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NEWS RELEASE

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UBICOMP/ISWC 2020 HIGHLIGHTS NEW VISIONS FOR ANYWHERE & EVERYWHERE COMPUTING

Top-Line Research on Mobile and Wearable Technologies to Be Presented

New York, NY, September 2, 2020 – ACM, the Association for Computing Machinery, will hold the annual ACM International Joint Conference on Pervasive and Ubiquitous Computing (UbiComp 2020) co-located with the ACM International Symposium on Wearable Computers (ISWC 2020) virtually from September 12-17. UbiComp/ISWC is the premier interdisciplinary venue for leading international researchers, designers, developers, and practitioners in the field to present and discuss novel results in all aspects of ubiquitous, pervasive and wearable computing. This includes the design, development, and deployment of ubiquitous and pervasive computing technologies and the understanding of human experiences and social impacts that these technologies facilitate.

The UbiComp/ISWC 2020 organizers have put together a broad multidisciplinary program, with research papers including articles published by the *Proceedings of ACM on Interactive, Mobile and Wearable Technologies (IMWUT)*, briefs and notes submitted to the International Symposium on Wearable Computers (ISWC), and a range of other contributions to the field. This year's program includes six keynote talks, 140 IMWUT and ISWC papers spread over 15 sessions and three parallel tracks, 49 posters and demos, six workshops, the Doctoral Symposium, and an ISWC Design Discussion.

"Our research community is keenly aware of what is going on in the world, and we have received many submissions that examine how mobile and pervasive computing might be used to mitigate the impacts of COVID-19 on society," said UbiComp General Co-chair Nadir Weibel, UC San Diego. "We've also planned parts of our program to address this. For example, we have arranged for three Keynote talks on COVID-19, featuring leading researchers working on the forefront of pandemic response. These talks will address how people are using pervasive and mobile computing to track the spread of the virus."

Considering the impact of the pandemic on physical and mental health and social interactions, UbiComp/ISWC Program Chairs have also invited three keynote speakers (Rana El Kaliouby, Affectiva; James Pennebaker, UT Austin; Phil Cohen, Monash University) who will speak on the topics of emotion AI, expressive writing, and dialogue systems. The opening keynotes by Kaliouby and Pennebaker will be followed by a discourse on emotion and expression. Virtual attendees will then have the opportunity to

participate in an open discussion on how ubiquitous computing and wearable technologies can contribute to the research and development supporting health and wellbeing and social interaction post-pandemic.

“Although we will be virtual this year, we have put a great deal of effort in bringing the full conference experience to our attendees,” added UbiComp General Co-chair Kristof Van Laerhoven, University of Siegen. “Virtual attendees will be able to engage with the conference live and see all of the talks at the scheduled time, as well as attend the Q&A panels at the end of each session. We will be using the Whova app that will facilitate interaction across attendees and with the speakers throughout the conference. Whova will also allow you to revisit the talks and panels you missed after the fact, since everything will be available for asynchronous consumption right after the live sessions.”

“The social aspect of a conference is also extremely important, and we’ve organized incredible opportunities for virtual interaction, engagement and discussion,” said UbiComp General Co-chair Monica Tentori, CICESE. “For example, we’ve organized a gather.town interactive space for the Posters, Demos, and the Gadget Show and conference goers will be able to have coffee or a drink with friends, bump into old and new colleagues, experience the city of Cancun, Mexico virtually, and much more.”

2020 ACM UBICOMP HIGHLIGHTS

Keynote Speakers

“Bringing Emotional Intelligence to Technology During Covid-19”

Rana el Kaliouby, Affectiva

We live our lives surrounded by artificial intelligence (AI) that helps us be smarter and more productive, and sometimes even healthier and happier. Designed to interact with humans, these systems have advanced cognitive capabilities — lots of IQ, but no EQ. And that is an issue. Just like empathetic and successful human beings have high emotional intelligence, AI must have EQ in order to be more perceptive, responsive and accurate. What if technology could understand humans the way we understand each other? Kaliouby will discuss Emotion AI, and how, in a global pandemic, it can help us better connect with one another.

