RESEARCH STATEMENT
Anthony Faiola

OVERVIEW

My research falls under the broad domain of health science, with two foci: **Digital Health Solutions** (*clinical interventions*) and **Health Behavior** (*health informatics/public health*). In the former case, study populations (patients/families) in the areas of oncology, critical care, cognitive impairment, and mental health. In the latter case, they include general populations, as well as underserved rural communities impacted by health disparities.

In the area of **Digital Health Solutions**, I apply an interdisciplinary approach from the fields of health informatics, human-computer interaction (HCI) / human factors, social science, and design thinking for health. The innovation pipeline includes empirical assessment, product innovation/development, usability/feasibility pilot testing, clinical implementation, and commercialization of 1) mobile health (mHealth/telehealth) and 2) gaming health interventions for patient and family-centered care. This research includes ongoing clinical trials that measure the efficacy of these digital health platforms, with the aim to improve the cognitive and mental health outcomes of patients and their families, especially those underserved rural communities. Other research in smart and connected health includes previously developed technologies in biosensors for hypoglycemia and prostate cancer. An assessment of these interventions is supported with several funding mechanisms. See below for a summary of five active funded projects.

1. This interventional study addresses the cognitive impairment of neuro-oncology and ICU (delirium) patients by investigating the efficacy of a novel interactive virtual reality gaming platform (**HomeTown Bound**). The aim is to mitigate cognitive dysfunction and improve synaptic plasticity by increasing sensory engagement through movement/embedded Selective Attention cognitive exercises, directing the player to focus and filter visual/auditory information using a three-level gaming strategy.
   - **Pilot Funding**: UK Center for Clinical and Translational Science (*Data collection status: In progress*)
   - **MCC Collaborators**: Dr. D. Villano, MD (Neuro-Oncology)
   - **Indiana U. Collaborators:** Drs. B. Khan & S. Khan, School of Medicine, IUHealth, & the Regenstrief Institute.
   - **Project Title**: A health game intervention for cancer patients suffering from acute cognitive impairment: A clinical study to assess a new form of brain stimulation therapy with the potential to improve synaptic plasticity.
   - **Effort: 20%**

2. This interventional study addresses the mental health disparities of families of cancer patients from rural Kentucky by investigating the efficacy of a newly developed mHealth platform (**FamCarePlus**). The aim of the digital health solution is to reduce mental trauma by connecting rural families at home with the bedside, [1,2] by providing a simplified means of receiving patient health/wellness updates and communication, without the complexity of MyChart proxy access. [*Media*]
   - **Pilot Funding**: Markey Cancer Center, Community Grant (*Data collection status: In progress*)
   - **MCC/UK Collaborators**: Drs. Hao, MD & Munker, MD in Oncology, MD; and Dr. Yates, MD in critical care.
   - **Project Title**: Addressing the mental health disparities of families (caregivers) of cancer patients from rural Kentucky: Investigating the efficacy of FamCare+ to reduce mental trauma using a mobile health service that connects families at home with the bedside.
   - **Effort: 20%**

3. The goal of our Comprehensive Connected Cancer Care (**C4/MyPath**) project is to advance health equity for underserved Kentucky populations by improving timely access to community-focused, patient/caregiver-centered, and high-quality cancer care, particularly targeting underserved populations such as rural, low-income uninsured communities. Building on the prior work of my collaborators,[3] this digital solution will provide coordinated care with supportive/ancillary providers / community services through use of a newly developed referral navigator system.
   - **Funding**: Merck Foundation: *Alliance for Equity in Cancer Care* (*Data collection status: In progress*)
   - **Collaborators**: PIs: Drs. Mullett, MD, P. Hull, M. Chih.; CoI: Dr. Faiola, PhD.
   - **Project Title:** Comprehensive Connected Cancer Care (C4) Program
   - **Effort: 5%**

4. The focus of our Children Eating Well mHealth (**CHEW**) project is food equity, i.e., improving the diet quality among low-income children. Building on the prior research of my colleagues,[4] we design/develop, test, and implement a nutrition goal-centered mobile application that supports health behaviors to lower the risk of obesity. CHEW is designed to increase use of these benefits through easy-to-use shopping tools and increase the consumption of quality foods through built-in nutrition education.

   - **Funding**: USDA, Grant No. 2017-68001-26352 (***Data collection status: In progress***)
   - **Collaborators**: PI: Drs. P. Hull, PhD, CoI: Faiola, PhD, and others.
   - **Project Title:** Children Eating Well (CHEW) Smartphone Application for WIC Families
   - **Effort: 10%**

5. The portable chromatograph-mass spectrometer for prostate cancer identification/diagnostics (**PPCID**) project builds on our existing canine-inspired nanosensor technology (NSF 2015-19) that uses VOC biomarkers and smart sensors to detect hypoglycemia from human breath. Our next phase of this technology uses VOC emanating from urine to screen for patients diagnosed with prostate cancer. This project will result in a portable GC-MS system to screen/detect prostate cancer in clinical settings and within a patient's home.

