BIOGRAPHICAL SKETCH

NAME: Faiola, Anthony

eRA COMMONS USERNAME (credential, e.g., agency login): afaiola

POSITION TITLE: Professor, College of Health Sciences, University of Kentucky (UK)
Affiliate Professorships: (1) Department of Biomedical Engineering and (2) Human Development Institute

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE	Date	FIELD OF STUDY
State University of NY, New Paltz, NY	BFA	06/1975	Fine Arts / Graphics
SUNY Albany University, NY	MA	06/1977	Fine Arts / Graphics
Ohio State University, Columbus, OH	MFA	06/1979	Experimental Media
Ohio State University, Columbus, OH	MA	12/1984	Industrial Design (Interface Design/Human Factors)
Purdue University, West Lafayette, IN	PhD	08/2005	Communication (Sociocultural Psychology & Media)

A. Personal Statement

I am currently a Professor in the College of Health Sciences, Department Human and Clinical Sciences, University of Kentucky (UK). I also have a joint faculty appointment in the Department of Biomedical Engineering and the Human Development Institute, with an affiliate professor in the Markey Cancer Center, Prevention & Control Research Program, University of Kentucky. Prior to my appointment at UK, I was Professor and Head of the Department of Biomedical and Health Information Sciences, at the University of Illinois Chicago (UIC). Previously, I also served as Associate Professor and the Founding Director of the Human-Computer Interaction Program at the Indiana University—School of Informatics and Computing (SoIC) in Indianapolis. During my time at SoIC, I also served as the School's Executive Associate Dean for five years.

While my research lies at the intersection of human factors, human-computer interaction design (HCI/d), and biomedical/health informatics, I am a social scientist who studies the effects of mobile health technology (mHealth/Telehealth) in the context of patient care and self-care monitoring. I have extensive knowledge of the fields of human-centered computing and usability engineering, as applied to the study, design and testing of the health-centered digital interactive technologies. In sum, my experience is in two core areas— (1) mHealth/telehealth design/testing of diagnostic solutions that support clinical work and patient care, and (2) patient care self-monitoring and patient-family-provider communication.

I am delighted to serve as Team Principal on this American Cancer Society Grant application related to cancer screening to progress early detection. Our project aims to identify and verify VOC biomarkers of prostate cancer using a portable gas chromatograph-mass spectrometer (GC-MS) and in parallel develop a miniaturized, rapid, and portable nanosensor array to detect the urinary VOC biomarkers and identify prostate cancer with high accuracy.

I am currently working on two cancer-related technologies that will significantly impact the health care of cancer patients, including: **(1)** Comprehensive Connected Cancer Care Program. Aim: Advance health equity for underserved populations by improving access to community-focused, patient-centered, and high-quality cancer care, through the use of mHealth/Telehealth patient monitoring and provider/staff education (Funding: Merck); **(2)** Serious Gaming for Cancer Patients Suffering from Acute Cognitive Impairment Due to Extreme Neurotoxicity from a Prolonged Pharmacological (Chemotherapy) Intervention. Aim: Reduce cognitive impairment through "first-person player interactive 3D" cognitive game therapy that integrates evidence-based Selection-Attention Process Testing into interactive cognitive exercises (Internal Funding: Center for Computational & Translational Science). Other relevant projects include: **(1)** Detecting Hypoglycemia from Human Breath Using an Electronic Nano-Sensor that Outputs Patient Data to a mHealth App, and **(2)** A Mobile Smart Glasses Application that Facilitates ICU Decision-Support by Means of Real-time Bedside and EMR Data Visualization.

These experiences, and my expertise in human factors and HCI/d make me well qualified for my role on this project, which includes the oversight of the design, development, and usability testing of all software/apps user interfaces for the VOC sensing diagnostic devices/technologies and wearable/handheld mobile device. I will also work closely with Dr. Agarwal to ensure that all device interfaces are acceptable, with usability findings being validated based on: (1) empirical user data and user requirements, and (2) FDA guidelines on safety, human factors / user error, and ease of use. In sum, all prototype iterations will go through a rigorous assessment process using a range of applied human factors principles and practices to ensure that all software and sensors are designed as a unified VOC-based diagnostic platform that is portable, intuitive, and user-friendly to maximize point of care application.

