2019

Innovation Accelerator

Annual Report

In partnership with

EMORY UNIVERSITY

Georgia Institute of Technology

THE JAMES M. COX FOUNDATION

THE INNOVATION ACCELERATOR

With the aim of speeding up development, testing, and dissemination of evidence-based interventions for Mild Cognitive Impairment (MCI), the **Innovation Accelerator** (IA) is offering seed grants to support research in the following areas: therapeutic programming, technology, and the built environment. The funded projects should result in innovative solutions, strategies, and methodologies developed through a culture of collaboration among students, researchers, clinicians, and those with MCI in less than 12 months' time.

Supported by funding from the Cox Foundation and in partnership with Emory Brain Health and the Goizueta Alzheimer's Disease Research Center, faculty from Georgia Institute of Technology and Emory have developed a ground-breaking new program that combines therapeutics, technology, data science, and the built environment to improve the lives of people diagnosed with MCI. The aim of this program, named the **Cognitive Empowerment Program** (CEP), is to empower people with MCI and their care partners and families by creating a living lab that promotes joy, purpose, health and wellness through comprehensive lifestyle programs, emerging technologies, and physical environments.

YEAR 1: THE BEGINNING

The beginning of something impactful! During the first year of the Innovation Accelerator, we are establishing protocol and baseline metrics for research in the CEP in the coming years. This will help us to understand what data needs to be collected, how we are going to collect it, and define which spaces are used and for what purposes.

HOW DO I GET INVOLVED?

For more information on the Innovation Accelerator or the Cognitive Empowerment Program, please contact us at the information listed below:

SIMTIGRATE DESIGN LAB | GEORGIA INSTITUTE OF TECHNOLOGY
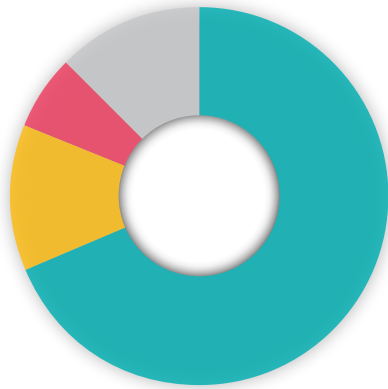
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2019 Pre-Proposal Area of Focus

11	TECHNOLOGY
2	THERAPEUTICS
1	BUILT ENVIRONMENT
2	COMBINATION OF AREAS

2019 Distribution of Applicants by Institution and Discipline

The IA believes diversity among disciplines results in better research and design. The tables below show the various institutions and disciplines represented by the pre-proposal applicants.

Institutions Represented

Emory	3
Georgia Institute of Technology	4
Georgia State University	1
Georgetown University	1
George Washington University	1
Private Business	3
Research Lab	3

Discipline

College of Design	3
College of Sciences	1
College of Engineering	1
College of Nursing	1
Department of Medicine	4
Research Lab	3

With the goal of faster development, testing, and distribution of evidence-based interventions for mild cognitive impairment (MCI), the Cognitive Empowerment Program (CEP) is supporting several new seed grants. Every year, the IA will fund selected research based on stakeholder involvement, composition and diversity of the research team, and the potential to impact the lives of people with MCI. Applications are evaluated according to an adapted NIH review criteria of significance, investigator(s), innovation, and approach. For more information, please see appendix.

Year 1: Selected Research

Everyday Memory Intervention for Caring DYADs

PI(s): Ann Pearman, Chris Hertzog

Collaborator(s): Ken Hepburn

This intervention is designed to help both CEP members and their care partners (caring dyads) learn new techniques to help improve their everyday memory and functioning. Investigators will teach both people strategies to manage their everyday functioning with a focus on self-regulation and dyadic interaction.

Identifying Barriers and Technological Interventions to Support Adherence Behaviors in Mild Cognitive Impairment

PI(s): Kayci L. Vickers, Dr. Felicia C. Goldstein, Marybeth Gandy Coleman, Laura Levy

Past research has shown that up to 40% of older adults do not adhere properly to prescribed medications, and that these rates are higher among individuals with Mild Cognitive Impairment (MCI). Although it has been less well-studied, there is growing evidence that behavioral recommendations such as changing one's diet, exercising more, becoming more cognitively active, and engaging in regular social activities are more difficult to carry out and therefore are likely to result in even higher rates of non-adherence. The proposed study aims to understand the major barriers to adherence to these types of regimens in individuals with MCI and their care partners, and to co-design technological solutions for overcoming these barriers.