   - **Funding**: American Cancer Society, Grant No. SPA-RFA-Team-1076327
   - **Collaborators**: Co-PIs: Drs. M. Woodlam, PhD, (Indiana U.), M. Agarwal, PhD, (Purdue U.), A. Faiola, PhD,
   - **Project Title:** Canine-inspired Identification and Analysis of Volatile Organic Compounds (VOC) Biomarkers of Prostate Cancer using Portable Chromatograph-Mass Spectrometer (GC-MS) and Development of a Hand-held Nanosensor System
   - **Effort: 15%**

My research in **<u>Health Behavior</u>** focuses on two areas: **1)** <u>Health Informatics</u>—solutions to improve the quality and safety of health care services, building novel data science methods using patient-clinician verbal communication and patient self-reported messages.[5,6] This work also includes text mining algorithms and analysis of patient narrative data of psychiatric antidepressant medication (e.g., Selective Serotonin Reuptake Inhibitors). The aim of this work is to identify social media information about adverse drug events and drug effectiveness by linking the patients' expressions of adverse drug events to medical standard vocabularies.[7] **2)** <u>Public Health</u> is related to mental health disparities in marginalized rural communities.[8,9] Increasingly, studies show that disparities in health outcomes present difficult challenges to underserved populations, both in Kentucky and the surrounding states, but also globally in countries like Pakistan and India. As such, these populations often experience a greater burden of disease, with less knowledge of health literacy and disease management. Health information technology (e.g., mobile health and telehealth) may provide a vital link to reducing such disparities in rural clinical and home care settings.

The June 2019 supplement of *Medical Care*, reviews the paper, *Addressing Health Disparities Through the Utilization of Health Information Technology*, in which, the authors discuss the importance of applying health IT "for reducing disparities by increasing access to care, improving quality of healthcare and by promoting better patient-clinician communication."[10] In alignment with this research, building mobile health interventions to address health disparities remains a primary focus of my work, concurrently with several on-going studies in Kentucky and in Pakistan. These studies focus on self-care behavior,[11] health literacy,[12] and the application of information to support disease prevention and health promotion. This also includes investigating social media cognitive overload associated with information anxiety and avoidance behavior.[13,14,15]

From 2017 to the present, I've also coauthored several papers on behavior change strategies using mHealth that targets the wellness needs of parents with children and the elderly. These latter studies evolved out of the CHEW project,[16] while the earlier papers focused on mHealth data analytics to support healthy lifestyle management. These position papers,[17,18] on consumer health informatics, argue for: 1) empowering the elderly through the use of mobile health to achieve and sustain healthy lifestyle behaviors, 2) developing a sociotechnical system model and the use of mHealth technologies to support the management of noncommunicable diseases such as diabetes, and 3) leveraging health informatics and human factors psychology, through which mHealth and lifestyle management care-team collaboration can significantly support sustainable healthy lifestyle behaviors.

FUTURE RESEARCH

Connected digital health solutions that are both mobile and intelligent enough to address the complexities associated with big data, predictive analytics, and machine learning (AI) will increasingly occupy an integral place in my research, i.e., mobile health, health games, and clinical support health technologies. Longitudinal and real-time health data that interact in complex ways (involving multiple overlapping sources) will be coupled with both prediction and actionable solutions for patients and caregivers, as well as support tools for clinicians. Through the intersection of health data analytics, mobile health, and human-centered computing, my work will increasingly work toward ways to enhance the health behavior of patients from broad populations including pediatrics, adults, and elderly. Current plans for future research include the following projects noted below. After collecting preliminary data from existing projects, future iterations will have their own associated funding mechanisms.

1. **Using AI to Enhance Cognitive Rehab Patient Experience during Gameplay of Health Gaming Platform**—Phase two of the health game HomeTown Bound (noted above) will transition from a virtual reality (VR) platform to enhancements with AI integration to better resolve the issues of cognitive impairment. Currently, the game is intended to maximize neuroplasticity through an interactive environment with specialized cognitive exercises that recruit executive function and processing speed. The game directs patients to focus on visual and auditory information as they move through the game. However, in phase two, we propose to study the possibility of a more intelligent game driven by a machine learning algorithms that challenges player cognition, i.e., to think more quickly and three-dimensionally as they move from exercise to exercise and environment to environment.

   We will discuss how AI techniques can be used to push the patient-game-player to use both short-term memory and other executive functions to improve cognitive plasticity, thus expanding our original aim in phase one of the game. Although common off-the-shelf games can produce some of the same positive effects of cognitive rehabilitation, we hope to build a more intelligent 3D space that can track/measure patient actions and interactions (with space, objects, and avatars), while anticipating future reaction in real-time. In addition to leveraging gaming AI, we also plan to employ greater knowledge of game theory, statistics, eye-tracking, and behavioral theory to better predict individual action and measure patient cognitive health based on movement and reaction speed, eye-hand coordination, and accuracy of exercise problem solving.

