DES 499

3rd Independent Study  
Realistic Scope observations of all docs

Evaluate feasibility – usually logical. Routinely invalid

Not here to force or limit anything. Here to help.

Keep me focused on getting what I want out of this class.  
Heathy mindset

Level of structure driven by what meets my goals

Unusual Circumstances : You can’t just do one class of work.

Other two independent studies, fill out form. Registrar won’t care, use right format.

Purview of each class.

Offers to talk to Singh and Young

There is precedent for this throughout DigiPen. (Phys class in GAM)

**[I]** Develop a deep understanding of biometric signal processing techniques and their applications in empathetic AI

* Read and analyze research papers on biometric signal processing techniques, such as ECG, EEG, and skin conductance
* Implement a basic HRV analysis algorithm using Python and relevant libraries (e.g., NumPy, SciPy)
* Conduct a literature review on the applications of biometric signal processing in empathetic AI, focusing on emotional state detection and regulation

**[II]** Implement algorithms for heart rate variability (HRV) analysis and machine learning models for emotional state classification

* Develop a more advanced HRV analysis algorithm, incorporating techniques such as time-frequency analysis and wavelet transform
* Train and evaluate a machine learning model for emotional state classification using a publicly available dataset (e.g., DEAP, MAHNOB-HCI)
* Implement a basic emotional state classification system using the developed machine learning model and HRV analysis algorithm

**[III]** Collaborate with the design independent study to co-design the biometric sensor interface and data acquisition protocol

* Participate in regular meetings with the design study team to discuss the biometric sensor interface and data acquisition protocol
* Contribute to the design of the biometric sensor interface, ensuring it meets the requirements for HRV analysis and emotional state detection
* Develop a data acquisition protocol that integrates with the biometric sensor interface and ensures reliable data collection

**[IV] Integrate Nitr0's emotional intelligence and NLP capabilities with the biometric sensor and AI framework**

* Implement an API to integrate Nitr0's emotional intelligence and NLP capabilities with the biometric sensor and AI framework
* Develop a system to process and analyze the biometric sensor data, using Nitr0's emotional intelligence capabilities to detect emotional states
* Integrate the machine learning model for emotional state classification with Nitr0's emotional intelligence capabilities

**[V] Develop a customizable interface for Nitr0 to interact with the sensor and users**

* Design and implement a user-friendly interface for Nitr0 to interact with the biometric sensor and users
* Develop a system to visualize the biometric sensor data and emotional state detection results
* Incorporate user feedback mechanisms to refine the interface and improve user experience

**[VI] Enable real-time data streaming between the sensor and Nitr0's digital form**

* Develop a system to enable real-time data streaming between the biometric sensor and Nitr0's digital form
* Implement a data processing pipeline to handle the real-time data stream and ensure reliable data transmission
* Integrate the real-time data streaming system with Nitr0's emotional intelligence capabilities