ICS ONLINE COURSE PROGRESS

ICS first reported the development and launch of a new ICS online course called Mind and Machines in the fall of 2018. This course is an Institute of Cognitive Science Computer Science course that introduces students to the study of the mind as an inter-disciplinary field with roots in Computer Science along with Psychology, Education, and a variety of other fields. ICS spoke with David Quigley, ICS Research Associate and Course Instructor on progress with the course and plans to expand the reach of the course.

ICS: How is the course being received, a year after its introduction?

The course is going very well! We've had some great success, with students figuring out how these concepts apply to what they've done in their lives and what they'd like to do going forward. We've even had some students who change their career objectives, saying things like "I didn't even know this stuff was out there!"

ICS: Had the course changed in any way, content wise? If so how?

The main consideration has been expanded opportunities to go in greater depth. Iterations on class discussions in the online forums has helped us figure out what areas provide for rich discussion. This semester I've been working these topic areas into class-sized discussion, getting students to go into even greater depth and fostering discussion and debate about the ideas in the course.

Continued on page 3...
Friends, what a year it has been! Our hard work is paying off: 2019 was an outstanding year for our research endeavors, and our academic program review process is exceeding expectations.

**A Record Year for Research.** We continue to enjoy growing, and *record levels* of annual grant expenditures. This increase in funding directly translates into new research and training opportunities for our graduate students and other early career scholars, and important impacts on society. Our research is pioneering the use of artificial intelligence to detect changes in mental health, understanding the health risks and benefits of using cannabis to treat chronic pain, blending cognitive neuroscience and computer modeling to understand human emotions, and developing high-quality curriculum to transform middle and high school science education.

**Academic Program Review Update.** This semester we completed our External Review Committee (ERC) visit and we participated in the penultimate stage in this multi-year process: the unit check-in. The ERC visit was a huge success - thanks to all of you! Their final report showed that they appreciated our unique strengths and impacts, as well as understanding our challenges. This report fed into the analyses performed by the campus-level review committee, which then makes recommendations for action to the Institute, to various Deans, and the Provost. At the unit check-in, we were given a preliminary copy of these recommendations and an opportunity to provide feedback. The final stage will take place next semester, when the recommendations will be approved by the Provost.

I am extremely pleased to inform you that this committee heard and engaged with all of our concerns, and their recommendations are fully consistent with our needs and expectations. In particular, they heard our voices, and our pain, with respect to: (1) transportation between our CINC facility and main campus, (2) establishing a sustainable revenue model for our educational programs, and (3) growing and replenishing our outstanding faculty. I know that we have heard these kind words from the campus in the past, but this time does feel different, and I am optimistic that positive and significant change can come from this exercise.

I hope you all have plans for relaxing and refreshing yourselves over the end-of-year break as next year is shaping up to be action packed:

- **Cognitive Neuroscience Open Faculty Search:** We completed interviews with four outstanding candidates this semester. We will need to work together to close the deal this spring semester and establish a smooth transition for this new community member.
- **Artificial Intelligence Open Faculty Search:** We have been approved to search at the Associate and/or Full Professor level, at the intersection of artificial intelligence and human cognition. We are working with partner units now to develop the job description, with the aim of convening a search committee in spring semester. We anticipate conducting interviews next Fall 2020.
- **New Pilot Study Fund:** Our Faculty and Executive Committee have authorized a new program whereby each year we will set aside funds to support pilot studies, with the aim of strengthening our grant development pipeline. We hope to fund the first round of studies next semester. Details on how to participate are forthcoming.

Thanks for being such wonderful colleagues! I look forward to seeing you all next year.

Tammy Sumner, ICS Director
ICS ONLINE COURSE GROWTH cont.
ICS: What are the plans for this to become a Coursera course, and what are the advantages to this?

Coursera Cognitive Science Specialization, Mind + Machine, is launched! This gives learners on all paths of life access the same transformative course materials that we’re using in our online and blended on campus offerings. The big difference is that they don't have access to the moderation and feedback from a live in person (or remote) instructor.

ICS: How is your experience teaching the course and supporting students evolving?

I've really expanded my depth of understanding for the axiom that students come from everywhere, with a wide variety of expectations and prior knowledge. I've been working to expand content within the course to support students in understanding the fundamentals that come into play in our curriculum. I'm also finally starting to see the bigger picture of where and why students are struggling with content, and understanding how I need to change instructions or provide different guidance to get students where they need to be.

Original article from Fall 2018 can be found at https://www.colorado.edu/ics/sites/default/files/attached-files/newsletter_fall_2018_ics_final.pdf

ICS FACULTY SPECIAL MENTIONS

Congratulations to Donna Caccamise for her appointment to the Academic Futures/Financial Futures Online Strategy Work Group with the goal of coordinated use of state-of-the-art technology to create a CU Boulder-specific strategy for a spectrum of education modalities from blended learning to online and distance education.

Cinnamon Bidwell, was named by Governor Jared Polis and with the consent of the senate as the Chair for the Institute of Cannabis Research Governing Board. The Governing Board guides the role and mission of the Institute to conduct or fund research related to cannabis and publicly disseminate the results of the research. It will also oversee and approve the annual budget of the Institute, advise any Colorado institutions of higher education on the development of cannabis related curriculum including recommendations to the Colorado Commission on Higher Education on approval of any cannabis related certifications or degrees. Congratulations!

Congratulations to Peter Foltz who was inducted as a Fellow of the Society of Text and Discourse.

PUBLICATION HIGHLIGHTS


Continued on page 20...
ICS FACULTY & FELLOWS SPECIAL MENTIONS

William Penuel was officially inducted in ceremonies an ISLS Fellow in June, and NAE in October. Congratulations!

Congratulations to Wayne Ward for his re-appointment as ICS Research Professor.

Christine Yoshinaga-Itano who received the honor of presenting the Judith S. Gravel Memorial Lecture at Vanderbilt University in Nashville, Tennessee. Congratulations!

