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Buerk Center for Entrepreneurship

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April 2019
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ITHS & WRF Commercialization Fellowship Project List 2019

1. VascuSight – 3D Ultrasound Monitoring of Critically Ill Patients

UW Principal Investigators: Shahram Aarabi, Dan Leotta
Departments: Mechanical Engineering, Applied Physics Laboratory
UW CoMotion Technology Manager: Lisa Norton

Ultrasound is widely employed as an imaging tool used across a spectrum of medical disciplines to define the size, shape and mass of tissues and organs inside the body. It is safe and painless for patients. We are developing a 3D ultrasound monitor and software that will allow for automated evaluation of a patient's circulating blood volume. This will allow for real-time evaluation to guide the treatment and resuscitation of critically ill patients - whether in the field, in the ER, in the ICU, or in the operating room. VascuSight will measure central venous morphology and blood flow changes over time. The device will be portable, easy to use, non-invasive, and low-cost.

We are looking for a Commercialization Fellow to help us identify the best near term and long term markets for this technology and to define an initial business plan outline.

2. 3D-Printed Hydrogels for Fermentation Processes

UW Principal Investigator: Alshkim Nelson
Department: UW Chemistry
UW CoMotion Technology Manager: Ryan Buckmaster

Fermentation is an age-old technology using micro-organisms, like yeast and bacteria, to produce beer and wine, food, fuels, pharmaceuticals and many industrial chemicals. However, fermentation has the down side of being a messy process done in batches which limits efficiencies and requires difficult purification methods due to the yeast and bacteria all dying at the end of the process. Our team has developed a technology that immobilizes living cells for fermentation allowing easy continuous production with high efficiency and high quality (see https://www.economist.com/news/science-and-technology/21724797-print-me-brewery-better-way-make-drinks-and-drugs).

We have completed a proof-of-concept demonstration that shows we can 3D print yeast-containing hydrogels that can continuously produce ethanol from glucose. We believe that this approach is broadly applicable toward other cell types and is illustrative of a promising technology for the future of bio-based chemical production. Fermentation is used to commercially produce a range of products that include pharmaceutical drugs and proteins (antibiotics, insulin), vitamins, chemical feedstocks, and biofuels. We seek someone who can perform an analysis of these different targets and provide guidance to which market would be impacted the most by our technology.

3. ORBIS

UW Principle Investigators: Christie Fong, MS Informatics Engineer
Department: UW Anesthesia and Pain Medicine Bioengineering, Computer Science and Engineering
UW CoMotion Technology Manager: Laura Dorsey

Operating rooms in hospitals are major cost centers consuming up to 40% of total hospital expenses and returning 50% of total hospital revenue. Operating room inefficiencies cost ~ $30 billion annually and are one of the most high-risk areas in a healthcare system with a high rate of preventable errors (~5%). Operating Room Business Intelligence System (ORBIS) is a software application that integrates data from multiple electronic systems such as Anesthesia Information Management System (AIMS), electronic medical records (EMRs) and ancillary applications into a single platform to perform advanced data analytics and reporting to improve

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operating room and perioperative efficiency, operation, quality, safety and cost containment. Clinicians and hospital administrators access ORBIS through a secure web interface where they can explore metrics through dynamic graphical visualizations. Data are updated in ORBIS on a daily basis so users may review surgical cases and outcomes and compare to historical trends as soon as the next day.

4. Instrument Organizer Cart

UW Principle Investigators: Blake Hannaford, Kris Moe, Randall Bly, Andrew Lewis
Department: BioRobotics Lab, UW Medicine, Head and Neck Surgery, Harborview Medical Center, Bioengineering, Computer Science and Engineering
UW CoMotion Technology Manager: Ryan Buckmaster

A longstanding collaboration between Head-Neck surgeons and engineers at UW has resulted in a patented sterile surgical instrument organization system designed to simplify workflow, reduce total surgery time, and decrease infection risk in the operating room. Current practice is to wait until the patient is anesthetized, prepped, and draped before meticulously placing instruments on the patient's chest, arranging them so they can be accessed by the assistant or surgeon, and plugging them in to their respective devices. This wastes 15 minutes of time per patient, at a cost of often over $100 per minute. In addition, the instruments, when placed on the patient, can tangle or fall on the floor. We are now using a second-generation prototype for endoscopic sinus, head & neck, and neurosurgery procedures. Primary needs for the commercialization of this project include a thorough value proposition for the myriad of customer roles involved in surgical device acquisition and use, and a business plan to be able to provide that value.