“Translating emotional experiences into words: Expressive writing, interviewing, and COVID”

James W. Pennebaker, University of Texas, Austin

When people are asked to write about personal upheavals, their physical and mental health often improves. Pennebaker will summarize several studies that point to the health benefits of limited online emotional expression using both Reddit and more controlled studies. Pennebaker will also discuss the implications for building automated agents to improve the health of distressed populations.

“Back to the Future for Dialogue Research”

Philip Cohen, Monash University

Cohen’s talk argues that future conversational systems that can engage in multiparty, collaborative dialogues will require a more fundamental approach than existing technology. Specifically, he argues

that current transactional dialogue systems, such those of Apple's Siri, Amazon's Alexa, Google's Assistant, and Microsoft's Cortana, are limited in important ways that will prevent usage in more complex applications. The talk shows how our returning to the plan-based approach to dialogue will provide a stronger foundation by coupling neural network-based semantic parsing with plan-based reasoning. In the last part of this talk, Cohen raises the topic of malevolent dialogue systems that can prey on unwary people and robots. He proposes that the subfield of dialogue research investigate defensive dialogue systems that are capable of inferring and responding to an adversary's manipulative plans and intentions.

Pandemic Response Panel

UbiComp 2020's Pandemic Response Panel will include three short keynote addresses, followed by a panel discussion.

"Modeling infectious spread on a university campus"

Natasha Martin, University of California San Diego

Martin will discuss her recent work involved with the COVID response as co-lead of the UCSD Return to Learn program. This program aims to use a data-driven framework to inform how to improve university campus safety through risk mitigation, viral monitoring, and public health efforts. She has developed county-level forecasting models for California, and individual-based network models to understand the impact of campus configuration and testing strategies on SARS-CoV-2 transmission.

"Agent-based Models of Infectious Spread"

Pinar Keskinocak, Georgia Institute of Technology

As the COVID19 spread in the US continues to grow, local and state officials face difficult decisions about when and how to transition to a new normal. Keskinocak's team developed an agent-based simulation model to project the infection spread; outcomes include the number of COVID19 infections and resulting severe outcomes, and the need for hospital capacity under social distancing, particularly, shelter-in-place and voluntary quarantine.

"On-body Technologies to Predict Infectious Disease"

John A. Rogers, Northwestern University

Scientists at Northwestern University and Shirley Ryan AbilityLab have developed a novel wearable device and a set of data algorithms tailored to catch early signs and symptoms associated with COVID-19 and to monitor patients as the illness progresses. The device is the size of a postage stamp. It is soft, flexible, wireless and sits just below the suprasternal notch, the visible dip at the base of the throat.

Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT) Papers

Below we have highlighted a few papers. For the full list of papers, visit here.

"**SmokingOpp: Detecting the Smoking 'Opportunity' Context Using Mobile Sensors**"

Soujanya Chatterjee, Santosh Kumar, Sayma Akther, University of Memphis; Alexander Moreno, James Matthew Rehg, Georgia Institute of Technology; Steven Lloyd Lizotte, Cho Lam, Neng Wan, David W

Wetter,University of Utah; Emre Ertin, The Ohio State University; Christopher P Fagundes, Rice University

Context plays a key role in impulsive adverse behaviors such as fights, suicide attempts, binge-drinking, and smoking lapse. The authors define the general concept of 'opportunity' contexts and apply it to the case of smoking cessation. They operationalize the smoking 'opportunity' context, using self-reported smoking allowance and cigarette availability. They show its clinical utility by establishing its association with smoking occurrences using Granger causality. They mine several informative features from GPS traces, including the novel location context of smoking spots, to develop the SmokingOpp model for automatically detecting the smoking 'opportunity' context. Finally, they train and evaluate the SmokingOpp model using 15 million GPS points and 3,432 self-reports from 90 newly abstinent smokers in a smoking cessation study.