2. **Music App as a Non-Pharmacological Intervention for Delirium Patients**—Early planning for forthcoming study will use music as a non-pharmacological intervention to reduce anxiety/stress and reduce the effects/duration of delirium among patients who are mechanically ventilated in the intensive care unit (ICU). Patients with acute brain failure associated with prolonged stays in the ICU may benefit from a controlled clinical intervention using a uniquely designed music health application (mHealth app) as evidenced by an early study by my collaborators on this project.[19,20] In our subsequent study, we will build on their feasibility and acceptability findings to assess if such a music mHealth can mitigate or reduce the effects of delirium among ICU patients. Initial project planning has focused on the importance of AI as a means of facilitating the most effective music choices and the appropriate times and durations of played music based on pre-selected genres. **This research is in collaboration with my colleagues from Indiana University, Drs. B. Khan & S. Khan, School of Medicine, IU Health, and the Regenstrief Institute.**

3. **mHealth Using AI to Provide Data-Driven Mental Health Indicators of Family Members**—As the next iteration of our family centered application (FamCare+), we will explore ways to integrate AI that can further support families connecting with clinicians at the bedside. Because this mobile platform is aimed at improving the mental health of family members, we intend to expand the Self-Assessment Mental Wellness tool for tracking and performance feedback for psychotherapy.

   While there are empirical data for what treatment modalities are effective for particular patient diagnoses, there is little to no empirical understanding of how patient mental health-care indicators, practitioner practices / competencies, and clinical outcomes are interdependently related. That is, clinical practitioners rarely collect heterogeneous data (systematically) that can determine the effectiveness of care/treatment at an organizational scale. The intent is to develop this mobile platform in ways that build a foundation for

understanding such treatment variables, including developing clinical content and UX tracking tools. Through the use of machine learning, the platform would provide data-driven insights that improve the predictive power of treatment and risk stratification for the distribution of treatment resources for families who are often underserved while their loved-one is in critical care. Such a system holds the potential to improve efficiency and effectiveness at all scales: those of the practitioner, of the greater enterprise, and psychotherapy at large.

4. **AI Driven Medical Data Visualization to Improve Diagnostic Decision-Making—**A recently initiated collaboration with colleagues in Computer Science (College of Engineering) and the Department of Pathology (College of Medicine), has revived an interest in a data visualization platform developed in 2006-15 while working at the IU School of Informatics and Computing. The project, **MIVA** (Medical Information Visualization Assistant), is a mobile real-time data platform, with a dynamic interface, to maximize clinical workflow. Advances in ICU bedside displays and EMR interfaces have not fully addressed the challenges of cognitive load and the delivery of real-time clinical data. Time constraints on decision-making added to complex numeric/textual data analysis leads to excessive cognitive strain and diagnostic error—impacting quality of care. MIVA's design allows for spatially and temporally organized data to support rapid clinical diagnostics, while reducing cognitive load.

The new MIVA system will integrate machine learning, which will improve the accuracy and efficiency of health outcome identification from the EHR, especially under a much more robust understanding of the clinical context. Our intent is that our integration of machine learning will improve patient health outcomes in the way of clinical notes based upon better diagnostic criteria. We also propose that machine learning may be useful for modeling the complex diagnostic data to better identify patient problems, and thereby improve the quality of care and patient safety. In sum, the domains of critical care medicine and health informatics have enormous potential for leveraging and transforming patient data through the use of human-centered AI designed visualization technologies that are smart, mobile, and easy to extract relevant patient-centered knowledge. With MIVA 2.0, clinicians could rapidly view, analyze and interpret EMR data.

This research was originally funded with (*four consecutively awarded*) proof-of-concept internal grants from the Indiana University Solutioin Center—Total: $73,600. This was a joint submission between PI Faiola and co-PIs from the Mayo Clinic and Indiana University School of Medicine and the Regenstrief Institute.

Funding History

GRANTS, SCHOLARSHIPS, AND CONTRACTS

PENDING & IN DEVELOPMENT GRANTS				
GRANTING AGENCY, FOA, & TITLE	**ROLE/EFFORT**	**AMOUNT**	**DATE**	**COLLABORATORS**
National Science Foundation - NSF **TITLE:** Development of Canine-Inspired Nanosensor Systems to Detect Pulmonary Exacerbations in Patients with Cystic Fibrosis. NSF 23-614 **(Smart & Connected Health)**	**PI**[1] **PENDING**	$1.2M (4 Yrs.)	2024-2028	**Other PIs: M. Agarwal, PhD (Contact PI)**, Purdue University; **PIs: DB. Sanders, MD, S. Cao, MD, M. Woollam**, **PhD,** Indiana University
National Institute of Mental Health, R01 **TITLE:** Clinical study of novel VR game intervention to improve cognitive function of ICU and cancer patients suffering from delirium and acute cognitive impairment. PAR-21-210	**CoPI**[2] **IN PROCESS**	TBD (5 Yrs.)	2024-2029	**Other CoPIs: B. Khan, MD, & S. Khan, MD**, Indiana University School of Medicine / Regenstrief Institute.
National Institute of Mental Health, R21 **TITLE:** Clinical pilot study of a serious interactive 3D gaming system for pulmonary ICU and cancer patients suffering from acute cognitive impairment due to extreme pharmacological neurotoxicity. PA-20-196	**CoPI**[2] **IN PROCESS**	TBD (2 Yrs.)	2024-2026	**Other CoPIs: Sikandar Khan, MD Babar Khan, MD**, Indiana University School of Medicine and the Regenstrief Institute.