5. Biomimetic Armor

UW Principle Investigator: Dwayne Arola
Department: Materials Science and Engineering
UW CoMotion Technology Manager: Ryan Buckmaster

Armor for ballistic protection and puncture resistance involves a set of compromises between effectiveness, flexibility and weight with the result often being substandard protection of those in harm's way such as military or police forces. Researchers led by Dwayne Arola in the Materials Science and Engineering department have developed a new armor system inspired by the natural armor of fish, such as the ancient *Arapaima gigas*. Armor based on elasmoid scales gives greater protection for a given weight while also allowing the armor to be flexible and conforming. The team is seeking a summer fellow to explore the different applications and markets for this technology to determine what to initially optimize it for and who potential partners may be.

6. Alchemy – Taking Poop and Making it into Gold

UW Principle Investigators: Tom Lendvay and Blake Hannaford
Department: UW Urology and Seattle Children's Hospital Robotic Surgery Center, and UW Electrical Engineering and Computer Science
UW CoMotion Technology Manager: Ryan Buckmaster

In hospitals across the country, fecal matter transplants of donor materials have become an increasingly standard treatment for many otherwise incurable infections as well as a host of other conditions by restoring the composition of microorganisms in the gut, the microbiome, back to proper balance. Recent research has suggested that preparing samples of one own gut microorganisms, an autologous fecal matter transplant, before procedures that disrupt the gut microbiome such as broad-spectrum antibiotics or chemotherapy would be the ideal treatment. However, current methods and infrastructure are not up to the task of providing timely point-of-care treatment of autologous fecal matter transplants. A team of UW researchers and medical experts, including Dr. Tom Lendvay, founder of UW spinout C-SATS, have developed a point of care processing device to take fecal matter and transform into a safe, ready to ingest form with a minimum of hands-on steps. A summer fellow is sought to explore market opportunities and help develop a commercialization strategy for a planned spinout.

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7. Blue Dot Photonics – New materials to boost solar panel power

UW Principle Investigator: Dan Gamelin
EIR: Jared Silvia
Department: Chemistry
UW CoMotion Technology Manager: Forest Bohrer

Solar panels are being deployed across the world in record numbers. Dramatic cost declines over the last 10 years have been driven by exporting panel manufacturing to lower cost countries and by achieving record scale in the value chain. Improvements in the efficiency of solar panels - how much electricity is generated from sunlight - has seen less improvements. We are developing new materials and manufacturing techniques to improve the efficiency of traditional solar panels by 15-25%. We have proof of concept results with near-term focus on building a working prototype device. We are seeking a Commercialization Fellow to help us investigate additional business strategies and target customers. Work will focus on customer discovery, ecosystem mapping, and business plan development. Fellows will be expected to drive an independent line of inquiry to validate assumptions and hypotheses about market opportunities

8. Aquarium/UW BioFab

UW Principle Investigator: Eric Klavins
Department: UW Electrical Engineering and Computer Science
UW CoMotion Technology Manager: Ryan Buckmaster

Biomedical laboratories, entrepreneurs, and researchers need data to develop medical therapies. But the complex experiments the process requires can be error-prone, often leading to longer timelines and higher costs. A team led by UW electrical engineering Professor Eric Klavins has launched UW BIOFAB built on the Aquarium Lab Operating System, which is a full-service laboratory that provides anyone with a laptop, whether undergraduate or faculty, access to full-scale molecular biology and cell engineering resources, and at a reasonable cost. Users can design custom mammalian cell lines, develop experimental workflows to assay them, view and analyze data and execute experiments, all from the comfort of a coffee shop. A summer fellow is sought to help develop the strategic plan for growing the BioFab and Aquarium user base and disrupt the current model of biological research.

9. De Novo Protein Design for Alternative Proteins

UW Principle Investigators: George Ueda, Jorge Fallas, and David Baker
Department: UW Institute for Protein Design, Biochemistry
UW CoMotion Technology Manager: Dennis Hanson

In the Institute for Protein Design we have been diving into the topic of “Cellular Agriculture” and “Alternative Proteins” in the food space. Our hypothesis is that de novo protein design capabilities offer a solution to growing need for “alternative” proteins as additives in food, as well as proteins that can support a much lower cost serum-free production of lab grown meat. Think “Meats without the animal.”

So far, we have identified at least three areas that need to be carefully considered and the business opportunity analyzed.

1. One example would be what we are calling “tasteless texture” which could be achieved with designed fibers or meshes that would, when added to other commodity protein supplies, would offer a more "meat like” feature.
2. Another example is designed food proteins as small molecule ligand binders that could formulate natural vitamins or colorants which otherwise are really not very bioavailable due to their chemical nature.
3. Yet another is proteins that are simply nutritious.

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4. But the currently most attractive commercial area we could identify in “superagonists” as low cost easy to produce, hyperstable growth factors that support “cell agriculture” We like these because they could be used to boost total cell mass production and support low cost meat growth, but also the growth of cells to produce designed food proteins as well since in either case the costs need to be dramatically reduced to realize the commercial potential of “Cellular Agriculture” and “Alternative Proteins” in the food space.