2017

Southeastern Pediatric Research Conference: Big Data for Better Care

Georgia Aquarium, Atlanta, GA
June 9, 2017

TECH DEMOS

CauteryGuard - Georgia Tech

Devin Li

CauteryGuard

A safer electrocautery device, CauteryGuard seamlessly integrates automatic retractability without sacrificing usability which allows it to eliminate any chance of initiating a surgical fire or inflicting cautery burns to either the user or the patient in the operating room.

Children's National Health System Washington DC - StethAid

Raj Shekhar

StethAid: A Mobile App for Identifying Innocent Still's Murmur in Children

Still's murmur is the most common innocent (benign) heart murmur of childhood, and roughly 720,000 children with Still's murmur are referred to pediatric cardiologists by pediatricians every year in the United States. This avoidable referral pattern comes at a high emotional cost to the children and parents, and high financial cost to the healthcare system. There is a need to minimize these unnecessary referrals, and our patent-pending solution, StethAid, is a mobile application (app) that can identify Still's murmur with high accuracy at the point of care to reassure pediatricians in their decisions regarding referral to a specialist. StethAid is a novel stethoscope that connects to a smartphone and a custom mobile app that records heart sounds and analyzes them for the presence of Still's murmur. Other features of the app include HIPPA-compliant cloud-based storage of all sound recordings as well as cloud-hosted analysis algorithm. StethAId is undergoing clinical testing currently.

Emory University and Georgia Tech - Davis Lab

Aline Yonezawa

3D bioprinting heart valves for Pediatric Patients

The Davis lab will be demonstrating our 3D bioprinting capabilities. At the demonstration, we will be bringing valves that were modeled from patient CT scans and printed using the EnvisionTec Bioplotter. In addition, we plan to have slides on the specs of the printer and more information on biomaterials that can be used with this printer.

Our demo directly relates to pediatrics because our goal is to 3D bioprint aortic valves for pediatric patients that are capable of growth and integration.

An Atlanta-based research alliance

Emory University - Buckley Lab

Corey Zheng

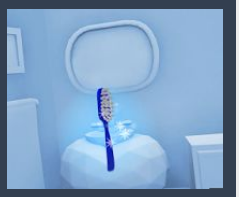
Diffuse optical techniques for non-invasive monitoring of children's brain

We are going to demonstrate novel optical technology that our laboratory is developing for non-invasive monitoring of cerebral blood flow, oxygenation, hemoglobin concentration, and oxygen metabolism in children. Conventional brain imaging modalities such CT and MRI do not permit bedside brain monitoring. Our portable optical systems enable bedside, continuous and real-time brain monitoring. These devices can potentially provide clinicians with critical information for the accurate diagnosis and therapeutic monitoring in pediatric brain-related diseases, including sickle cell disease, traumatic brain injury and hypoxic-ischemic encephalopathy.

The technology combines two diffuse optical spectroscopy techniques called Diffuse Correlation Spectroscopy (DCS) and Diffuse Reflectance Spectroscopy (DRS)/Frequency-Domain Near Infrared Spectroscopy (FD-NIRS). DCS is an emerging technology that measures blood flow in a microvasculature by quantifying light scattering off of moving red blood cells. DRS/FD-NIRS are non-invasive spectroscopic techniques that relate the spectra of detected light in the visible or near-infrared region to hemoglobin concentration and oxygen saturation of the underlying tissue. Combination of these two novel diffuse optics techniques holds great potential as a new monitoring tool for brain diseases in children.

GamesThatWork

Dov Jacobson



Brush Up VR

This is an enjoyable Virtual Reality game that trains young children to be aware of all their tooth surfaces and to consider a brushing session incomplete until all surfaces have been cleaned.

It is part of a larger toothbrush training program that has won awards from the Institute of Medicine (National Academy of Medicine) and it has itself won First Prize among 80 SBIR funded games at the US Education Department in December 2016.

We hope to demonstrate and discuss how games and Virtual Reality can be used to influence behavior and build healthy habits in children

Georgia Tech Research Institute

Edward Clarkson

A Data-Driven Tool for Post-Operative Appendicitis Care

While a large body of work with machine learning has focused on diagnosis and preoperative surgical care, very little attention has been made toward optimizing the postoperative phase, which has been the focus of numerous quality improvement efforts to streamline care in order to decrease length of stay. Most of these efforts are based on anecdotal experience and are not data driven.

We have developed a statistical model and interface to provide data driven recommendations for the postoperative management of pediatric perforated appendicitis. Specifically, we aimed to identify factors that would optimize length of stay while also providing healthcare providers and patients with information regarding complications including readmission. The result of this work is a prototype smart protocol application, driven by an iteratively-refined data model and under evaluation by pediatric appendectomy care providers.

Intent Solutions – ATDC

Sam Zamarripa

Intent Solutions – Ensuring right dose is dispensed at the right time to the right patient

Intent Solutions, Inc. (IS) is a technology enabled services company with hardware and software for monitoring and managing medication adherence in applied health care sectors.

Our solution is comprised of a portable medication dispenser, an App, and a cloud-based data manager. The dispenser, called tad™ (acronym for Take as Directed) is a fully portable device that can be easily programmed with most prescription regimens to ensure the right dose is dispensed to the right person at the right time. Tad™ is connected wirelessly to our App that notifies users when it is time to take a medication and captures and delivers our data sets to the cloud database, where data can be analyzed to deliver insights through business intelligence software.

