I earned my Master of Science degree in Robotics and Autonomous Systems from the University of Turku in 2023. During my studies in Finland, I participated in various real-world artificial intelligence (AI) applications in industrial projects. In my first year, I was assigned as the team leader for a smart shelf project at the well-known Valmet Automotive factory in Finland, where I developed an automated ordering system to fill the empty spots of the shelves in an industrial assembly line without human intervention. In addition, I conducted research on health data analysis and mobile-based digital health applications. I also conducted a feasibility study on using AI for an affective computing project, specifically Emotion Classification.

As a PhD candidate and Graduate Assistant at the University of Hawaii at Manoa, my current research focuses on the intersection of passive and active sensing, digital phenotyping, and affective conditions with the primary goal of understanding and managing affective conditions through AI technology. This work involves evaluating the efficiency of wearable devices as well as designing and developing sophisticated web and mobile applications engineered and optimized to collect both passive and active data. Additionally, a central aspect of this ongoing research is developing AI solutions using the behavioral, physiological, and environmental data collected from mobile apps and wearable devices. For instance, I'm leading studies on predicting stress-related blood pressure spikes and identifying substance use and craving events. By using a mobile-based app for ecological momentary assessment (EMA) to label time series data, I have developed a model to predict these events more effectively, using a mix of self-supervised and supervised methods.

My future work aims to build on my past and ongoing work to contribute to the development of personalized AI models with the purpose of enhancing wearable devices to predict a wide range of mental health disorders such as psychological and psychological changes induced by stress and anxiety. In particular, I intend to develop machine learning models that can identify individual and nuanced patterns in the biosignals collected by wearable devices, such as heart rate and heart rate variability, skin temperature, blood oxygen levels, breathing patterns, and accelerometer readings. To accomplish this, I plan to use the following procedure: 1) Data collection and participant recruitment, 2) Data Integration and labeling, 3) Implementation and real-time forecasting, and 4) Iterative refinement and feedback. I aim to recruit a diverse cohort of participants with a variety of mental health conditions to wear advanced wearable devices that continuously monitor various biosignals of their bodies. I also plan for these participants to use developed mobile applications to log subjective experiences (e.g. stress levels) through Ecological Momentary Assessment (EMA). Then I intend to create models that can analyze this data in order to forecast biological variations in individuals. By integrating these forecasting-based personalized models in future generations of health trackers, my work serves to provide patients and medical practitioners with timely warnings about serious health disorders such as blood pressure spikes, panic attacks, depressive episodes, etc., or even life-threatening symptoms such as arrhythmia that in some cases might lead to heart failure.

Another goal of my future work is to revolutionize diagnosis and forecasting methods for affective conditions, including a range of mental and neurodevelopmental disorders. My future research is particularly useful to the diagnosis and treatment of neurodevelopment disorders like autism spectrum disorder (ASD) and attention-deficit/hyperactivity disorder (ADHD) that affect cognitive functions and behavior and typically manifest early in childhood. Due to these conditions’ subjective and complex natures, medical practitioners face significant challenges in accurately diagnosing and forecasting them. By leveraging objective measures through cutting-edge wearable and mobile technology, my work aims to bring a high degree of precision and personalization to this process. Integrating personalized AI in this field is particularly transformative. By analyzing multimodal data, ranging from physiological signals to behavioral patterns, collected in real-time, these models can uncover subtle symptoms that are usually overlooked by traditional or generalized methods. This capability enables the detection of nuanced mental and neurological states. Furthermore, using these technologies facilitates earlier intervention. By identifying markers of affective disturbances at an earlier stage, my work aims to empower clinicians with timely insights that are critical for effective and immediate developmental management and treatment. This in turn not only enhances clinical outcomes, but also reduces the long term social and economic impact of these disorders. Thus, my ongoing and future research leads to a more comprehensive and objective assessment that is crucial for accurate and timely diagnosis and forecasting of affective conditions and neurodevelopmental and mental disorders.

In the broader scope, my research seeks to refine these diagnostic and forecasting tools in order to ensure the accessibility and applicability of these devices across diverse populations. This includes the process of continuous improvement of the AI models to adapt to the variability in symptoms across various demographics. My future work also aims to advance the application of affective computing by providing more tangible and impactful tools that patients and clinicians can rely on for making informed, timely, and effective decisions to improve the overall trajectory of mental health care and managing neurodevelopmental disorders.