Ongoing and recently completed projects include:

1. **Center for Computational and Translational Sci. & Research Alliance for Lung Disease**
   Faiola (PI), Meulenbroek, Villano, Yates (Co-PIs) College of Medicine   09/01/22/ - 08/30/2023
   Title: A Usability and Clinical Pilot Study of a Serious (Interactive 3D) Game for Pulmonary ICU and Cancer Patients (Both) Suffering from Acute Cognitive Impairment Due to Extreme Neurotoxicity from a Prolonged Pharmacological Intervention

2. **Merck Foundation (Alliance for Equity in Cancer Care)   ID# Award in Process**
   Mullett/Chih/Hull (PIs) / Faiola (Co-I)   07/01/22 - 06/30/2027
   Title: Comprehensive Connected Cancer Care (C4) Program (Targeting underserved populations/disparities, rural, low-income/Medicaid, uninsured)

3. **USDA 1000100032 / 2021-05397   ID# 311122**
   Hull (PI) / Faiola (Co-I)   05/01/2021 – 04/30/2024
   Title: Children Eating Well (CHEW) Smartphone Application for WIC Families

4. **NSF 1406813   Award #: 1502310**
   Agarwal (PI) / Faiola (Site PI)   05/01/2014 –11/30/2020
   Title: Canine-Inspired Smart Sensor for Detecting Hypoglycemia from Human Breath

Citations:

1. **Faiola, A.** Srinivas, P. and Duke, J. (2015). Supporting clinical cognition: a human-centered approach to a novel ICU information visualization dashboard, *Am Med Inform Assoc,* Nov 14, 2015. PMID:26958190 PMCID: PMC4765655.

2. Zolnoori, M., Fung, K. W., Patrick, T. B., Fontelo, P., Kharrazi, H., **Faiola, A.,** Shah, N. D., Wu, Y. S., Eldredge, C. E., Luo, J., Conway, M., Zhu, J., Park S. K., Xu, K., Moayyed, H., & Goudarzvand, S. (2019). A systematic approach for developing a corpus of patient reported adverse drug events: A case study for SSRI and SNRI medications, *Journal of Biomedical Informatics*, *90*. PMID: 30611893.

3. **Faiola, A,** Belkacem I, Bergey D, Pecci I, Martin B. (2019) Towards the Design of a Smart Glasses Application for MICU Decision-Support: Assessing the Human Factors Impact of Data Portability & Accessibility. *Proceedings of the International Symposium on Human Factors and Ergonomics in Health Care*; 8(1):52-56.

B. Positions and Honors

Positions and Scientific Appointments

2022 – present **Professor** (*Affiliate*), Markey Cancer Center, Prevention & Control Research Program, UK
2021 – present Professor (*Affiliate*), Dept. of Biomedical Engineering, College of Engineering, University of Kentucky
2020 – present Professor, Dept. of Health and Clinical Sciences, CHS, University of Kentucky (UK), Lexington, KY
2020 – 2021 Associate Dean of Research, College of Health Sciences (CHS), UK, Lexington, KY
2016 – 2020 Professor, Dept. of Biomedical & Health Information Sciences, College of Health Sciences (AHS), University of Illinois at Chicago (UIC), Chicago, IL
2016 – 2020 Chair, Dept. of Biomedical & Health Information Sciences, AHS, UIC, Chicago, IL
2016 – 2020 Adjunct Professor, Dept. of Computer Science, College of Engineering, UIC, Chicago, IL
2008 – 2013 Executive Associate Dean, SoIC, Indiana University, IUPUI, Indianapolis, IN
2007 – 2009 Director, Media Arts & Science Program, Indiana University, SoIC, IUPUI, Indianapolis, IN
2002 – 2014 Founding Director, Human–Computer Interaction Program, Indiana University, SoIC, IUPUI
2001 – 2016 Associate Professor, Indiana University, School of Informatics & Computing (SoIC)
             Department of Human-Centered Computing, IUPUI, Indianapolis, IN
1998 – 2001 Assistant Professor, Purdue University, Department of Computer Graphics West Lafayette, IN

Honors

2022 Keynote Speaker**,** 2ʳᵈ Int. Conf. on Approaches in Social Science, Mental Health for All, Punjab, Pakistan
2017 Keynote Speaker, 2ⁿᵈ Int. Conf. on Informatics, Health, & Technology (IEEE), Riyadh, Saudi Arabia.
2013 Dedicated Service Award for Administrative Excellence as Executive Associate Dean
2003 Indiana University Board of Trustees Excellence in Teaching Award
2003 Fulbright Scholar, Media & Interaction Design, Moscow State University of the Printing Arts
2002 Fulbright Scholar, eBook Technologies, Moscow State University of the Printing Arts
1999 Fulbright Scholar, Media & IT Usability, St. Petersburg State U. of Information Technology