ACTIVE EXTERNAL & INTERNAL GRANTS				
GRANTING AGENCY & TITLE	**ROLE/EFFORT**	**AMOUNT**	**DATE**	**COLLABORATORS**
AGENCY: American Cancer Society **TITLE**: Canine-inspired Identification and Analysis of Volatile Organic Biomarkers of Prostate Cancer using Portable GC-MS & Develop. of a Hand-held Nanosensor System. Award ID #: PASD-Team-23-1076327-01-PASD	**Team Principle— 15%**[3] **ACTIVE External Grant**	$1.2M (5 Yrs.)	2024-2028	**Other PIs:** Drs. Mangilal Agarwal, PhD, Purdue U. & Mark Woollam, Indiana U.
AGENCY: USDA /National Institute of Food & Agriculture **TITLE:** Children Eating Well (CHEW) Smartphone Application for WIC Families, V2. ID# 1000100537. Grant Site Link.	**Co-PI—10%**[1] **ACTIVE External Grant**	$2,524,922 (5 Yrs.)	2017-2024	**PI:** P. Hull, UK Medicine (Project Dir.); **Co-PI:** S. Mulvaney, Vanderbilt U.
AGENCY: Merck Foundation (Alliance for Equity) **TITLE:** Comprehensive Connected Cancer Care (C4) Center. Grant Site Link.	**Co-I—7% ACTIVE External Grant**	$2M (5 Yrs.)	2022-2027	**Other Co-Is: P.** Hull, T. Mullett, M. Chih, B. Shelton, UK
AGENCY: Markey Cancer Center Community-Engaged Partnership Grant (U of Kentucky) **TITLE**: Addressing the mental health disparities of families of cancer patients from rural Kentucky: Investigating the efficacy to reduce mental trauma using FamCare... Link.	**PI—20% ACTIVE Internal Grant** (*Clinical Pilot Study for Preliminary Data*)	$10K (1 Yr., with 1 Yr. Extension)	2022-2024	**Co-Is:** Z. Hao, MD, PhD, Professor of Medicine and Cancer Biology, College of Medicine, Div. Oncology
AGENCY: Center for Computational and Translational Sciences – Pilot Grant (U of Kentucky) **TITLE**: A health game intervention for cancer patients suffering from acute cognitive impairment: A clinical study to assess a new form of brain stimulation therapy with the potential to improve synaptic plasticity.	**PI—20% ACTIVE Internal Grant** (*Clinical Pilot Study for Preliminary Data*)	$8K (1 Yr., with 1 Yr. Extension)	2022-2024	**Co-Is:** P. Meulenbroek, Com Sciences and Disorders; J. Villano, MD, PhD, College of Medicine, Div. Oncology

Notes provided to clarify role and effort for each grant, especially in the context of Team Science and shared leadership.[4]

[1] **NSF (Principal Investigator / Co- Principal Investigator / Project Director (PI/CoPI/PD)):** Means the individual(s) responsible for the scientific or technical direction of the project. NSF does not infer any distinction in scientific stature among multiple PIs, whether referred to as PI or co-PI. …The PI and any identified co-PIs, however, will be jointly responsible for submission of the requisite project reports. **(NSF Link) (NIFA Same as NSF: Link)**

[2] **NIH (PI or Multiple PIs or CoPI):** All PD/PIs have equal responsibility and accountability for leading and directing the project. …All PD/PIs must be qualified to serve as PD/PIs and will share responsibility for the project. Although the PD/PIs may identify a leader of the project or a coordinator of the overall team, that is not a role that NIH formally acknowledges. **(NIH Link)**

[3] **American Cancer Society (PI and Team Principle, similar to NSF Co-PI):** PI serves as the team leader and primary point of contact for the ACS Extramural Research Staff, ensures the team complies with the terms of the award, and oversees all organization assurances and certifications. (no multi- or co-PIs allowed); Team Principal: Leads a component of the research based on their area of expertise, together with Lead PI, shares authority for scientific leadership. **(ACS Link)**

[4] **NIH and Team Science:** "Shifting the research culture from a primary investigator-initiated focus to one that embraces collaboration and efforts that cut across discipline-based departments." See: **NIH/NCI** and **Collaboration and Team Science**