Congratulations to Matt Jones, ICS Fellow, Director of the Center on Research on Training, and Associate Professor of Psychology and Neuroscience, published his first article in Physics. The paper shows how mathematical tools from cognitive modeling can be used to characterize quantum entanglement or contextuality. ones, M. (2019). Relating causal and probabilistic approaches to contextuality. Philosophical Transactions of the Royal Society A, 377, 20190133. https://royalsocietypublishing.org/doi/pdf/10.1098/rsta.2019.0133

ICS FACULTY PRESENTATION HIGHLIGHTS


D’Mello, S. presented at AIED 2019 in Chicago, IL

D’Mello, S. presented at EDM 2019 in Montreal, Canada

EXECUTIVE COMMITTEE UPDATE

A report by ICS Director Tammy Sumner

Welcome New ICS Executive Committee Members!

- Leanne Hirshfield (Associate Research Professor - ICS)
- David Quigley (RA/Instructor - ICS/CS)
- Chenhao Tan (CS – ICS Fellow)

In a separate process, the graduate students wisely selected their outstanding Executive Committee Representative.

- Norielle Adricula (PhD Student Dept of Linguistics & ICS)

We are grateful for the following members who will continue to serve on the Executive Committee:

- Cinnamon Bidwell (ICS Assistant Professor)
- James Martin (ICS and CS Professor)

Ex Officio members:

- Donna Caccamise (ICS Associate Director)
- Matt Jones (CRT Director)
- Nicole Speer (INC Director of Operations)
- Tamara Sumner (ICS Director)

Thank you to members who are stepping down after their dedicated service to the ICS community. Please be sure to relay your appreciation to:

- Christine Brennan (SLSH - ICS Fellow)
- Mike Mozer (ICS/CS Professor)
- Karli Watson (RA/Instructor - ICS/Psyc)
- Shannon McKnight (PhD student in Psy & Neuro & ICS)
Cinnamon’s tenure track appointment as ICS Assistant Professor was approved by the University administration and the Regents. Congratulations!

ICS: How do you expect your role at ICS to change as a result of the promotion?

It’s an exciting opportunity to step into a broader role that is more integrative in terms of research, teaching, clinical services, and leadership opportunities at the Institute, the Department of Psychology and Neuroscience, and CU more broadly.

ICS: What are some of your goals/hopes as an ICS Faculty member?

I am hoping to foster growth and depth in my lab as a core research arm of the Brain, Health, and Wellness component of the ICS strategic vision. Building on my already generative relationships with ICS and Psychology colleagues, I look forward to extending my own research, and the collaborative work of CU REACH, as leading contributors to the cannabis and health research field.

ICS: Are you teaching this semester?

This year, I am teaching Cognitive Behavioral Therapy Practicum for clinical psychology graduate students, which includes didactic training and intensive individual supervision for graduate therapists taking on their first clinical cases. It’s a blast!

Cinnamon’s current research investigates the direct neurobiological effects of drugs of abuse, including high potency marijuana and cannabinoids in psychiatric and medical populations, and the direct physiological and behavioral effects of cannabinoids as they pertain to both their abuse potential and potential therapeutic effects in observational as well as double-blind, placebo controlled human laboratory studies.

ICS OFFICE NEWS

The ICS Muenzinger office has moved!
Please note that Jean, Anna and student assistants now work in room MUEN D418, one door down from their previous office space.

Please welcome Tracey Parnaby to the ICS-CINC staff. She will be working at the CINC front desk location ½ time in the afternoon, Monday thru Friday. Tracey comes to ICS with experience in front office school administration. Front-desk related requests (such as borrowing projectors, room reservations requests, etc.) can now be referred to Tracey, who will also be assisting with a wide variety of ICS business functions.
Reach Tracey at 303-735-5250 and tracey.parnaby@colorado.edu

Ellen MacKenzie’s duties are changing with increased time in the ICS Finance Office where she will work more closely with finance, payroll, and HR functions.

Please welcome the 2019-2020 student assistants.
• Working at the MUEN office: Kayla Ezell, Abena Gyimah, Annette Emanyonu.
  o Shout out to Kayla who has returned to us for a third year of work, and is a second-generation ICS student assistant. Her sister worked for us too!
• Working at the CINC office: Kylee Smith
NEW ICS FELLOWS – WELCOME!

Tom Yeh
Assistant Professor Computer Science.
Tom’s research focuses on the intersection of human computer interaction and AI, in areas such as accessibility, ethics, design, evaluation, and STEM education, with a special mission to support underserved children including children with visual impairments or children in adverse environments.

Chenhao Tan
Assistant Professor Computer Science and Information Science
Chenhao’s research focuses on language and social dynamics, human-centered machine learning, and multi-community engagement. He also explores computational social science, natural language processing, and AI.

Jintae Lee
Associate Professor LEEDS School of Business
Jintae’s research focuses on text mining user general contents (UGC) such as tweets and user postings during disaster situation, to identify patterns in both form and content. He is also interested in text mining cultural differences.

ICS FELLOW SPOTLIGHT

Congratulations to Ann Eisenberg for her rise to Senior Research Associate.

Special thank you to Zachary Kilpatrick assistant professor, Applied Mathematics for being the very first ICS community member to reply to our call for newsletter content! His research interests include Mathematical neuroscience, Spatiotemporal pattern formation, Stochastic dynamics of neural activity, Evidence accumulation and decision making, and Dynamics of collective decisions.

He also recently received a grant as a PI: "Spatiotemporal neural dynamics of visual decisions"; NSF DMS – Mathematical Biology ($249,999). Congratulations!

Zach would like to recognize Ph.D. Student Fellowship winner Subekshya Bidari for receiving the Dissertation Fellowship ($20,000) for the American Association for University Women. Congratulations Subekshya!

ICS FELLOWS PRESENTATIONS


Morris, B., Helmuth, T., Giordano, G., & Bryan, A. (May, 2019). Changes in TNF-α, IL-6, and IL-18 Predict Depression Following a 16-Week Exercise Intervention in Older Adults. Poster presented at the Association for Psychological Science Convention, Washington, DC.

ICS FELLOWS AWARDS

Chenhao Tan, assistant professor of computer science, received an NSF CRII award titled “Harnessing Machine Learning to Improve Human Decision Making: A Case Study on Deceptive Detection”. Congratulations.

DONORS

ICS thanks the following fall semester donors for their generous contribution to the Institute.