C. Contributions to Science

1. **Mobile Health (mHealth) Systems: mHealth innovation that supports patient self-care and healthy life-style management.**

   This contribution of science includes two lines of research. In the **first line**, my team lead the design and usability study of two mHealth products: **(A)** This work focused on a mHealth intervention that supports hypoglycemia for diabetic patients. My team developed a system to detect hypoglycemia noninvasively in human breath, consisting of the breathing device and the mHealth app for smartphone. The device (via Bluetooth) sends warning alerts, a hypoglycemia score, and data for visualization on the patient's smartphone for real-time monitoring. My role in this project focused on the design and usability testing of the mobile app. **(B)** This second patient-centered care project supports communication to improve patient-provider interaction, in the context of the secondary user experience. The objective of the study was to understand the extent that a patient-operated mHealth app can improve communication between the patient and provider during an initial face-to-face (first visit) encounter.

   In the **second line,** my team explored two theoretical models that address the challenges of noncommunicable diseases (e.g., diabetes) and the potential of mHealth to support healthy lifestyle management: **(A)** In the first paper we advanced the notion that the human factors model SEIPS 2.0 provides a framework for increasing patient control over personal health information, collaboration with providers to establish healthy life practices, and active participation in decision-making about healthcare delivery. **(B)** In the second paper, we outlined a theoretical framework related to the use of mHealth for lifestyle management and increased empowerment of an aging population. Through increased accessibility to health literacy, self-care monitoring, and patient–provider–community collaboration, we proposed an integrated model through which mHealth plays a central role. We also highlighted research gaps around understanding this target population, and their health needs in the context of mHealth.

   a. **Faiola, A.,** Vatani, H., & Agarwal, M. (2019). Hypoglycemic Detection by Human Breath: A Mobile Health Application that Alerts Diabetics of Low Blood Glucose, *EAI Transactions on Ambient Systems (Special Edition on Smart Coaching Solutions for Health and Well-Being, 6(18), e4.*

   b. Tunnell, H. D., **Faiola, A.** Bolchini, D., & Ellis, R. (2018). Simulated Clinical Encounters Using Patient-Operated mHealth: An Experimental Study to Investigate Patient-Provider Communication, *Journal of Medical Internet Research—mHealth and uHealth, 6*(11): e11131. PMCID: PMC6238098.

   c. **Faiola, A.** & Holden, R. (2017) Consumer Health Informatics: Empowering Healthy-Living-Seekers through mHealth*, Progress in Cardiovascular Diseases, Special Edition: Conceptualizing the Healthy Lifestyle Healthcare System*, *59*(5), 479-486.

   d. **Faiola, A.,** Papautsky, E., & Isola, M. (2019) Empowering the aging with mobile health: A mHealth framework for supporting sustainable lifestyle behavior, *Current Problems in Cardiology, 44*(8), 232-266. PMID: 30185374.   32 22. 54. 27

2. **Sociotechnical / Health System Design**: **Analyzing the effects of data visualization on ICU clinical cognition.**

   The Intensive Care Unit (ICU) has the highest annual mortality rate of any hospital unit or 25% of all clinical admissions. Studies show a relationship between clinician cognitive load, clinical decision-making, and workflow, and their impact on patient safety and the subsequent occurrence of medical mishaps due to diagnostic error. Conversely, medical data visualization tools can provide the means to quickly transform data into contextual knowledge suitable for interpretation and clinical decision-making. In this research, my team: **(1)** investigated the underlying mechanisms/causes of ICU error related to the effects of clinical workflow: clinical cognition, team communication/collaboration, and the use of diagnostic systems and **(2)** constructed and validated a novel ICU data visualization dashboard through which data is organized into multivariate data visualizations. It does this as the primary means to represent and manage complex context-based patient data at various user-defined temporal resolutions. We demonstrated a significant difference in speed/accuracy with the use of a new ICU dashboard application—for reducing cognitive load and enabling quicker decision-making.