				(*Active Funding*) $5,742,922

External Grants
Past Grants & Contracts

GRANTING AGENCY & TITLE	ROLE / EFFORT	AMOUNT	DATE	COLLABORATORS
Agency: NIDILRR-ARCP (Advanced Rehab. Research Training Program) Dept. of Health & Human Services, Admin for Community Living. **TITLE:** Advanced Training in Translational and Community-Engaged Scholarship to Improve Community Living & Participation for People with Disabilities **ID#** 311122. **Grant Site Link**.	**CoPI—5%** Multiple PIs *(Funding contract ended once CoPI left UIC)*	$999,995 (5 Yrs.)	2020-2025	**CoPIs: Tamar Heller,** Dept. of Intellectual Disability & Human Develop.; **Yolanda Balcazar,** Dept. of Occupational Therapy, **Angela Young,** Dept of Kinesiol & Nutrition
Agency for Healthcare Research & Quality Award #: AHRQ-R21HS025443-01 **TITLE:** An Etiology for Medication Ordering Errors in CPOE Systems **ID #:** R21 HS25443-02 **Program Link Site Link**	**Site PI—10%**	$297,108 (2 Yrs.)	2018-2020	**PI: Joanna Abraham, PhD,** Washington University (School of Medicine)
Agency: NSF Smart & Connected Health **TITLE:** Canine-Inspired Smart Sensor for Detecting Hypoglycemia from Human Breath[21][22] **Award #:** 1502310 **Program Link**	**Site PI—30%**	$738,311 (3 Yrs.+ 1 Yr. no-cost extension)	2015-2019	**PIs: Mangilal Agarwal**, PhD (Contact PI), **Peter Roach, MD**; **Sudhir Shrestha, PhD,** Purdue U.
Contract Agency: King Saud Bin Abdulaziz University for Health Sciences (KSB), Office of the Dean **TITLE:** Health Information Management Curriculum Licensing **Program Link**	**Contract** 100%	$450,000	2017-2018	**Contractors: Majid Al Salamah, Riyad Alshammari,** College of Public Health & Health Informatics, Riyadh, Saudi Arabia
Agency: HASTAC: MacArthur Foundation Grant **TITLE:** Creatures Classified: An exploration of cataloging creatures across the galaxy **Grant #:** 08-91858-000-HCD **Grant Site Link**	**Grant Director** (PI Admin. Oversight) 2%	$40,000 1 Yr.	2010	**PIs: Mathew Powers, MFA, Clint Koch, MA, Jennifer Stewart, MS,** IU School of Informatics and Computing
Agency: U.S. Dept. of Veterans Affairs Project #: RRP 06-156 (HSR&D Study) **TITLE**: Pre-Implementation of a Decision Support Tool for Improving Patient Handoff **Grant Site Link**.	**Contract** 5%	$6,800 1 Yr.	2006	**PI: Bradley Doebbeling,** MD MSc & **Mindy Flanagan PhD,** Richard L. Roudebush VA Medical Center, Indianapolis, IN
Agency: Clarian (Health) Grants Admin. **Project #:** VFE-183 **TITLE:** Computerized Education to Prevent Hypoglycemia When Driving	**PI—15%** (Multiple PIs)	$79,841 2 Yrs.	2007-09	**Co-PIs: Donald Orr , MD,** IU School of Medicine**; Joseph DeFazio, PhD,** IU School of Informatics & Computing
Agency: Walther Cancer Institute **Project #: 601-3200-00-0002** **TITLE:** A Web-Based System to Support Family Caregiving for Cancer Patients	**Co-PI—8.3%**	$396,147 2 Yrs.	2009-2011	**PI: Anna McDaniel, PhD,** University of Florida (Previously IU School of Nursing)
				(*Past Funding*) $3,008,202

INTERNAL UNIVERSITY GRANTS
Past Awards for Research, Teaching Excellence, & Research Travel