Institute of Cognitive Science Fund
Dr. Kirsten Butcher
And
Mr. Richard Hanson

Bidwell Lab Fund
Margaret Blazek

CU REACH
Tom Yoksas

CENTER FOR RESEARCH ON TRAINING UPDATE

From Matt Jones: The main activities of CRT this semester have revolved around a new collaboration with faculty in the Civil Engineering and Computer Science, funded by NSF’s ‘Future of Work at the Human-Technology Frontier’ program.

The collaboration project ‘Improving Construction Work Performance through Human-Centered Augmented Reality’ has developed a new space in the College of Engineering and Applied Science: C3P (Civil, Construction, Computer Science, Psychology) Collaboratory. The team and their students have been developing and testing initial prototypes that allow participants to adjust the detail of information shown on an augmented display (AR) as well as display sequential information. While these initial AR prototypes have utilized smartphone devices, the C3P Collaboratory is currently integrating these initial AR applications on AR headsets. While the initial prototypes are being tested with students at CU Boulder, the research team has also been recruiting construction craft professionals to participate in future phases of the research. Ultimately, the research team will examine how the detail and origin of information influences human behavior and performance.

CU Boulder Research Team, from L to R: Matthew Hallowell (Co-PI), Paul Goodrum (PI), Matthew Jones (Co-PI), Tom Yeh (Co-PI).

VISIT THE ICS WEBSITE FOR NEWS

For information on special events, colloquia, and research updates & news, visit:

www.colorado.edu/ics

READ PREVIOUS NEWSLETTERS

http://www.colorado.edu/ics/about

Digital newsletters with active hyperlinks are found at:

www.colorado.edu/ics/about-us
ICS: Why did you develop “Medical Cannabis: The Health Effects of THC and CBD” specialization course?

I originally developed the course because there is a lot of interest among our undergraduates in this topic given enormous growth in industry related jobs. But there is also a lot of interest in these topics across the globe so I also adapted the course for the Coursera platform to reach a much broader audience of health care providers, patients, and loved ones as well as those interested in the industry.

ICS: Is the course still available free as an audit, and free to CU students, faculty, and staff?

People associated with CU can take it free. People always have the option of auditing it for no cost. People who pay $49/mo get access to additional materials and assessments and receive a certificate if they pass the assessments.

ICS: Research on this topic is emerging and changing quickly – how often do you anticipate the course content to be updated, or will the content stay static?

I will be updating it each year as I update my materials for my in person class (so early spring semester). As a quick example, I need to add information on the lung/vaping crisis as well as other issues.

ICS: Why would you recommend members of the ICS community take this course?

People in the ICS community may want to know more about the topic for both personal and professional reasons. We all have family or friends who deal with things like cancer or sleep problems. And of course, many of us are interested from a research perspective (e.g., how does cannabis impact cognition and learning).

Register for the course at https://www.coursera.org/specializations/health-effects-cannabis-thc-cbd

CU students, faculty, staff can take the full course for free through the pilot program called "CU on Coursera". Follow the instructions on the "CU on Coursera" OIT page to login and access the course. The course is available free to any person who would like to audit the course. Those not affiliated with CU who would like a completion certificate after taking the assessments will need to subscribe to Coursera at $49/month. When you audit a course for free, you can access the course materials without graded assignments or the ability to earn a certificate.
The INC welcomed four new staff members this fall. Mr. Suebin Song (Integrative Physiology, ‘21), Mr. Rafael Orozco Leon (Psychology & Neuroscience, ‘21), and Ms. Kiara Rodriguez (Psychology & Neuroscience, ‘22) joined the INC team as the first INC interns (“INCterns”), and Dr. Lena Sherbakov joined the INC team as INC’s first Data Scientist.

Since its inception in 2011, INC has become a national leader in providing research teams with high-quality neuroimaging data for a range of participant populations. This expansion of staff will enable INC to enhance its services to include support for running participants as well as for data storage, processing and analysis.

Dr. Lena Sherbakov has undergraduate degrees in Physics and Mathematics from the College of William and Mary, a M.S. in Applied Math from the University of Washington, and a Ph.D. in Computational Neuroscience from Boston University. She worked on neuroimaging analyses at Oregon Health & Science University, worked as a logistician for Doctors Without Borders, and most recently worked for Airbus developing machine learning and deep learning solutions to visual recognition and search problems.

Lena moved to Gold Hill with her partner last month, and has been enjoying getting to know her mountain community and building furniture for her new home. Lena will be meeting with research teams in the coming months to better understand current MRI data processing and analysis pipelines, to understand were INC can be most supportive to research teams and enable them to move more efficiently from data collection to study results.

If you would like to hear more about how INC can support your research by helping you incorporate neuroimaging approaches into your projects, please contact Dr. Nicole Speer, INC Director of Operations at 303-492-2875 or by e-mail at Nicole.Speer@colorado.edu.

SAVE THE DATE FOR BRAIN AWARENESS WEEK 2020!

Brain Awareness Week is set for March 12-19, 2020. This year’s events feature talks on nutrition, stress, and mental health; real-time neurofeedback; and adolescent brain development, as well as Community Brain Day, when neuroscience-focused labs and student groups across the Front Range will gather to share their research with the broader community. Student-focused events featuring mental health awareness will include a Brain Health Fair and Mental Health Awareness Hike (see details on page 20.)
inquiryHub GROWTH CONTINUES

inquiryHub research partnership welcomes Kate Henson to the team. Kate’s focus at inquiryHub is Teacher Professional Learning from a research and application perspective. Kate is a former high school science teacher. She holds a BS and MS in Biology and a PhD in Curriculum and Instruction, Science Education. Her research interests focus around student and teacher learning in classroom and professional development contexts.

ICS: In the five years of inquiryHub Biology course collaborative co-design and development, what do you know about who is using the online, open source high school course curricula?

iHub: We have conducted Professional Learning workshops with teachers at Denver Public Schools, Bellevue Washington School District, state of Louisiana schools to name a few. The exciting feature of open source curricula is that anyone can access and use the materials. We are seeing teachers from at least 20 states are using iHub Biology materials. We are in the process of analyzing user data in 2020.