Development and Testing of a Social Game with the Therapeutic Potential for Individuals with MCI and their Families

PI(s): Chantal Kerssens, Maribeth Gandy Coleman, Laura Levy

Collaborator(s): Cecile Janssens, Tracy Mitzner, Dr. Molly Pirkens, Suzette Binford

The proposed project aims to create, implement and test an adapted version of a well-known game, such as Scrabble, for people with MCI and their family members. Many couples and families seek opportunities to stay active, physically and mentally, to support their brain health.

Feasibility of Using Tele-Technology for Mind-Body Interventions for People with Mild Cognitive Impairment

PI(s): Traci L. Mitzner, Dr. Patricia C. Griffiths

Group mind-body classes, such as tai chi and mindfulness, have the potential to provide both physical and social health benefits. Unfortunately, there are substantial logistical, cultural, and structural barriers for adults aging with cognitive disabilities, such as Mild Cognitive Impairment (MCI), to engage in group exercise classes. Barriers include lack of transportation to classes, fear of negative stereotypes, and a dearth of instructors with appropriate training. Tele-technology, such as videoconferencing with audio and video exchange, provides the opportunity for people to deliver and attend group exercise classes remotely, with great potential to support people with MCI.

Feasibility of Measuring Natural Gait Speed In-Home to Quantify Falls Risk in Individuals with MCI

PI(s): Jon Sanford, Joe Nocera, Dawn Fletcher

The purpose of the proposed pilot project is to demonstrate the feasibility of using continuous measures of naturalistic gait speed during an individual's normal, everyday activity in the home environment and if the captured measures can provide a more reliable assessment of mobility and fall risk in individuals with MCI.

ID6271: Healthcare Design of the Future Fall 2019

Instructor(s): Craig Zimring, David Cowan, Leandro Tonetto

This class uses multidisciplinary, evidence-based design to create innovative student team projects that help make healthcare safer, less stressful for patients, families and staff, and more efficient. The instructors and students work with a clinical and design partner each year to focus on an emerging topic in healthcare. This year's topic is designing for those with MCI.

Food for Thought

Food for Thought provides a service that allows MCI fellows and caregivers the ability to customize meal prep boxes that will help them adhere to the healthy diet prescribed from their nutritionists and/or physicians.

Student(s): Devanshi Kesaria, Chanjoo Kim, Bianca Shrestha, Daisy Yan

Making Care Easy

This website helps minimize the stress MCI fellows experience during doctor's appointments by reducing their cognitive load & empowering the fellows to advocate for themselves throughout the entire primary care process.

Students: Julie Harrison, Abby Kettle, Monica Magcalas

NaviCart

NaviCart helps the MCI member with the challenges of shopping by managing a shopping list and in-store navigation, resulting in improved spatial orientation.

Students: Jonathan Hatley, Benton Humphreys, Maria Kopka

Reminder Pro

Reminder Pro is an automated program that links together the data, bios of the fellow's social circle, and can help jog up their memory and keep them informed about appointments, meetings, etc. through a calendar and reminder system.

Student(s): Ishwar Ramnarine, Sharvari Tamhane, Rodrigo Tosaki

### Wayfinding Transportation Signage

Enabling everyday activities for MCI members by improving wayfinding for MARTA through a system of intermediate and personalized directional cues.

Student(s): Ryan Arrison, Carly Langsdorf, Tarek Sherif

Instructor(s): Herb Velazquez

This collaborative ID capstone studio course gives students an overview of the industrial design process, focusing on the informative, iterative and productive facets of design: design research, ideation, prototyping, evaluation, validation, implementation and presentation.

Design for Socialization
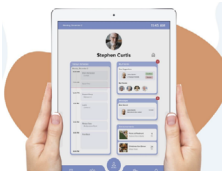
"Design for Socialization" seeks to create a product or system of products that can be implemented in the Emory Empowerment Center, to encourage and facilitate socialization.

Student(s): Savannah Black, Mary Han, Taft Kilpatrick, Susie Kim, Kristine Park, Tammy Vupham

Lev Meal Prep Station

Lev empowers those with MCI while cooking by improving confidence through safe manageable stimuli, discretely assisting with teaching transitions, and facilitating interaction between users and rewarding achievements.