GRANTING AGENCY & TITLE	ROLE / EFFORT	AMOUNT	DATE	COLLABORATORS
Agency: IU Solution Center Grant **TITLE:** Medical Information Visualization Assistant – System Design (Phase 1-4 Funding)	**PI** 100%	$73,600	2008-2014	**Co-PI: Simon Hillier, MD**, IU School of Medicine
Agency: IU Research Support Funds Grant Application **TITLE:** Support for Purchase of BioPac Psycho-physiological Measuring Equipment	**PI** 25%	$13,000	2010	**Co-PI: Mark Pfaff**, PhD, IU Schools of Informatics and Computing
Agency: IU Learning Environments Grant **TITLE:** Tablet PC Presentation for Diabetic Patients: Diabetes Prevention and Control	**Consultant** 100%	$25,000	2010	**PI: David G. Marrero, MD and Paris Roach, MD**, IU School of Medicine,
Agency: IU Learning Environments Grant **TITLE:** Media Arts Research Learning Arcade (MARLA): A Research/Learning Game Community Lab	**Co-PI** 15%	$25,000	2009-10	**PI: Mathew Powers, MFA,** Media Arts & Science Faculty
Agency: IUPUI Research Support Grant – Seed Funding **TITLE:** Using Interactive Games to Improve Treatment Adherence in Children with Type 1 Diabetes	**Co-PI** 10%	$29,000	2009	**PI: Hadi Kharrazi,** IU Schools of Informatics and Computing
Agency: IUPUI Research Support Grant – Seed Funding **TITLE:** Using Interactive Frameworks to Enhance Treatment Adherence in Type 1 Diabetes	**Co-PI** 10%	$15,000	2009	**PI: Hadi Kharrazi,** IU Schools of Informatics and Computing
Agency: Purdue Research Summer Grant **TITLE:** Qualifying Digital Color Targets for Skills and Knowledge Standard	**PI** 100%	$5000	2000	Graphic Arts Tech. Found. Pitts., PA
Travel Funding				
Agency: IU Research Grant, Part 1 and 2 **Title:** Russian and American Cross-Cultural Study of Hypermedia Design & Accessibility	**PI** 100%	$3,070	2002-03	SoIC & Institute of Tech., Optical Design & Engineer., St. Petersburg, Russia.
Agency: IU Office of International Prog. Overseas Conf. Fund **TITLE:** 12th International Conf on Information Visualization: HCI Symposium	**PI** 100%	$600	2008	IU Schools of Informatics and Computing
Agency: IU International Travel Grant **TITLE:** CATac'06 Cultural Attitudes Towards Technology and Communication	**PI** 100%	$600	2006	Estonia England
Agency: IU International Travel Grant **TITLE:** Study of Cross-cultural Behavior of International Online Gamers	**PI** 100%	$2000	2006	Moscow State University, Russia
Agency: IU International Travel Grant **TITLE:** The Copernican shift: HCI education and the design enterprise	**PI** 100%	$750	2003	Crete, Greece
				(Past) Funding **$192,620**

FULBRIGHT SCHOLARSHIPS				
GRANTING AGENCY & TITLE	**ROLE / EFFORT**	**AMOUNT**	**DATE**	**COLLABORATORS**
Agency: Fulbright U.S. Scholar Program. Bureau of Educational and Cultural Affairs (U.S. Dept. of State). **Senior Specialist Lectures**. **TITLE:** Communication & Online Publishing Tech.	**PI** 100%	$6,000	2003	Moscow State University of the Printing Arts, Russia
Agency: Fulbright U.S. Scholar Program. Bureau of Educational and Cultural Affairs (U.S. Dept. of State). **Senior Specialist Lecture**. **TITLE:** Communication & eBook Technologies	**PI** 100%	$6,000	2002	Moscow State University of the Printing Arts, Russia
Agency: Fulbright U.S. Scholar Program. Bureau of Educational and Cultural Affairs (U.S. Dept. of State). **Traditional/Core Award.** **TITLE:** Interactive Media, Usability, and Design Com.	**PI** 100%	$30,000	1999-2000	St. Petersburg State University of Information Technology, Mechanics, and Optics, SP, Russia
			(Total Fulbright Funding) **$42,000**	

PRODUCTS, PATENTS, & COMPANIES

1. **Product Name**: MIVA: Medical Information Visualization Assistant, A data visualization clinical decision support system for use in the ICU or other clinical-data-intense environments.
   - **Patent #:** 8,645,164 B2 - **US Patent Link: [LINK]**
   - **Patent date filed**: 5/27/10 & 1/6/11 (**Patent date**: February 4, 2014; **Patent Expired**: 2018)
   - **Assignee**: Indiana University Research and Technology Corporation
   - **Inventors**: **Anthony Faiola**, Formally: Indiana University, Indianapolis; Currently: University of Kentucky, and **Simon C. Hillier,** Dartmouth College (EtnaNH) (Formally: Indiana University)
2. **Product Name**: Low Power Wireless Sensor System with Ring Oscillator and Sensors for Use in Monitoring of Physiological Data.
   - **Patent #:** 20150295562 (Provisional #) - **US Patent Link: [LINK]**
   - **Patent date filed**: April 13, 2015 (**Patent date published**: Oct. 15, 2015)
   - **Assignee**: Indiana University Research and Technology Corporation
   - **Inventors**: Mangilal Agarwal, Purdue University (IUPUI); Anthony Faiola, Indiana University (IUPUI); Hosseign Jafarian, Purdue University (IUPUI); Sudhir Shrestha, Purdue University; Khodadad Varahramyan, University of Maine; Ali Daneshkha, Purdue University.
3. **Product Name**: FamCarePlus
   - **Apple Store**: https://apps.apple.com/us/app/famcare/id6446958621
   - **Website**: https://famcareplus.org/
   - **Patent #:** No patent issued as of this date.
   - **Description: FamCarePlus supports access to patient health updates for family members, caregivers, and next-of-kin (NOK). FamCarePlus enhances communication and coordination between (remote) families and healthcare staff at point-of-care**. Apart from its direct impact on reducing psychological trauma, maintaining communication, and the flow of bedside health and wellness information, FamCarePlus proves invaluable for creating informed families, while lowering anxiety and depression and building trust and satisfaction with healthcare services.
4. **Product Name**: HomeTown Bound
   - **Patent #:** No patent issued as of this date.
   - **Description: Hometown Bound is an interactive gaming environment that includes cityscapes, persons and objects, through which cognitively impaired patients navigate. Moving through a 3D space as a (first-person) avatar, the game is designed to increase cognitive and sensory engagement through (embedded) selective attention (SA) exercises.** Our gaming environment manages SA stimuli by directing the patient to focus and filter visual and auditory information through dichotic listening and shadow tasking. Each SA exercise acts like a spotlight on a particular task within the patient's visual and auditory field. The game targets the strengthening of brain synapses, i.e., the connection at the end of neurons. As the patient-player learns and adapts to each new cityscape environment and SA exercise, electrical signals assist in the release of neurotransmitters into the synapse.
5. **Company Name**: Advanced Insight Medical (AIM), LLC—Anthony Faiola, CEO
   - Registered in Indianapolis, Indiana, D&B DUNS Number: 078682124, Nov. 2016.
   - Dedicated to biomedical and health information technology such as mobile health and telehealth for purposes of self-monitoring, clinical support, and patient and family centered care.