ICS: Where do you see the most interest coming from in the future? Is there a plan on where you’d like to see the Biology materials being used?

iHub: We will reach out to larger school districts that have shown an interest in Open Educational Resources (OER) through the adoption of materials from Engage NY (available from Expeditionary Learning). The majority of districts are small, geographically distributed, and it would be beneficial for these smaller districts to use our free curriculum materials. One challenge is how to help these smaller districts connect with one another about using our OER, and we will be focused on building a plan to help these districts.

ICS: What is coming in 2020 for iHub Biology?

iHub: We will host a Teacher Professional Learning Summer Institute on the CU campus in Summer of 2020. This will be a Biology 101 workshop for teachers new to our curriculum. And in response to demand from out of state districts, several workshops in districts located in Washington and Louisiana are planned, with additional workshops in the planning stages. The curriculum was awarded the Next Generation Science Standards digital Design Badge by Achieve, for the Evolution unit of the Biology Course. We hope to be nationally recognized for the Genetics and Ecosystems units as well.

Continued on page 11...

NEW PHYSIO-BEHAVIORAL-NEURO LAB: MUEN D414

Sidney D’Mello and Leanne Hirshfield tells us about this new lab. The lab is a:

- A dynamic on-campus physio-behavioral-neuro lab for ICS research
- Mainly for those who do not have on-campus labs (but open to all)
- The idea is for a no-frills, reconfigurable test space, flex based on needs
- Fall ’19 setup includes:
  - Two high-fidelity setups for collecting eye tracking, fNIRS, EEG, physiology, camera
  - Three consumer-off-the-shelf setups for collecting multimodal data during collaboration
  - Three workstations for collecting behavioral data (no sensors)

The proposed usage model is for:

- Faculty meet each semester to discuss data collection needs and pooling of resources
- Figure out thorny issues like data security, computer setups, schedules, planned personnel for running data collection and analyzing data, etc.
- Each nominates a designated student/staff rep to coordinate details (of usage) “it means that each person who intends to use the space appoints a person who helps maintain the lab.”

The goal is to conduct great science with help from ICS staff but with minimal oversight. The space is not intended to be a place to hold lab meetings or for folks to work.

A message from Leanne: “The reason that we are being vague here is that there really is no ‘one size fits all’ way at this point to have ICS faculty & students use the equipment without making sure we’ve accounted for the many different variations of ‘thorny issues’ noted above.”

We look forward to hearing more about this lab!
inquiryHub GROWTH cont.

inquiryHub’s SchoolWide Labs

The Schoolwide Labs project works with Denver Public School middle school science and dedicated STEM teachers to integrate and promote computational thinking into classrooms. Teachers and researchers collaboratively design Storyline units focused on phenomena. Students use the sensing platform to conduct a variety of data-enabled science and engineering investigations that are rooted in personally relevant questions about their community and their lives. This sensing platform enables teachers and students to envision a new type of “school-wide science lab” - moving beyond specialized classrooms where students go to conduct experiments to imagining the entire school and neighboring environment as a potential space for scientific inquiry. As such, this expanded environment for “doing science” enables teachers across STEM disciplines to creatively integrate computational thinking (CT) activities into their disciplinary instruction.

NEW SHINE LAB

System Human-Interaction with NIRS and EEG Lab

Leanne Hirshfield directs the SHINE Lab housed at CINC. The lab utilizes non-invasive cognitive, physiological, and behavioral measurement devices. For cognitive state measurements, this includes two NIRX Sport wireless fNIRS devices with embedded EEG electrodes for studying a range of human-machine teaming scenarios with up to 3 human team members per study. With this equipment, Leanne research fits at the intersection of machine learning, psychology, biomedical engineering, and human-computer interaction. She uses fNIRS to hyperscan the brains of multiple people at the same time while they interact with one another during a variety of Human-Machine Teaming (HMT) scenarios. When not in use at the CINC lab, the portable equipment will be used in MUEN D414 new lab.

As an example of one avenue of HMT research, one of Leanne’s NSF grants involves the creation of an intelligent agent that monitors the mental states (e.g., visual perceptual load, auditory perceptual load, working memory load, frustration) of human teammates while they conduct search and rescue tasks while wearing augmented reality (AR) glasses. The content shown through the AR glasses adapts in real-time based on each teammate’s mental state, to optimize the overall performance of the team. Other tracks of research apply deep learning techniques on high-density fNIRS data to better predict the social, cognitive, and affective states of the various team-members as they work on a joint task. As a firm believer that the best research happens at the fringes of disciplines, Hirshfield is always looking for interesting collaborative projects. Students and faculty who have ideas for experiments or joint research projects are encouraged to email Leanne at Leanne.Hirshfield@colorado.edu.
“Language is a critical pathway to detecting patient mental states,” says Foltz. “Using mobile devices and AI, we are able to track patients daily and monitor these subtle changes.”

The new mobile app asks patients to answer a 5- to 10-minute series of questions by talking into their phone. Among various other tasks, they’re asked about their emotional state, asked to tell a short story, listen to a story and repeat it and given a series of touch-and-swipe motor skills tests.

In collaboration with Chelsea Chandler, a computer science graduate student at CU Boulder, and other colleagues, they developed an AI system that assesses those speech samples, compares them to previous samples by the same patient as well as the broader population and rates the patient’s mental state.

In one recent study, the team asked human clinicians to listen to speech samples of 225 participants—half with severe psychiatric issues; half with healthy volunteers—in rural Louisiana and Northern Norway and assess them. They then compared those results to those of the machine learning system.

“We found that the computer’s AI models can be at least as accurate as clinicians,” says Foltz. Their technology is not commercially available yet. But he and his colleagues envision a day when such AI systems could be in the room with a therapist and a patient to provide additional data-driven insight, or serve as a remote-monitoring system for the severely mentally ill. If the app detected a worrisome change, it could notify the patient’s doctor to check in.

“Patients often need to be monitored with frequent clinical interviews by trained professionals to avoid costly emergency care and unfortunate events,” says Foltz. “but there are simply not enough clinicians for that.”

By Lisa Marshall • CU Strategic Relations
Published: Nov. 12, 2019
https://www.colorado.edu/today/2019/11/12/want-know-your-mental-health-status-theres-app

Thanks to advances in artificial intelligence, computers can now assist doctors in diagnosing disease and help monitor patient sleep patterns and vital signs from hundreds of miles away.