"**AuraRing: Precise Electromagnetic Finger Tracking**"

Farshid Salemi Parizi, Eric Whitmire, Shwetak Patel, University of Washington

The authors present AuraRing, a wearable magnetic tracking system designed for tracking fine-grained finger movement. The hardware consists of a ring with an embedded electromagnetic transmitter coil and a wristband with multiple sensor coils. By measuring the magnetic fields at different points around the wrist, AuraRing estimates the five degree-of-freedom pose of the ring. We develop two different approaches to pose reconstruction—a first-principles iterative approach and a closed-form neural network approach. Notably, AuraRing requires no runtime supervised training, ensuring user and session independence. AuraRing has a resolution of 0.1 mm and a dynamic accuracy of 4.4 mm, as measured through a user evaluation with optical ground truth. The ring is completely self-contained and consumes just2.3 mW of power.

"UbiquiTouch: Self Sustaining Ubiquitous Touch Interfaces"

Anandghan Waghmare, Qiuyue Xue, Dingtian Zhang, Yuxui Zhao, Shiva Mittal, Nivedita Arora, Ceara Byrne, Thad Starner, Gregory D. Abowd, Georgia Institute of Technology

The authors present UbiquiTouch, an ultra low-power wireless touch interface. With an average power consumption of 30.91µW, UbiquiTouch can run on energy harvested from ambient light. It achieves this performance through low power touch sensing and passive communication to a nearby smartphone using ambient FM backscatter. The authors also address the future application space for this technology.

"AssessBlocks: Exploring Toy Block Play Features for Assessing Stress in Young Children after Natural Disasters"

Xiyue Wang, Kazuki Takashima, Tohoku University, Tomoaki Adachi, Miyagi Gakuin Women's University, Patrick Finn, Ehud Sharlin, University of Calgary, Yoshifumi Kitamura, Tohoku University

Following the 2011 Earthquake and Tsunami in Japan, the authors witnessed a shift of toy block play behavior in young children who suffered from stress after the disaster. The behavior reflected their emotional responses to the traumatic event. The authors explore the feasibility of using data captured from block-play to assess children's stress after a major natural disaster. They prototyped sets of sensor-embedded toy blocks, AssessBlocks, that automate quantitative play data acquisition. During a three-year period, the blocks were dispatched to fifty-two post-disaster children. Within a free play session,

they captured block features, a child's playing behavior, and stress evaluated by several methods. The results reveal correlations between block play features and stress measurements and show initial promise of using the effectiveness of using AssessBlocks to assess children's stress after a disaster.

"PrivateBus: Privacy Identification and Protection in Large-Scale Bus WiFi Systems"
Zhihan Fang, Boyang Fu, Zhou Qin, Desheng Zhang; Rutgers University; Fan Zhang, SIAT, Chinese Academy of Sciences & Shenzhen Beidou Intelligent Technology Co., Ltd
The ubiquity of mobile devices has led to an increasing demand of public network services, e.g., WiFi hot spots. As a part of this trend, modern transportation systems are equipped with public WiFi devices to provide Internet access for passengers as people spend a large amount of time on public transportation in their daily life. However, one of the key issues in public WiFi spots is the privacy concern due to its open access nature. The authors conducted a case study in a large-scale bus WiFi system, which contains 20 million connection records and 78 million location records from 770 thousand bus WiFi users during a two-month period. In their paper, they also introduce their PB-HIDE algorithm, which protects more than 95% users from the potentially leaked information by inserting only 1.5% synthetic records in the original dataset to preserve their data utility.

ACM International Symposium on Wearable Computers (ISWC)
Below we have highlighted a few of ISWC's Notes & Briefs offerings. For the full list of papers, visit here.