REFERENCES & NOTES

1.   Faiola, A., Abraham, J. & Papautsky, E.L. (2019). Delivering Patient Information and Access to Mental Health Counseling for ICU Families: Towards a Human-Centered Mobile Health System for Room-to-Family Communication. Poster, Extended Abstract and Presentation, *Proceedings from Human Factors and Ergonomics in Health Care, Chicago, IL, March 2019.*

2.   Faiola, A. and Abraham, J. (2018). FAMcare: A MICU Room-to-Mobile System—Supporting the Communication Needs of Families, Extended Abstracts, American Medical Informatics Association, Annual Symposium, San Francisco, CA, November, 2018. https://symposium2018.zerista.com/event/member/508059

3.   Aronoff-Spencer E, McComsey M, Chih MY, Hubenko A, Baker C, Kim J, Ahern DK, Gibbons MC, Cafazzo JA, Nyakairu P, Vanderpool RC, Mullett TW, Hesse BW. Designing a Framework for Remote Cancer Care Through Community Co-design: Participatory Development Study. J Med Internet Res. 2022 Apr 12;24(4):e29492. doi: 10.2196/29492. PMID: 35412457; PMCID: PMC9044168.

4.   Weber, S., Mulvaney, S., **Faiola, A.,** Brown, M, Koyama, T., Sun, L., Goggans, S., Hull, P., (Accepted). Family Behavioral Goal Setting and Tracking: Quality Evaluation of Commercially Available Mobile Applications for Parents, *JMIR Pediatrics and Parenting.* http://doi.org/10.2196/preprints.41779

5.   Hosseini, M, **Faiola, A**, Jones, J, Vreeman, D, Wu, H, & Dixon, B.E. (2019). Impact of document consolidation on healthcare providers' perceived workload and information reconciliation tasks: a mixed methods study, *Journal of the American Medical Informatics Association,* *26*(2), 134–142. https://doi.org/10.1093/jamia/ocy158 [Selected in category of Best Papers for the Health Information Management Section of the 2020 IMIA Yearbook. (*International Medical Informatics Association*)]

6.   Zolnour A, Eldredge CE, **Faiola A,** Yaghoobzadeh Y, Khani M, Foy D, Topaz M, Kharrazi H, Fung KW, Fontelo P, Davoudi A, Tabaie A, Breitinger SA, Oesterle TS, Rouhizadeh M, Zonnor Z, Moen H, Patrick TB and Zolnoori M (2023). A Risk Identification Model for Detection of Patients at Risk of Antidepressant Discontinuation, *Frontiers in Artificial Intelligence (Medicine and Public Health).*

7.   Zolnoori, M., Fung, K., Fontelo, P., Kharrazi, H., Faiola, A., Wu, Y, S., Stoffel, V., & Patrick, T. (2018). Identifying the Underlying Factors Associated With Patients' Attitudes Toward Antidepressants: Qualitative and Quantitative Analysis of Patient-Generated Data, *Journal of Medical Internet Research— Journal of Mental Health*, 5(4):e10726. doi:10.2196/10726 (NIH Site: https://pubmed.ncbi.nlm.nih.gov/30611893/https://pubmed.ncbi.nlm.nih.gov/30287417/)

8.   **Faiola, A.,** Soroya, S., Naeem, S., Lenox, S., Piekarski, S., & Tenuta, G. (Developing). Addressing the mental health disparities of families of critical care patients from rural communities: Investigating the efficacy to reduce mental trauma using mobile health services. *Journal of Environmental Research and Public Health.*

9.   **Faiola, A.,** Kamel Boulos, M.N., Bin Naeem S., ur-Rehman, A. (2023). Integrating social and family support as a measure of health outcomes: validity implications from the integrated model of health literacy. *International Journal of Environmental Research and Public Health*, 20(1):729. https://www.mdpi.com/1660-4601/20/1/729, doi: 10.3390/ijerph20010729.