Now, CU Boulder researchers are working to apply machine learning to psychiatry, with a speech-based mobile app that can categorize a patient’s mental health status as well as or better than a human can.

“We are not in any way trying to replace clinicians,” says Peter Foltz, a research professor at the Institute of Cognitive Science and co-author of a new paper in Schizophrenia Bulletin that lays out the promise and potential pitfalls of AI in psychiatry. “But we do believe we can create tools that will allow them to better monitor their patients.”

Nearly one in five U.S. adults lives with a mental illness, many in remote areas where access to psychiatrists or psychologists is scarce. Others can’t afford to see a clinician frequently, don’t have time or can’t get in to see one.

Even when a patient does make it in for an occasional visit, therapists base their diagnosis and treatment plan largely on listening to a patient talk – an age-old method that can be subjective and unreliable, notes paper co-author Brita Elvevåg, a cognitive neuroscientist at the University of Tromsø, Norway.

“Humans are not perfect. They can get distracted and sometimes miss out on subtle speech cues and warning signs,” Elvevåg says. “Unfortunately, there is no objective blood test for mental health.”

In pursuit of an AI version of that blood test, Elvevåg and Foltz teamed up to develop machine learning technology able to detect day-to-day changes in speech that hint at mental health decline.

For instance, disjointed speech—sentences that don’t follow a logical pattern—can be a critical symptom in schizophrenia. Shifts in tone or pace can hint at mania or depression. And memory loss can be a sign of both cognitive and mental health problems.
DISSEMINATION ACTIVITIES: PRESS RELEASES

This issue includes the full press release written and distributed by Strategic Relations to demonstrate the amplified effects of partnering with CU channels to draw attention to research grants, publications, and activities. ICS asked Peter Foltz and Leanne Hirshfield for feedback about their experiences.

ICS: What led you to initially contact me about your research/publication/grant and getting the word out?
LH: PR stories are a great way to spread the word and highlight the work we’re doing. And it’s a great way to find new potential grad students and new potential collaborators. In addition to websites and publishing papers for our research communities, PR releases are another way to get our work out to a broader audience.

PF: We had a publication coming out in a journal that we thought had broad implications around how the public should think about the use of AI in psychiatry. Since the public generally doesn’t notice articles in scientific journals, we thought that this would be a good way to get the information out to a wider audience.

ICS: Can you describe the process you went through with me and then Lisa to have her write a press release?
LH: I sent you (Yasko) an email saying that I’d received the equipment grant along with a couple of other grants on human-machine teaming research with fNIRS. With the new equipment arriving, I thought it would be a good time to take some pictures and spread the word! You kindly got me in touch with Lisa.

PF: I first discussed the goals of the press release with you. Then I met with Lisa and spent about an hour describing the published work and the history of the research that led to the publication. She read several related articles we had published and then wrote a draft of the press release. She was able to turn the work into a compelling story. We had several chances to review and edit her draft and then worked with her to pick a good day to put out the release. After the release was published, Lisa handled inquiries from the press, including helping schedule interviews.

ICS: What are some benefits that arose because of the press release?
PF: The release generated a lot of news articles as well as TV and radio interviews. This helped identify some new potential colleagues, data sources, and funding avenues.

LH: My only prior experience (since Lisa has not yet done the PR) is when I was a PhD student at Tufts. We put out a press release about being among the first researchers to use fNIRS for Human-Computer Interaction purposes. I was amazed at the number of press articles (Wired Magazine, Boston Herald, etc) that came from the press release. It was a great way to shine a light on the cutting-edge work we were doing. Of course we have websites as labs and we publish papers, but PR releases are another way to get your work out to a broader audience.

ICS: Would you recommend other ICS researchers to contact Lisa and me?
LH: Yes, definitely.
PF: Yes. As researchers, we want people to know about what we do. CU wants to tell the world about the great work happening on campus, and the University has skilled staff who will help get the word out.

Update: As a result of Peter working with the CU Science Writer, Altmetric ranked his paper in the top 5% of all research outputs scored and has generated as of mid-November, 27 news stories, 3 blogs and 10 Tweets. In addition, Newsy TV, Channel 9 News, Colorado Public Radio’s Colorado Matters and others have featured interviews and articles.

When Peter was preparing to talk with Strategic Relations and be interviewed by Newsy TV, I asked if he would please mention Institute of Cognitive Science by name as often as possible. Why? Because it is important that we communicate to the larger world, about who we are and what we do. Because Peter mentioned ICS by name at the very start of the press release process, a large number of news outlets’ coverage includes our name. In the world of browser search engines and notability, his conscious effort will have a large impact on our web presence.

I also received an email from Peter that read: “…two weeks ago I gave a talk to the Board of Regents and President Kennedy about educational technology where I mentioned ICS as well. Maybe not as good as a press mention for Wikipedia, but helps remind the administration that we exist!”

Thank you, Peter! You are tipping the scales for ICS to be notable enough for a Wikipedia page.

I encourage all our faculty and student researchers to mention Institute of Cognitive Science by name whenever you publish press releases and give interviews.
ICS CERTIFICATES AND PHD COMPLETION

Congratulations

Combined PhD
Tao Lin
Language
Kayla Jane Kohake
Language

Human Language Technology Certificate
Amy Burkhardt
Katrielle Parnes
Elizabeth Sullivan
Samuel Young

ICS Undergraduate Certificate
Samantha Bartolo
Krystal Arnold

NEW ICS CERTIFICATE STUDENTS

Welcome

Combined PhD
We welcome nine new Combined PhD students to the ICS Graduate Program.

Undergraduate Certificate
To date, we welcome five new Undergraduate Certificate students to ICS.

