

WRF/ITHS Summer Commercialization Fellows Projects 2023

StarCount – Ultrasensitive Cancer Screening Method

(Bo Zhang, Chemistry)

An ultrasensitive and low-cost cancer screening method will offer enormous benefits to millions of cancer patients and people at risk, especially for low-income people. Our innovation, called the StarCount, is a highly sensitive, cost-effective bench-top bioanalyzer for in-home cancer screening. While most existing screening methods rely on extensive molecular separation and expensive genetic testing at centralized facilities, our method allows one to screen cancer by detecting and counting *single* cancer exosomes from body fluids such as blood, saliva, and urine at low cost. Using StarCount, patients can run their sample with the push of a button and obtain test results on their cell phones within a few minutes. A summer fellow will help us evaluate different go-to-market pathways for this technology and understand potential entry points into clinician workflows.

Improving Kidney Dialysis - Increasing Patient Survival by Removing Protein-bound Uremic Toxins

(Bruce Hinds, Materials Science & Engineering)

Although kidney dialysis for 300,000 Americans costs nearly \$29B annually, five-year survival rates are only 35-42%. Toxins bound to large carrier proteins, which are too large to be removed by the dialyzer membranes, are associated with 16,000 annual deaths alone as well as an additional \$2.3B in treatment for cardiovascular complications. Our innovative approach to this problem is to bind the carrier albumin protein to a surface and trigger the release of the small molecule toxins into solution to be removed by the dialyzer. We have recently discovered a physiologically safe release agent and are building a prototype that can directly work with conventional dialysis machines. A summer fellow will explore the dynamics of the kidney dialysis market and identify potential entry pathways for bringing this novel process to clinical settings.

Odo: The Biological eNose

(Oliver Nakano-Baker, Materials Science & Engineering)

When you get sick, your dog knows. From the smell of your breath, canine companions can detect COVID-19, bacterial infections, diabetic ketoacidosis, cancers, and even epileptic seizures. Odo Labs and the MacKenzie group are developing a new, powerful type of biosensor that could soon allow your cell phone to detect scents like a dog's nose. Compact, affordable, and adaptable, this artificial nose will screen for early-stage cancers and rapidly diagnose infectious diseases. Applications could include blood glucose monitoring, industrial sensing, explosives detection, and more! Our core innovation uses machine learning to design biological molecules that bind to a microchip and allow it to detect the scent fingerprint of diseases. A summer fellow will help us to identify our first hero market for the Odo eNose, guiding our ongoing strategies for sensor development, regulatory compliance, functional trials, and strategic partnerships.

TIPS – A Smart Needle Micropuncture System

(Feng Zheng, UW Medicine)

Liver cirrhosis is a major global health problem, with cirrhosis-related portal hypertension being the main cause of patient deaths. Placing a transjugular intrahepatic portosystemic shunt (TIPS) is the most effective life-saving procedure to treat various fatal complications caused by this condition, but TIPS remains one of the most challenging and radiation-intensive procedures and carries a high risk of various complications itself. To increase the success rate, we have developed a novel imaging and ultrasound-integrated fine needle/balloon catheter system for TIPS placement. Our system will make TIPS procedure much easier, safer, more efficient, and cost-effective to perform. While we continue prototype development, a summer fellow will help us understand the cirrhosis treatment market and potential commercialization pathways, including exploring other possible application areas.