10.   https://journals.lww.com/lww-medicalcare/toc/2019/06001

11.   Soroya, S. H., Rehman, A. U., and **Faiola, A**. (Accepted). Exploring the impact of Internet and media sources exposure on self-care behavior: Mediating the role of health anxiety, literacy, and information seeking behavior, *Journal of Rural Health.*

12.   Rehman, A., **Faiola, A.,** & Naeem, S. B. (2023). The prevalence of low health literacy in Pakistan: current status and future directions, *Health Information and Libraries Journal, 40*(1). DOI.org/10.1111/hir.12475

13.   Soroya, S. H. and **Faiola, A**. (2023). Why did people avoid information during the COVID-19 Pandemic? Understanding information sources' dynamics among Pakistani Z generation. *Library Hi Tech*, 40(6):150. DOI 10.1108/LHT-02-2022-0113

14.   Soroya, S. H., Nazir, M., & **Faiola, A.** (2022). Impact of health-related internet use on disease management behavior of chronic patients: Mediating role of perceived credibility of online information. *Information Development*, *0*(0). https://doi.org/10.1177/02666669221144622

15.   Naeem, S. B., **Faiola, A.,** Boulos, M. K., & Azam, M., Boulos, M. K., & Rehman, A. U. (Under Review). e-Health literacy and self-care behaviors - results from a survey of university students in a developing country. *Future Internet.*

16.   Hull, P., Mulvaney, S., Faiola, A., Weber, Summer, (Under Review). Child and Family Goal Setting and Tracking: Quality Evaluation of Commercially Available Mobile Applications for Parents. *Journal of Medical Internet Research.*

17.   Faiola, A. & Holden, R. (2017) Consumer Health Informatics: Empowering Healthy-Lifestyle-Seekers through mHealth, *Journal of Progress in Cardiovascular Diseases, Special Edition: Conceptualizing the Healthy Lifestyle Healthcare System*, *59*(5), 479-486. https://www.sciencedirect.com/science/article/pii/S0033062016301438

18.   Faiola, A., Papautsky, E., & Isola, M. (2019) Empowering the aging with mobile health: A mHealth Framework for supporting sustainable lifestyle behavior, *Journal of Current Problems in Cardiology, 44*(8). 232-266. DOI: 10.1016/j.cpcardiol.2018.06.003

19.   Khan SH, Xu C, Purpura R, Durrani S, Lindroth H, Wang S, Gao S, Heiderscheit A, Chlan L, Boustani M, Khan BA. Decreasing Delirium Through Music: A Randomized Pilot Trial. Am J Crit Care. 2020 Mar 1;29(2):e31-e38. doi: 10.4037/ajcc2020175. PMID: 32114612; PMCID: PMC7666845.

20.   Seyffert S, Moiz S, Coghlan M, Balozian P, Nasser J, Rached EA, Jamil Y, Naqvi K, Rawlings L, Perkins AJ, Gao S, Hunter JD 3rd, Khan S, Heiderscheit A, Chlan LL, Khan B. Decreasing delirium through music listening (DDM) in critically ill, mechanically ventilated older adults in the intensive care unit: a two-arm, parallel-group, randomized clinical trial. Trials. 2022 Jul 19;23(1):576. doi: 10.1186/s13063-022-06448-w. PMID: 35854358; PMCID: PMC9295531.

21.   This NSF funded research addresses the global epidemic of diabetes mellitus types 1 and 2, as well as related physiological complications stemming from severe hypoglycemia (HYPO). HYPO detection relies on analyzing blood glucose levels through continuous monitoring, saliva, urine, and skin pricking—all of which have limited accuracy. Diabetes-alert dogs (DADs) are trained to detect HYPO by smelling volatile organic compounds (VOCs) in human breath. Patients with DADs have

demonstrated more accurate and faster detection than those methods noted. In this research, we are developing a HYPO warning and data delivery system, referred to as HYPOalert. HYPOalert uses an electronic nanosensor that mimics a canine's ability to detect HYPO from VOCs in human breath. The sensor outputs data integers from 1 to 10 (via Bluetooth) to an mHealth smartphone app, which provides numeric and data visualizations along with HYPO alerts that warn patients when they are approaching or in HYPO. Three prototype iterations have been completed and tested. Version one of the final app is near completion.

[22] Faiola, A., Vatani, H., & Agarwal, M. (2019). Hypoglycemic Detection by Human Breath: A Mobile Health Application that Alerts Diabetics of Low Blood Glucose, Special Edition on Smart Coaching Solutions for Health and Wellbeing, Journal of EAI Transactions on Ambient Systems, Special Issue: Smart Coaching Solutions for Health and Well-Being. https://eudl.eu/doi/10.4108/eai.23-3-2018.162220