suited for the purpose:

* Describe what is an autoencoder and how it can help.
* Describe what a CNN is and how it can aid in the purpose.
* Describe what current efforts to deal with afib look like from the ml side.

What have had been done and are there any gaps:

* Describe what is missing from other research operation how this project can deal with these gaps.
* Describe how this project differs from what has been done before and the complexity of the process being proposed.
* Describe what current efforts to deal with afib look like from the ml side.

How will deep learning be used in this case (study aims and reasoning)