Students: Daniel Derochers, Gyeontae Kim, Sungtae Kim, Jonathan Moon, Thomas Schmelzle

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Instructor(s): Leila Aflatoony

Summer 2019

This course invovles comprehensive projects that incorporate in iterative approach to design development of products, systems, and services with emphasis on invention, design, and manufacturing.

XYLA

XYLA is an interactive musical device that allows the user to play along with their favorite songs. The user can connect directly to the device and follow along by creating music "whack-a-mole" style.

Student(s): Haley Brooke Clark, Autumn Fields, Seo Jin Kim, Dustin Duy Nguyen

Interactive Cutting Board

Interactive Cutting Board guides a user through meal preparation by utilizing an interactive touch screen display embedded in a cutting board. This project aims to mitigate short term memory issues associated with MCI that might affect one's ability to cook a meal from start to finish.

Student(s): Shireen Holly, Evan Thomas Parker, Arleta Blake Underwood, Madison Nicole Watts

Locker Mate: Wearable Assistant
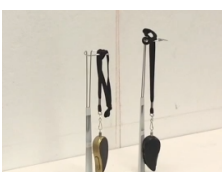
Locker Mate attempts to mitigate memory issues associated with mild cognitive impairment. The user can rely on a mobile device to keep track of where their belongings are kept.

Student(s): Melissa Sue Cosler, Bailey Elizabeth Griffin, Brenton Javon Jackson, Nikole Andrea McLeish

The class is aimed at graduate students and advanced undergraduates in Architecture, Industrial Design, Systems Engineering, HCI, BME and others. Students will learn specific techniques for finding and evaluating research and will write two initial reports describing the state of the research and a final project applying this work to innovative healthcare designs that improve wellness and the quality, experience and effectiveness of care.

The class has a unique opportunity to work with clinicians, people with mild cognitive impairment and families to contribute to the Emory Georgia Tech Mild Cognitive Impairment (MCI) Program to create evidence-based designs for a therapeutic space to be opened in January 2020 and for home settings that allow people to have safe, joyful and engaged lives.

Increasing Social Interaction of Individuals with MCI Through Evidence-Based Design of Emory Empowerment Center

Problem Statement: While existing research can serve as a guideline to inform design of the Empowerment Center, how they fare in addressing the unique challenges faced by individuals with MCI, while accommodating for their unique abilities and needs pertinent to social interaction, has not been examined. Therefore, we propose to undertake a series of research and development activities to better understand and envision how to design an enabling environment that facilitates social interaction for people with MCI.

Students: Tia Calhoun, Ethan Cha, Susan Lee

Improving Personalization of MCI Interventions

Problem Statement: The providers and neurocognitive experts at the MCIEP are prepared to provide personalized intervention programs for every fellow that participates in the program. Each intervention will vary due to each fellow's personality and habits. However, just like with any prescription, MCI fellows might struggle with complying with their personalized intervention plan. We will conduct research to investigate what suggestions are made by providers in each personalized intervention plan; interview MCI experts to understand how MCI's unique traits play a role in personalization; and determine what gaps are present in ensuring the fellow follows their regiment. A process map of the current state will be created to understand the current gaps, and a process map of the future, recommended state will be created to illustrate proposed changes.

Students: Awshaw Mohseni, Renee Puvvada

Correlation of Visual Spatial Memory with Built Environment: For Patients with Mild Cognitive Impairment

Problem Statement: The goal is to understand if the enhanced environment has better impact on the visual memory of patients with MCI versus the regular environment. Enhanced environments can incorporate various patterns, textures, colors in architectural design of spaces. There is a need to understand the decline of visuospatial abilities of fellows of MCI to help them cope up in familiar environment effectively so that they can be confident in navigating and orientation.

Students: Shilpa Mehta, Jin Yu

Let There Be Light

Problem Statement: The goal is to understand if the enhanced environment has better impact on the visual memory of patients with MCI versus the regular environment. Enhanced environments can incorporate various patterns, textures, colors in architectural design of spaces. There is a need to understand the decline of visuospatial abilities of fellows of MCI to help them cope up in familiar environment effectively so that they can be confident in navigating and orientation.
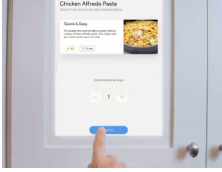
Students: Annalea Anderson, Hailey Avis, Lynn Belhumeur, Meiyi Guo, Seong Hwan Park

Comprehensive projects incorporating an iterative approach to design development of products, systems & services with emphasis on invention, design and manufacturing.