Our technology platform can be used across a range of pediatric applications and clinical services principally in managing and monitoring critical adherence protocol. This may include medications for both chronic and acute conditions. Additionally, we believe our technology can be a tool for teaching and improving adherence among children and young adults due to their early adoption and familiarity with technologies.

Jvion

Allison Kavanagh

Getting the Big Picture: Using Cognitive Science to See Risk Beyond the Patient

According to a 2012 Robert Wood Johnson Health System study, approximately 60% of the factors impacting a patient's risk of disease and illness are external. Things like household income, zip code, and access to transportation all influence health inequalities and outcomes. But incorporating these thousands of factors into clinical decision making is a near impossible task made more complicated by the disparate, inconsistent, and incomplete nature of the data.

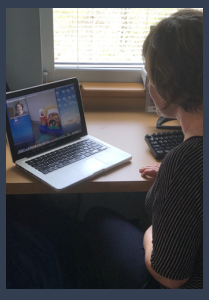
Emerging cognitive solutions are helping providers account for and incorporate exogenous factors into patient risk and deliver individualized interventions. These machines make sense of millions of data elements to deliver a complete, high-definition view into the future state of the patient. They go beyond clinical encounter information to accommodate external determinants and deliver recommended care paths that are more comprehensive, actionable, and individualized.

During this session, we will discuss the how cognitive science machines make sense of the ever changing and ever growing body of healthcare related data, the key attributes that activate cognitive science machines within the provider setting, and what these machines mean for the future of healthcare.

Marcus Autism Center

Megan Costo

Using Technology to Support Early Intervention Providers to Build Capacity in Families of Toddlers at Risk for Autism Spectrum Disorder



Caregivers are the most community-viable agents of change in providing necessary supports for young children at risk for autism spectrum disorder (ASD), yet early intervention providers (EIPs) are ill-equipped to coach caregivers (Friedman, Woods, & Salisbury, 2012). To bridge this gap, the Marcus Infant-Toddler Collaborative Coaching Program aims to improve coaching proficiencies of EIPs across Georgia through a coach-the-coach model focused on increasing knowledge of adult-learning strategies, early red flags for ASD, and supports to build family capacity to promote active engagement for toddlers at risk for ASD. The project utilizes innovative, wearable, mobile coaching technology that allows EIPs to connect to Marcus Community Interventionist coaches via VSee, a HIPAA compliant telehealth program for in-the-moment support. Ongoing data are indicating that EIPs in our coaching program are able to build caregiver capacity and ability to implement evidence-based supports for their children using this innovative technology.

Nanofiber Solutions

Kevin Nelson

Patient-Specific Nanofiber Tissue Engineered Vascular Grafts Using 3D Printing

Approximately 25% of babies born with CHD each year require invasive or other potentially lifesaving treatment. Single ventricle anomalies (SVAs) make up one of the largest groups of CHDs and is estimated to be about 1,800 patients annually in the US. In untreated SVAs, only one of two ventricles is of functional size, associated with a 70% mortality rate during the first year of life. To treat SVAs, a graft is implanted to connect the inferior vena cava (IVC) and the pulmonary artery. Biological grafts lack growth potential and have poor durability due to calcification and secondary graft failure, necessitating replacement, and leading to failure rates of 70-100% in 10-15 years. We propose the development of a patient-specific tissue engineered vascular graft (TEVG). The mandrel for the patient-specific nanofiber scaffolds will be printed from the pre-surgery 3D imaging data combined with a CAD model. The nanofiber scaffold implant will then be coated around this custom mandrel for the creation of a patient-specific TEVG. Such a technique could drastically enhance the available treatments available for children suffering from congenital heart disease (CHD).

Medical University of South Carolina - SealCath, LLC

Cephus Simmons

The Cephus Catheter – A Double Balloon Catheter for the Treatment of Intussusception in Children

The Cephus catheter includes two balloons extending from the outer surface of the catheter that when inflated creates a seal between the catheter and the patient's anus thereby eliminating leakage of air or fluids from around catheter during intussusception reduction procedure. This innovation will completely sandwich the rectum between its two balloons creating a seal that had not been experienced for treating pediatric patients with intussusception. The mission of SealCath, LLC is to provide a double balloon catheter that will improve the efficacy of procedures requiring an airtight seal around the rectum. Please visit SealCath's website at www.sealcath.com for more detailed information.

Quick Wins, and Atlanta Pediatric Device Consortium

Leanne West, and Martha Willis

Quick Wins is a funding program put in place to provide rapid solutions to unmet clinical and business needs at Children's Healthcare of Atlanta. Project proposals must be submitted by teams comprised of individuals from each organization, Children's and Georgia Tech (may include academic and/or GTRI assets). The project must be capable of delivering a workable solution (at minimum a validated "prototype") into the hands of a clinician or team within 18 months from the receipt of funds and project start.

The Atlantic Pediatric Device Consortium (APDC) is one of seven FDA funded pediatric device consortia awarded in 2013. A collaboration between Georgia Tech, Emory University, Children's Healthcare of Atlanta and Virginia Commonwealth University, APDC provides a national platform to translate ideas through its product development pathway all the way to commercialization. The mission of APDC is to enhance the lives of children through the development of novel pediatric medical devices, which are both safe and effective.