"Smartwatch-based Topic Suggestion to Enrich Casual Conversations in Awkward Encounters"
Hiromu Ogawa, Pattie Maes, MIT Media Lab
Encounters with casual acquaintances are common in our daily lives. In such situations, people are sometimes unable to find an appropriate topic for conversation, and as such, an awkward silence follows. In this study, the authors examined a method to enrich casual conversations for an unintended encounter by following three strategies. (1) an online questionnaire survey that involves 10,750 participants to determine how they experience awkward encounters. (2) the design and implementation of a smartwatch-based topic suggestion that relies on finding a commonality in the users' video-viewing histories. (3) demos and semi-structured interviews that involves 15 participants to evaluate this approach. This investigation demonstrates that this novel approach can help users overcome the awkwardness of conversations with casual acquaintances.

"A Wearable Magnetic Field Based Proximity Sensing System for Monitoring COVID-19 Social Distancing"
Sizhen Bian, Hymalai Bello, Bo Zhou, Paul Lukowicz, German Research Center for Artificial Intelligence (DFKI)
The authors present a wearable, oscillating magnetic field-based proximity sensing system to monitor social distancing as suggested to prevent COVID 19 spread (being between 1.5 and 2.0m) apart. They evaluate the system both in controlled lab experiments and in a real-life large hardware store setting. They demonstrate that, due physical properties of the magnetic field, the system is much more robust than current BlueTooth (BT)- based sensing, in particular being nearly 100% correct when it comes to distinguishing between distances above and below the 2.0m threshold.

"Face Mask Design to Mitigate Facial Expression Occlusion"

Çağlar Genç, Ashley Colley, Jonna Hakkila; University of Lapland; and Markus Löchtefeld, Aalborg University

The COVID-19 pandemic dictated that wearing face masks during public interactions was the new norm across much of the globe. As the masks naturally occlude part of the wearer's face, the part of communication that occurs through facial expressions is lost—and could reduce acceptance of mask wear. To address the issue, the authors created 2 face mask prototypes, incorporating simple expressive display elements and evaluated them in a user study. They believe their work provides a stepping-stone towards producible solutions for smart face masks that could potentially increase the acceptability of face mask wear in public.

Workshops

- HASCA 2020: 8th International Workshop on Human Activity Sensing Corpus and Applications
- CML-IOT 2020: 2nd Workshop on Continual and Multimodal Learning for Internet of Things
- CPD 2020: THE 3rd Workshop on Combining Physical and Data-Driven Knowledge in Ubiquitous Computing
- Mental Health: Sensing and Intervention
- UbiTtention 2020: 5th International Workshop on Smart & Ambient Notification and Attention Management
- WellComp'20: 3rd International Workshop on Computing for Well-being

About UbiComp

The ACM International Joint Conference on Pervasive and Ubiquitous Computing (UbiComp) is a premier venue for presenting research in the design, development, deployment, evaluation and understanding of ubiquitous computing systems, including pervasive, wireless, embedded, wearable and mobile technologies, to bridge the gaps between the digital and physical worlds. Ubicomp brings together top researchers and practitioners who are interested in both the technical and applied aspects of ubiquitous computing. UbiComp is sponsored by the ACM Special Interest Group on Mobility of Systems, Users, Data and Computing (SIGMOBILE) and the ACM Special Interest Group on Computer-Human Interaction (SIGCHI).

About ISWC

ISWC (ACM International Symposium on Wearable Computers) is a premier interdisciplinary venue in which leading international researchers, designers, developers, and practitioners in the field present and discuss novel results in all aspects of wearable computing. This includes the design, development, and deployment of wearable computing technologies and the understanding of human experiences and social impacts that these technologies facilitate. It has been held yearly since 1997 and is collocated with International Joint Conference on Pervasive and Ubiquitous Computing (UbiComp) since 2013.

About ACM

ACM, the Association for Computing Machinery is the world's largest educational and scientific computing society, uniting computing educators, researchers and professionals to inspire dialogue, share resources and address the field's challenges. ACM strengthens the computing profession's collective voice through strong leadership, promotion of the highest standards, and recognition of technical excellence. ACM supports the professional growth of its members by providing opportunities for life-long learning, career development, and professional networking.