Google Sous

Google Sous is a smart kitchen assistant that helps fellows prepare and cook a meal via an interactive guidance system.

Students: May Iyer, Sung Jang, Jason Kim, Dana Palacio, Leah Slepian

Curio

Curio is designed to make cooking not as daunting as MCI fellows might think it to be. Having everything in one place makes the process easier for them. This was a project to help design the kitchen portion of Emory's MCI Day Center.

Students: Angela Kim, Eugie Song, Abby Tan, Stephen Wang, Belinda Zhang

Instructor(s): Herb Velazquez

The purpose of this course is to design a built environment strategy or artifact that will improve the ability of persons with mild cognitive impairment to function in the community.

Aura

The Aura system is a group of products that fit into every room to turn any home into a living calendar. They use visual and audio cues to prompt users through a series of tasks. The Aura products are connected via Wi-Fi and set up by a web and smartphone app.

Students: May Iyer, Anna Taute, Kelsie Thomas, Baylor Ward

Psynosure

Psynosure is a multi-component system that comes as a "starter kit," which includes one LCD display, one tray, and one medicine organizer.

Students: Michael Armstrong, Cameron Chartier, Jenna Hollington, Anisha Matharu

100 Days

Curio is designed to make cooking not as daunting as MCI fellows might think it to be. Having everything in one place makes the process easier for them. This was a project to help design the kitchen portion of Emory's MCI Day Center.

Students: Valerie Koh, Sze-Yee Abigail Tan, Belinda Zhang

ADAM Wellness

ADAM is a unique shopping experience that allows the user to feel like are in control of what they want to see, while also showing them what they needed to see.

Students: Daniel Charanis, Ariana Olalde, Matt Schoonover, Amy Virasak

Review Methods and Criteria for 2019 Seed Grant Proposals

The seed grant submission process was completed in two-parts: a pre-proposal which detailed the scope of the project, budget, and timelines, and a full proposal, which offered more detailed into the pre-proposals. Each submission was evaluated according to the NIH scoring rubric.

NIH Scoring Rubric

Degree of Impact	Impact Score	Descriptor	Additional Guidance on Strengths and Weaknesses
High	1	Exceptional	Applications are addressing a problem of high importance/interest in the field. May have some or no weaknesses.
	2	Outstanding	
	3	Excellent	
Moderate	4	Very Good	Applications may be addressing a problem of high importance in the field, but weaknesses in the criteria make the impact moderate.
	5	Good	Applications may be addressing a problem of moderate importance in the field, with some or no weaknesses.
	6	Satisfactory	
Low	7	Fair	Applications may be addressing a problem of moderate/high importance, but weaknesses in the criteria bring the overall impact to low.
	8	Marginal	Applications may be addressing a problem of ow or no importance in the field, with some or no weaknesses.
	9	Poor	

Table guidelines retrieved from the NIH

Submission Criteria

Submissions will be reviewed based on the involvement of stakeholders, composition of the research team and potential for impacting the lives of people with MCI. In particular, the review committee will look at how teams anticipate working directly with individuals with MCI and parts of their care network (therapists, family members); the Innovation Accelerator team will facilitate access to these important stakeholders for requirements gathering, design and evaluation activities. Specifically the peer review panel will evaluate proposals according to the following criteria, adapted from the NIH:

1. **Significance.** Does the project address an important problem or a critical barrier for people with MCI? Have people affected by MCI been involved in identifying this as an important issue? How will people with MCI be involved in the project? If the aims of the project are achieved, how will the lives of people with MCI be improved?

2. **Investigator(s).** Are the Principal Investigator (PI), collaborators and other researchers well suited to the project? Does the project team include people from both Emory and Georgia Tech? Is this a trans-disciplinary collaboration? Does it create new collaborative relationships?

3. **Innovation.** Does the application challenge and seek to shift current understandings and approaches to empowering people with MCI? Are the concepts, approaches or methodologies, technologies, strategies or interventions novel to MCI?

4. A**pproach.** Are the overall strategy, methodology and analyses well-reasoned and appropriate to accomplish the specific aims of the project? If the project involves human subjects research, are the plans for protection of human subjects from research risks justified in terms of the scientific goals and research strategy proposed?