   a. **Faiola, A**., & Hillier, S. (2006). Multivariate relational visualization of complex clinical datasets in a critical care setting: A data visualization interactive prototype. *Proceedings of the conference on Information Visualization 2006*, Pages 460–468. https://doi.org/10.1109/IV.2006.76

   b. **Faiola, A**., A., & Newlon, C. (2011). Advancing critical care in the ICU: A human-centered biomedical

data visualization systems. In *Ergonomics and Health Aspects of Work with Computers* (pp. 119-128). Springer Berlin.

   c. **Faiola, A.,** Srinivas, P., Karanam, Y., Chartash, D., & Doebbeling, B. (2014, April). VizCom: a novel workflow model for ICU clinical decision support. *CHI EA '14: CHI '14 Extended Abstracts on Human Factors in Computing Systems, April 2014,* Pages 1705–1710.

3. **Biomedical / Health Informatics: Analyzing medical record duplication and social media posts of psychiatric medication effects.**

These studies address two health informatics problems. **First**, our study of the Indiana Health Information Exchange represents a tool for the consolidation of Continuity of Care Documents, which is a major step toward improving information access and the interoperability among information systems. We found, however, that almost all the inaccuracies were caused by issues involving the use of standardized terminologies within the documents to represent individual information medical/health entries. While more work is necessary, automated systems like the one evaluated in this study, will be necessary to meet the informatics needs of providers and health systems in the future.

    Second, patients' self-report experiences of medications in online health care communities can provide direct insight into the underlying factors associated with patients' perceptions and attitudes toward antidepressants. In our study, we established that patient (self-reporting) social media posting of psychiatric medication effects may constitute a reliable source of attitudes towards antidepressant treatment. However, social media cannot be used as a replacement for formal clinical-directed self-reporting methods because of the lack of information of some variables, colloquial language, and the unstructured format of data.

   a. Hosseini, M, Jones, J, **Faiola, A,** Wu, H, Vreeman, D, & Dixon, B. E. (2017). Reconciling disparate information in continuity of care documents: Piloting a system to consolidate structured clinical documents. *Journal of the Biomedical Informatics, 74, 123-129.* PMID: 28903073.

   b. Hosseini, M, **Faiola, A,** Jones, J, Vreeman, D, Wu, H, & Dixon, B.E. (2019). Impact of document consolidation on healthcare providers' perceived workload and information reconciliation tasks: a mixed methods study, *Journal of the American Medical Informatics Association*, *26*(2), 134–142. PMCID: PMC6804409.

   c. Zolnoori, M., Fung, K., Fontelo, P., Kharrazi, H., **Faiola, A.,** Wu, Y, S., Stoffel, V., & Patrick, T. (2018). Identifying the Underlying Factors Associated With Patients' Attitudes Toward Antidepressants: Qualitative and Quantitative Analysis of Patient-Generated Data, *Journal of Medical Internet Research— Journal of Mental Health*, 5(4):e10726. PMCID: PMC6876546.

   d. Zolnoori, M., Fung, K. W., Patrick, T. B., Fontelo, P., Kharrazi, H., **Faiola, A.,** Shah, N. D., Wu, Y. S., Eldredge, C. E., Luo, J., Conway, M., Zhu, J., Park S. K., Xu, K., & Moayyed, H. (2019). The PsyTAR dataset: From patients generated narratives to a corpus of adverse drug events and effectiveness of psychiatric medications. *Data in Brief, 24.* PMCID: PMC6495095.

4. **mHealth Applications for ICU Patient Care: Mobile technologies that assist critical care clinician-family communication and health IT-mediated interruptions.**

This area of research has focused on two groups of mHealth to support the communication of ICU patient families and clinicians in optimizing workflow: **(A)** Research consistently reports that family members of critically-ill patients are not engaged meaningfully in inpatient critical care processes—putting them at risk for experiencing mental trauma, such as anxiety, depression, and post-traumatic stress disorder. Such studies demonstrated that information flow and communication between patients' families and critical care teams is inadequate, technical, complex and prone to errors. Towards this end, my team conducted an exploratory pilot study that included observation, ad hoc interviews, and questionnaires, which captured clinician perspectives regarding family engagement. Findings informed the design of a family-centered mHealth platform intended to provide a set of tools/services that deliver remote 24/7 (HIPAA compliant) real-time bedside access to vital-sign/wellness patient information, text support for family-bedside communication (patient notes from the bedside) and texting/email support for social work and mental health counseling.