Graduate Certificate and Combined PhD Program and Undergraduate Certificate Program info is found:
www.colorado.edu/ics/graduate-programs
www.colorado.edu/ics/undergraduate-certificate-cognitive-science-overview

GRADUATE STUDENTS RECOGNIZED

Shirley Huang received the American Speech-Language-Hearing Foundation New Century Scholars Doctoral Scholarship. “I am working towards the combined PhD in SLHS and Cognitive Science. In my application, I emphasized the value of interdisciplinary work and specifically pointed out ICS’s role in building my career and expanding my research approach.” More about the scholarship>

Christian Hill, ICS and CS undergraduate student received a Google CS Research Mentorship Program award. The award provides recipients with Google research scientist mentorship ranging from support in conducting and publishing research, career and advanced academic development, to traveling to Google headquarters and a premier CS research conference with other awardees. More about Christian and his award>

Congratulations to Sidney D’Mello’s Students:

Emily Jensen - 1st place in Computer Science Research Expo
Lucca Eloy, presented by Angela Stewart - Best Student Paper at ICMI 2019
Stephen Hutt - Computer Science Outstanding Service Award
Angela Stewart - SIGCHI Student Travel Grant

Former ICS graduate student Dr. Christopher D’Lauro presented at the ICS colloquium on the topic of concussions in sports and other fields. Christopher received his Ph.D. in 2010, working in the CU Boulder ICS Curran Lab on visual perception and categorization. He is now Associate Professor at the Air Force Academy in Colorado Springs. He spent time with students after the colloquium sharing his perspective on post-PhD job opportunities, work-life balance, and career paths.
STUDENT TRAVEL & RESEARCH AWARDS

By Stephen Sommer, Committee Chair (EDUC)

To encourage student participation in interdisciplinary study and research, the Institute provides funds for ICS students to attend and present at interdisciplinary conferences or to conduct original research.

Distributed three times per year (fall, spring, and summer semesters), ICS Travel and Research Awards are administered by a student committee consisting of one representative from each member department. Each department selects its own method for choosing a student representative. This committee is responsible for announcing the award each semester and allocating available funds.

Students in any member department may apply for funds. Member departments are: Architecture and Planning; Computer Science; Information Science; Integrative Physiology; Linguistics; Philosophy; Psychology and Neuroscience; School of Education; and Speech, Language, Hearing Sciences.

Applications for the spring semester will open on January 17 and close on February 7, 2020. Details on the application process is found at ICS website Student Travel & Research Awards page.

Fall 2019 Awardees

For Fall 2019 the ICS Student Travel & Research Awards Committee supported both of the applicants. We encourage more students to apply, as we are eager to support their work!

Shirley Huang (SLHS)
Shirley received $500 to support travel to the American Speech Language Hearing Annual Convention where she will present 2 papers (1-1st author, 1-2nd author) and a research poster (1st author) on her work related to Children's Emotional Language Experience and Cultural Differences.

Janghee Cho (InfoSci)
Janghee received $500 to support material cost and participant compensation for his research related to Technological Interventions for Pro-Environmental Behavior.

New Award Committee

Many thanks to the following students for serving on the Awards Committee.

CS – Alexandra.Gendreau@colorado.edu
LING - Norielle.Adricula@colorado.edu
PHIL – Lisa.thomasmith@colorado.edu
PSYC - Shannon.Mcknight@colorado.edu
SLHS - Carly.Schimmel@colorado.edu

UNDERGRADUATE STUDENTS RECOGNIZED

Five CUChange Undergraduates Named BSI, UROP and PACE Student Scholars

CUChange wishes huge congratulations to our five undergraduates who were named either BSI or UROP undergraduates scholars this Spring! The Biological Sciences Initiative (BSI) and the Undergraduate Research Opportunity Program (UROP) both make awards to students to support them in pursuing an independent research project over the course of the Summer or the academic year. We are proud to announce that five of our amazing undergraduates were accepted with their project. (From left to right) Julia Friedman (BSI), Ivy Zhou (UROP), Mohammad Habib (BSI), Benji Morris (UROP) and Jerry Ma (not pictured, UROP).

More about their research>>

CUChange wishes huge congratulations to our five undergraduates who were named either BSI or UROP undergraduates scholars this Spring! The Biological Sciences Initiative (BSI) and the Undergraduate Research Opportunity Program (UROP) both make awards to students to support them in pursuing an independent research project over the course of the Summer or the academic year. We are proud to announce that five of our amazing undergraduates were accepted with their project. (From left to right) Julia Friedman (BSI), Ivy Zhou (UROP), Mohammad Habib (BSI), Benji Morris (UROP) and Jerry Ma (not pictured, UROP).

More about their research>>
COG SCI RESEARCH PRACTICUM

Every fall, the Institute celebrates and supports the outstanding, interdisciplinary graduate students participating in our Cognitive Science Research Practicum by taking the students and their advisors to breakfast in the Hotel Boulderado. Between when we order our food, and when it arrives, each student stands up and gives the attendees a one-minute overview of their dissertation research.

Students
- Chelsea Kendall Chandler
- Spencer Dudley
- Jennifer Ellis
- Cathalina Fontenelle
- Alex Gendreau
- Layne Hubbard
- Ghazaleh Kazeminejad
- Ali Raza

Faculty
- Ashis Biswas (CU Denver)
- McKell Carter
- Eliana Colunga (PSYC)
- Peter Foltz
- June Gruber (PSYC)
- Jim Martin
- Martha Palmer (LING/CS)
- Tamara Sumner
- Tom Williams (School of Mines)

ICS STUDENT PRESENTATIONS

Adricula, N. and Narasimhan, B. presented a poster at the 44th Boston University Conference on Language Development this past month (Nov. 7-10). It is titled ‘Understanding is Understanding by Seeing’: Visual Perception Verbs in Child Language. We will also be writing up a proceedings paper for this work.


ICS STUDENT PUBLICATION HIGHLIGHTS


Identity Development, Participation, and Representation in STEM Outreach and Community Science Programs

Leighanna Hinojosa
Advisor: Joseph L. Polman

Leighanna Hinojosa is interested in the ways learning and identity co-constitute participation in science. Her research looks at informal learning science spaces, such as museums and collaborative outreach programs, and how the environment affords and constrains participants, particularly among those who belong to groups historically underrepresented in Science, Technology, Engineering, and Mathematics (STEM).

Her dissertation explores how individuals participate and enact certain identities within the constraints for their environments during participation in outreach and community science volunteer work using models of apprenticeship with mentorships.

Research findings have implications for the future design of inclusion and outreach programs for museums and other science learning environments. Designing inclusion programs can benefit from using a mentorship component involving individuals from historically underrepresented groups and designing for a welcoming space for students from diverse backgrounds to feel safe, so they may cultivate positive identifications with science.

