

# WENRUI XU

Minneapolis, Minnesota

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## Education

**Univeristy of Minnesota, Twin Cities(Advisor: Prof. Keshab. K. Parhi)** **Expect 2028**  
*Doctor of Philosophy in Electrical Engineering(GPA: 4.0/4.0)* *Minneapolis, Minnesota*

**Univeristy of Minnesota, Twin Cities** **May 2023**  
*Bachelor of Computer Engineering(GPA: 3.9/4.0)* *Minneapolis, Minnesota*

## Relevant Coursework

- Artificial Intelligence
- Digital Signal Processing
- Algorithms Analysis
- VLSI
- Parallel Computing
- Deep Learning
- Data Structures
- Computer Architecture

## Work Experience

**Boston Scientific** **May 2023 – August 2023**  
*Rhythm Management R&D Research Intern* *Minneapolis, Minnesota*

- Device innovations research intern for the cardiac rhythm management and diagnostics team.
- Developed novel convolution neural net architectures to classify arrhythmia in ECG.
- Implemented a parallel processing algorithm to reduce the ECG pre-processing computation for a large-scale database (2.5 TB) by a factor of 40.

## Research Experiences

**Graduate Research Assistant, with Prof. Keshab K. Parhi** **September 2023 - Present**

- **Knowledge Graph Project:**
  - Use the Hyperdimensional Computing (HD) method to encode knowledge graphs using FB15K-237 and WN18RR database.
  - Prove the applicability of the HD method on knowledge graph completion.

**Undergraduate Research Assistant, with Prof. Keshab K. Parhi** **June 2022 - May 2023**

- **Arrhythmia Detection Project**
  - Use the Hyperdimensional Computing (HD) method to classify arrhythmia using the MIT-BIH database.
  - Extract 164 features of FFT (Fast Fourier Transform), HRV, and DWT (Discrete Wavelet Transform) and apply the MRMR (Maximum Relevance Minimum Redundancy) feature selection algorithm to identify the top 20,10 and 5 features for the HD model training.
  - Prove the applicability of the HD method on multiple abnormal heartbeats sets detection.
- **Seizure Detection Project:**
  - Apply the LBP (Local Binary Pattern) and PSD (Power Spectral Density) methods to extract features from the CHB-MIT Database, with which the HD method, the internal database be trained.
  - Use cross-validation to comparatively study the HD models trained by ictal phase data of different seizure types and select the optimal model applicable to predicting seizures.
  - Prove the applicability of the HD method on UPenn and Mayo Clinic's Seizure Detection Challenge. (Reimplementation of the feature selection method used by Lulu Ge in her previous research)

**Undergraduate Research Assistant, with Prof. Marc Riedel** **June 2022 - September 2022**

- Use neural networks with multiple layers to train the NetMHC database for higher accuracy and predict the binding scores for different peptides.
- Implement SMILE (Simplified Molecular Input Line Entry System) encoding method to transform the characters of peptides into chemical notation for improved training performance with the neural networks.

## Technical Skills

**Fluent in:** Python, C, Matlab, Java, git, conda, Tensorflow.

**Capable in:** Verilog, HTML/CSS, JavaScript, SQL, Assembly, Pytorch, PCB design.

## Activities

**Engineering Honor Society, Tau Beta Pi** **Spring 2022 — Present**  
**IEEE Student Branch** **Spring 2022 — Present**  
**HKN Omicron Chapter** **Spring 2022 — Present**  
**Solar Vehicle Project** **Summer 2021 — Summer 2023**