WRF/ITHS Summer Commercialization Fellows Projects 2024

Molecubit – Molecular Tagging for Sustainable Supply Chain Transparency
(Jeff Nivala, Computer Science & Engineering)

With 70% of consumers increasingly favoring sustainable products, the demand for transparent supply chains has never been higher. Traditional methods like RFID and holograms, however, face challenges in flexibility and security. Molecubit is pioneering a revolutionary approach to ensure product authenticity and traceability within supply chains. Our groundbreaking Simple Bio-Tag Solution (SBTS) utilizes nanoscale, synthetic protein-based biomolecular tags to provide an invisible, tamper-proof, and scalable solution for physical tagging that utilizes portable nanopore sensor technology for quick and reliable readouts. SBTS stands apart from conventional methods, offering cost-effectiveness and seamless integration with existing tracking systems in the food, fabric, and electronics industries. A summer fellow will help us evaluate different go-to-market pathways for this technology and identify an ideal beachhead market.

Nanopore Biosensing – Creating Ultrasensitive Biosensors Through Protein Design
(Alexis Courbet & Jinwei Xu, Institute for Protein Design)

Protein nanopores, with their unique ability to function as single-molecule biosensors, can seamlessly bridge the gap between biochemistry and electronics and open avenues for real-time, ultrasensitive, and label-free electronic analyses of intricate biological networks of nucleic acids, proteins, and small molecules. Our team leverages the capabilities of generative AI to design de novo protein nanopores tailored for specific detection modalities. These customized proteins are precisely integrated within solid-state nanopore arrays on silicon chips, giving rise to an unprecedented synergy in the form of protein-silicon hybrid nanopores purpose-built for single-molecule biosensing applications. Our mission is to attain sensor densities that vastly exceed today's industry standards, enabling a paradigm shift towards truly massively multiplexed detection of biomarkers. A summer fellow will explore the potential applications of this technology within the DNA sequencing and point-of-care diagnostics markets and help identify viable entry pathways.

Platea Biosciences - Accelerating Psychiatric Drug Discovery with AI
(Eric Szelenyi, UW Medicine)

Psychiatric disorders collectively comprise the major health challenge of the 21st century. Underscored by an inability to target brain dysfunction effectively, psychiatry remains the lowest performing category in drug development with only 9% of new therapeutics reaching the market. A main factor is the lack of effective modeling practices used to predict – or translate – patient response prior to initiation of long and costly clinical trials. To change these odds, we are developing a platform of deep technology to understand the efficacy of novel therapeutics *before* human testing begins. Our team has integrated our academic work with an end-to-end AI framework delivering high-content therapeutic profiles to enhance candidate selection and dosing in humans. A summer fellow will help us understand the partnering landscape for such a platform technology within the pharmaceutical industry and develop an initial go-to-market strategy.

PanClip – A Personalized 3D Printed Surgical Closure Device
(Alshakim Nelson, Chemistry)

Pancreatic cancer is a devastating malignancy for which the only cure is surgery. Unfortunately, pancreatic resection carries high risk for serious complications, and for some procedures, this risk is exacerbated by the inadequate status quo for closure of the pancreatic stump. Our innovation, PanClip, is a personalized 3D printed surgical closure device designed specifically to address the shortcomings of current closure methods. The device is created from a proprietary protein-based bioplastic developed for stereolithography 3D printing that is biocompatible, biodegradable, and mechanically robust. We envision PanClip as the first of many devices we could develop for similar use cases, and a summer fellow will help to identify other potential applications and markets for this technology.