Leighanna would like to thank her advisor, Joseph L. Polman and committee members Tamara Sumner, Nicole Speer, William Penuel, Susan Jurow, and Kris Gutiérrez for their time and support. Leighanna intends to graduate in May 2020 with a dual PhD in Learning Sciences and Human Development and Cognitive Science.

In Praise of Habit

Lisa Thomas-Smith
Advisor: Iskra Fileva

As an empirical matter, most people behave according to the moral norms of their culture, at least most of the time (Pinker, 2001). This does not suffice to establish that people behave morally since cultural norms may not track moral truth; however, it does show that people want to be good. Culture provides a ready standard of measure for whether or not we are behaving well. Culture does not explain how we achieve moral consistency, however. According to popular philosophical views, moral consistency is a result of moral knowledge, moral reflection, and a strong will. In this dissertation, I defend the controversial thesis that the answer is, in fact, “habit.”

Due to facts about the human mental faculties such as the possibility of mental fatigue and error, we cannot depend on reflection and will. Further, limited human attentional capability does not allow for constant and consistent focus on moral matters, and research supports the uncomfortable conclusion that we sometimes do not even know our own reasons for behaving as we do. Therefore, the behavioral consistency we observe requires an explanation beyond knowledge and moral commitment. I contend that given normal cognitive limitations, habituation provides the best explanation of observed consistency.

The dissertation is organized into five chapters which address habit’s role in decision making, the kinds of habit required for consistent moral practice, the effect of culture on habit and vice versa, the role of habitual attitudes in social and political debate, and the implications of my theory on our current theories, practices, and attitudes about moral behavior.

Lisa would like to thank her advisor, Iskra Fileva and committee members Tamara Sumner, Ajume Wingo, and Robert Rupert for their time and support. Lisa has received as dissertation completion fellowship for Spring semester and intends to graduate in May, 2020 with a dual PhD in Philosophy and Cognitive Science.
<table>
<thead>
<tr>
<th>PI Name (CAPS) ICS Faculty (BOLD)</th>
<th>Sponsor</th>
<th>Title of Project</th>
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<td>BANICH Hewitt</td>
<td>NIH-San Diego</td>
<td>Supplement for ABCD-USA Consortium: Twin Research Project</td>
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<td>NIH</td>
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<td>CARSTON</td>
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<td>Capturing the Power and Pitfalls of Human Decision-Making</td>
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<td>D’MELLO Dame</td>
<td>IARPA-Notre Dame</td>
<td>Additional Funding and Extension A Comprehensive Approach to Modeling Job Performance via Unobtrusive, Continuous, Multimodal Sensing</td>
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<td>D’MELLO Mind Scholar Network-NVF</td>
<td>Mind Scholar Network-NVF</td>
<td>Analytic and Computational Approaches to Uncover Teacher Practices that Foster Positive Identity and Equity in Engagement and Learning for Middle School Math Students</td>
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<td>D’MELLO Hirshfield</td>
<td>NSF</td>
<td>Modeling Brain and Behavior to Uncover the Eye-Brain-Mind Link during Complex Learning</td>
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<tr>
<td>D’MELLO</td>
<td>NSF</td>
<td>AI-DCL: Understanding and Alleviating Potential Biases in Large Scale Employee Selection Systems: The Case of Automated Video Interviews</td>
<td>2</td>
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<td>D’MELLO</td>
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<td>Intelligent Facilitation for Teams of the Future via Longitudinal Sensing in Context</td>
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<td>EISENBERG Gross</td>
<td>NSF</td>
<td>REU SUPPLEMENT for Collaborative Research: Debugging By Design: Developing a Toolset for Debugging with Electronic Textiles to Promote Computational and Engineering Thinking in High School</td>
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<td>FARRELL Penuel</td>
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<td>Measuring the Effectiveness of Research-practice Partnerships in Education</td>
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<td>GILLEY Yoshinaga-Itano</td>
<td>Dept of Ed - Gallaudet Univ</td>
<td>Rehabilitation Engineering Research Center on Improving the Accessibility, Usability and Performance of Technology for Individuals who are Deaf and Hard of Hearing</td>
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<td>AFOSR</td>
<td>A Wearable Cognitive, Physiological and Behavioral Sensor Suite for Testing and Evaluation of Human-Machine Teaming Environment</td>
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<td>HIRSFIELD D’Mello</td>
<td>ARO</td>
<td>Development and Empirical Evaluation of a Theoretical Framework for Integrating Adaptive Multimodal Processes to Optimize Outcomes of Human-Agent Teams</td>
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<td>HIRSFIELD</td>
<td>DOD-Syracuse</td>
<td>Development of a Remote-fNIRS Device for use Under Naturalistic Working Conditions</td>
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<td>NAVY-Aptima</td>
<td>Tools for Objective Measurement and Evaluation (TOME II)</td>
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<td>HIRSFIELD</td>
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<td>CHS: SMALL: APERTURE: Augmented Reality and Physio-Enhanced Robotic Gesture</td>
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<td>MISHRA Martin</td>
<td>Lockheed Martin</td>
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<td>PALMER Martin</td>
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<td>Temporal Relation Discovery for Clinical Text (Renewal)</td>
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<td>PALMER</td>
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<td>RESIN: Reasoning about Event Schemas for Induction of Knowledge</td>
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<td>SEDEY</td>
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<td>VAN VUUREN</td>
<td>NIH-Shirley Ability Lab</td>
<td>Modulating Stimuli Intensity to Improve Clinical Outcomes in Aphasia Treatment</td>
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<td>WARD</td>
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<td>EAGER: Comprehension Assessment via Spoken Dialogue</td>
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<td>YOSHINAGA-ITANO Gilley</td>
<td>CDC-Univ of South Carolina</td>
<td>Economic Outcomes of EHDI</td>
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**Non Grant Funds**

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<td>SA_Rapides Parish Professional Development Service Agreement</td>
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<td>SUMNER Penuel</td>
<td>Denver Public School District</td>
<td>SA_Inquiry Hub Professional Development - Basic Plan</td>
<td>7</td>
<td>$357,823</td>
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</table>

**VISIT THE ICS WEBSITE FOR NEWS**

For information on special events, colloquia, and research updates & news, visit:

[www.colorado.edu/ics](http://www.colorado.edu/ics)


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Continued on page 22…


Foltz, P. gave a talk on Technology in Higher Education at the Educational Writer’s Association Fall meeting at the University of Michigan

Foltz, P. presented a talk on Best Practices around Automated Scoring at the National Council for Measurement in Education Annual meeting in Toronto, April.

