Year-8_ CVDI IP Report

The following tables list the Intellectual Property (IP) items developed for each Year 8 project that are available for licensing, along with a description of key features.

Project reports containing detailed information about the associated research results will be sent separately.

The ID numbers that appear in the tables are identified by the following patterns: IP Item: Project-[Project #]-[Item #]

CVDI Project 8A.006.UL – Visual Analytics of Real-time Hospital Emergency Department Operations: A Human-Centric Approach, Drs. Raju Gottumukkala, Christopher Borst; Prabhakar Vemavarapu, Seyedmajid Hosseini (University of Louisiana at Lafayette)

IP Item Description
P – 8A.006.UL - 1 : A software prototype that can stream real-time multiple physiological signals from wearables to an edge device, streaming algorithms that extract signal features from multi-modal physiological signal, and machine learning algorithm that can predict stress for individuals. Language: Swift (Mobile app), Influx DB (Time series database), Python
Key Concept 1: Providing real-time stress detection for individuals working in the building using wearables in a privacy-aware method.
Key Concept 2: Feature extraction and windowing technique for streaming data that balances computational performance with stress detection accuracy. The window size can be determined automatically by formulating the optimal window size that achieves best computational and predictive performance as an optimization problem
Key Concept 3: Provide a machine learning algorithm that uses multi-model signal features to predict the stress levels of individuals by formulating this as a classification problem (using a Convolutional Neural Network and Random Forest)

IP Item Description
P – 8A.006.UL - 2 : A personalized machine learning model that predicts the stress levels (as high, medium or low) based on the subject's physiological signals (i.e. galvanic skin response, skin temperature, heart rate) observed over time.
Key Concept 1: The personalized model uses features extracted from the general population model for the initial model (when no training data is available for a subject). The model is then updated based on both the features and feedback provided by the user.
Key Concept 2: The model is adjusted based on the feedback provided by the user

CVDI Project 8A.024.SBU – Movement/Mobility Visual Analytics from Sensor Data - Phase II, Dr. Dimitris Samaras (Stony Brook University)

IP Item Description
P – 8A.024.SBU - 1 : Design a system to be used as Real World Evidence and Digital Biomarker for Physical Therapy and Clinical Trials. In particular, the goal is to predict 3D human skeletal pose directly from smart shoe sensor data. This system would eliminate the need of a camera for tracking body pose. Language: Python, Processing software, Pytorch, Microsoft Kinect SDK
Key Concept 1: Design a real-time system for Kinect data recording.
Key Concept 2: Visualizing 3D skeletal data and synchronizing data between shoe sensors.
Key Concept 3: Demonstrating Proof of Concept on actions recorded from a single subject.
Key Concept 4: Training an LSTM model to learn mapping between insole data and skeletal pose on collected data.
Key Concept 5: Testing the trained model on mobility data from subjects not considered during training.

IP Item Description
P – 8A.024.SBU - 2 : Collect mobility data from human subjects to create a dataset for training a predictive model for pose estimation. Language: Zeblok smart shoe, Microsoft Kinect device, Weighing scale.
Key Concept 1: Visualizing dynamic skeletal data using Kinect and data synchronization to verify the accuracy of the collected data.
Key Concept 2: Data acquisition from human subjects by measuring their height, weights and recording their skeletal pose.