    (B) Previous research on reducing unwanted interruptions in the ICU have focused on providing context-aware solutions that consider factors such as location and activity of the person receiving the interruption. We sought to broaden our understanding of how to manage interruptions by using the Locales Framework to analyze data collected from a field study on mobile notification interruptions in the ICU. Based on our data along with previous literature on cognitive theories, mental models, strategies for managing interruptions,

and principles of human factors, we proposed five guidelines to aid in designing mobile technology interventions for the ICU. Informed by these guidelines, we designed and tested a mHealth solution, using patient-enhanced notifications, that presents a preview of patient information. Our study validated the potential to help ICU clinicians better manage interruptions.

a. **Faiola, A.,** Papautsky, E. L. and Joo, M. (2016). Supporting Patient Healing through ICUsmartCARE: Technologies that Enable Family Collaboration, Presence, and Information Flow, *2016 IEEE International Conference on Healthcare Informatics (ICHI)*, 2016, pp. 297-300. doi: 10.1109/ICHI.2016.42.

b. **Faiola, A.** & Abraham, J. (2018). FAMcare: A MICU Room-to-Mobile System—Supporting the Communication Needs of Families, Extended Abstracts, *American Medical Informatics Association, Annual Symposium*, San Francisco, CA.

c. Srinivas, P., **Faiola, A.**, & Mark, G. (2016). Designing guidelines for mobile health technology: Tools for managing notification interruptions in the ICU, *Proceedings of ACM CHI Notes, San Jose, CA, USA, May 7-12.* New York, NY: Association for Computing Machinery Press*, April 2016*.

d. Srinivas, P., Reddy, M. C., & **Faiola, A.** (2017). Better managing technology-mediated interruptions in the ICU: Examining the role of patient information for improving text message notifications. *Proceedings of American Medical Informatics Association, Annual Symposium*, *Nov. 2017*.

5. **User Cognition and Online Behavior: Understanding sociocultural cognition in the context of online information design and game-based learning.**

These three research projects represent my work in relation to human factors and the sociocultural aspects of online information design and user preferences: **(A)** In this study comparing American and Chinese web designers, we found that during the process of online information production, content was shaped by cultural-centered cognitive processes. Specifically, this study explored issues related to Web designers' cultural cognitive styles and their impact on user responses, i.e., user preferences and user interaction with Web content. In sum, we established that media designer cultural cognitive style shapes information production, with links between sociocultural behavior and user preferences.

(B) In this theoretical paper, we further explored the notion that connects culture to online user preferences and performance. We observed that few communication scholars recognize the impact of culture on online information design and usability. We proposed that to improve computer-mediated communication, Web site design should accommodate culturally diverse user groups. Building on this contrast, a theory of cultural cognitive design was proposed as a means of understanding differences in cognitive styles that develop under the influence of culture and their impact on designing and organizing online information.

(C) In this study, my team observed how online virtual worlds are becoming an important environment to observe and understand cognition in the context of game-based learning. The authors posit that flow (a theory on the feeling of increased psychological immersion) in virtual worlds (e.g., Second Life), can be positively associated with degrees of cognitive immersion and telepresence. This study tested three hypotheses related to flow and telepresence, with findings suggesting that the complex interrelationships and interactions that lead to flow in virtual gameplay engender the feeling of hope, while also improving a positive attitude of online learning. In sum, we established that flow experience is positively associated with degrees of cognitive immersion and telepresence during virtual gameplay.

a. **Faiola, A**., & Matei, S. A. (2005). Cultural cognitive style and web design: Beyond a behavioral inquiry into computer-mediated communication. *Journal of Computer-Mediated Communication*, *11*(1), 375-394.

b. **Faiola, A.**, & MacDorman, K. (2008). Exploring the influence of web designer cognitive style on information design: A cross-cultural comparison of a holistic and analytical perspective. *Information, Communication and Society*, *11*(3), 348-374.

c. **Faiola, A.,** Newlon, C., Pfaff, M., & Smyslova, O. (2013). Correlating the effects of flow and telepresence in virtual worlds: Enhancing our understanding of user behavior in game-based learning. *Computers in Human Behavior*, *29*(3), 1113-1121.

MyNCBI (Partial List): https://www.ncbi.nlm.nih.gov/myncbi/anthony.faiola.1/bibliography/public/