Foltz, P. presented a talk titled Artificial Intelligence in Education: Present and Future to the CU Board of Regents in November. He then hosted a roundtable discussion on the topic with Regents and members of the administration.

Foltz, P. presented on a panel on Advancing the Measurement Field with Data Science at the National Council for Measurement in Education Annual meeting in Toronto, April.


Vrzakova, H. presented at CHI 2019 in Glasgow, Scotland


Continued on page 22…


Yoshinaga-Itano, C. (2019). Early Intervention Challenges and Strategies for Addressing the Needs of Families and Children who are Deaf or Hard of Hearing from Diverse Cultural and Linguistic Backgrounds. 7th Annual Tom Davidson Memorial Conference, Knoxville TN.


Continued on page 23…


Chiu, B., Baker, S., Palmer, M., Korhonen, A., Enhancing biomedical word embeddings by retrofitting to verb clusters,

In the Proceedings of the 18th BioNLP Workshop and Shared Task, held with ACL, Florence, Italy, August 1, 2019.


Continued on page 23…
FACULTY PUBs Cont.


https://doi.org/10.1007/s10597-019-00411-x

Continued on page 24...

FACULTY PRESENTs Cont.


Continued on page 24...

ICS FELLOWS PRESENTATIONS Cont.


--- END ---
FACULTY PUBs Cont.


Continued on page 25...

FACULTY PRESENTs Cont.


Yoshinaga-Itano, C. (2019). A Look into the Crystal Ball for Children Who are Deaf or Hard of Hearing: Needs, Opportunities, and Challenges. International Association of Logopedics and Phoniatrics, Taipei, Taiwan, August 21, 2019

Yoshinaga-Itano, C. (2019). A Look into the Crystal Ball for Children Who are Deaf or Hard of Hearing: Needs, Opportunities, and Challenges. International Association of Logopedics and Phoniatrics, Taipei, Taiwan, August 21, 2019


Yoshinaga-Itano, C. (2019). A Look into the Crystal Ball for Children Who are Deaf or Hard of Hearing: Needs, Opportunities, and Challenges. International Association of Logopedics and Phoniatrics, Taipei, Taiwan, August 21, 2019


Continued on page 25...


--- END ---
**FACULTY PUBs Cont.**

Validation of a multisubstance online timeline follow back assessment. Brain and Behavior.


**Penuel, W. R.** & Hill, H. C. (in press). Building a knowledge base on research-practice partnerships: Introduction to the special topic collection. AERA Open. [Heather and I were co-editors of the whole collection]


**Quigley, D.,** Caccamise, D., Weatherley, J., Foltz, P. "Exploring Video Engagement in an Intelligent Tutoring System" has been accepted to HCI International 2020: http://2020.hci.international/


Continued on page 27...
**FACULTY PUBs Cont.**


--- END ---

**STUDENT PRESENTs Cont.**


Hutt, S. presented at CHI 2019 in Glasgow, Scotland.

Hutt, S. presented at EDM 2019 in Montreal, Canada.

Jensen, E. presented at EDM 2019 in Montreal, Canada.

Stewart, A. presented at CSCW 2019 in Austin, Texas.

Stewart, A. presented at ICMI 2019 in Suzhou, China.

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**STUDENT PUBs Cont.**


Continued on page 28...


---END---

HAVE QUESTIONS? NEED HELP?

Jean Bowen, MUEN Office, Mon - Fri 9 to 5, Jean.Bowen@colorado.edu

Donna Caccamise, Associate Director
Donna.Caccamise@colorado.edu
Open office hours: MUEN D422: Mon: 9-12, Wed: 1-3, Friday 10-12 CINC 227: TTH

Tammy Sumner, Director
Sumner@colorado.edu
Open office hours: MUEN D420: Fridays 2-4pm
CINC 182j: Thursdays 1-3pm

The ICS newsletter is looking for researchers and students to feature in the Spring Edition 2020.

Interested? Contact Yasko.Endo@colorado.edu
We need your help to sustain and grow our innovative research studies and initiatives and provide outreach programs to the public. Our Institute is almost entirely funded by research grants and donations.

Your donations are particularly helpful in supporting critical pilot studies that build into larger scale research, graduate students, and early career scholars.

Your donations both large and small can also help the functioning of the following programs:

<table>
<thead>
<tr>
<th>The ICS General Fund</th>
<th>Supports pilot studies, graduate students, early career scholars.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The CU Reach Fund</td>
<td>Supports Research, Education, and Application in Cannabinoids and Health (CU REACH) multi-disciplinary center to expand the capacity for research, education, and application and become leaders in the study of cannabinoids and health.</td>
</tr>
<tr>
<td>The ICSD Building Community &amp; Collaboration Fund</td>
<td>Supports research collaboration events and functions associated with recruitment, outreach, and community building.</td>
</tr>
</tbody>
</table>

Donations can also be made to specific programs such as faculty labs, Centers, special projects.

Digital newsletters with active hyperlinks are found at www.colorado.edu/ics/AboutUs
MISSION
Our mission is to identify and address key questions in cognitive science. Through interdisciplinary research and education, we explore the nexus of humans and machines as we seek to understand and extend human cognition, machine intelligence, and fruitful collaborations between the two. Our research builds on artificial intelligence, cognitive neuroscience, human learning, and emotional processing to tackle some of society’s most pressing challenges: understanding brain health and wellness, developing personalized therapies and interventions, enhancing and deepening human learning, and optimizing complex cognitive processes to improve human performance and collaboration.

VISION
Our vision for ICS is:
• Be a campus leader in innovative, interdisciplinary research
• Be a campus leader in inclusiveness, diversity, and equity
• Reimagine our interdisciplinary educational programs
• Develop a robust resource engine to support future growth