

PROFILE

Mohammad is a researcher and a designer whose work is focused on the design and evaluation of data visualization tools and digital/tangible computer interfaces that support education, group negotiation, and decision-making. Currently, he is working with the Engineering Design Center, University of Cambridge, to develop a tangible programming language that supports children in learning programming concepts. Recently, Mohammad received a certificate of postgraduate studies in computer science from the University of Cambridge where he investigated the sensations involved in interacting with tangible programming languages. Prior to his studies at Cambridge, he was a graduate student research assistant in the City Science (Changing Places) group at the MIT Media Lab, a research associate in the Center for Complex Engineering Systems (CCES) at KACST and MIT, and a teaching fellow at Harvard School of Engineering and Applied Sciences.

Mohammad received his B.Sc. degree in computer engineering from King Fahd University of Petroleum and Minerals (KFUPM), and an M.Sc. degree in Information from the University of Michigan (UM) - Ann Arbor where he specialized in Human-Computer Interaction, and Incentive-Centered Design. Mohammad's interests have gravitated toward computer interfaces, group collaboration, interactive visualization and decision-making. He started the CityGame project at the Media Lab, where he designed and developed different visualizations, and graphical and tangible computer interfaces to evaluate their impact on a city planning negotiation scenario. Prior to his work on CityGame, Mohammad worked on the Sustainable Infrastructure Planning System (SIPS) project, at CCES, in which he developed a Collaborative Planning Interface (CoPI) to visualize complex data to support decision makers in making better-informed decisions.

Mohammad continues to design, develop and evaluate interactive visualization tools that support collaborative decision-making for complex systems. This work is part of a broader research plan to define an ontology that abstracts, represents, and creates tools and interactive visualizations for data from complex systems.

SUMMARY OF QUALIFICATIONS

- Graduate Student Supervisor, University of Cambridge.
- Graduate Research Assistant in the City Science (Changing Places) Group, MIT Media Lab
- Teaching Fellow at Harvard SEAS.
- Research Associate at CCES.
- Received a Certificate of Postgraduate Studies in Computer Science, University of Cambridge.
- Received an M.S in Media, Arts and Sciences, M.S in Information (specialized in HCI and ICD), and B.S in Computer Engineering.
- Experience in software/web development, tangible programming, interface design, social research, object recognition, image processing, and visualization projects.
- Worked in education, Healthcare, computer networks, IT, consulting and advertising domains.
- Published work on programming languages, complex systems visualizations and collaborative planning interfaces in peer reviewed conferences and journals internationally.
- Engaged in group projects and individual projects during my career and school projects.
- Volunteered in conferences and led students and professional organizations.
- Received several awards for academic and professional work.
- Interested in big data interactive visualization, tangible interfaces and collaborative digital workspaces research and decision-making.

EDUCATION

- 2018 **University of Cambridge, Cambridge, UK**
Certificate of Postgraduate Studies in Computer Science
- Report: *Sensation in Tangible Programming Languages: A Phenomenological Approach*
 - Report: *Tangible Lambda: Abstract Tangible Programming Function to Support End-user Programming of IoT Devices at Home*
 - Graphics and Interaction Group (“Rainbow”), Computer Lab
 - Scholarship from King Abdulaziz City for Science and Technology in Saudi Arabia
- 2016 **Massachusetts Institute of Technology (MIT), Cambridge, USA**
M.S. in Media, Arts and Sciences
- Thesis: *The Impact of Computer Interfaces on Multi-Objective Negotiation Problem*
 - City Science (Changing Places) Group, Media Lab
 - Scholarship from King Abdulaziz City for Science and Technology in Saudi Arabia
- 2009 **University of Michigan (UM), Ann Arbor, USA**
M.S. Information
- Human-Computer-Interaction (HCI) and Incentive-Centered Design (ICD)
 - Scholarship from the Ministry of Higher Education in Saudi Arabia
- 2006 **King Fahd University of Petroleum and Minerals (KFUPM), Dhahran, Saudi Arabia**
B.S. Computer Engineering
- University honored student
 - College of Computer Science and Engineering Dean’s List

EXPERIENCE

- Oct 2016 - Current **Graduate Student Supervisor**
HCI and Interaction Design courses at the Computer Laboratory, University of Cambridge
Cambridge, Cambridgeshire, United Kingdom
- Summer 2016 **Data Science Research Intern**
Bell Labs, Nokia
Cambridge, Cambridgeshire, United Kingdom
- Spring 2015, 2016 **Teaching Fellow**
CS171 - Visualization Course at Harvard
School of Engineering and Applied Sciences, Harvard University, Cambridge, MA
- Sep 2013 - Jun 2016 **Research Assistant**
MIT Media Lab (Changing Places Group, and City Science Initiative)
Cambridge, MA, USA
- Oct 2011 - Jun 2016 **Research Associate**
Center for Complex Engineering Systems (CCES) at KACST and MIT
Riyadh, Saudi Arabia - Cambridge, MA, USA
- Jul 2010 - Jun 2012 **Research Assistant**
Radiation Oncology
University of Michigan Health System, Ann Arbor, MI
- Aug 2008 - May 2009 **Communication and Marketing Assistant**
Informatics Program
University of Michigan, Ann Arbor, MI

Sep 2006 - Jun 2007

VSAT Engineer and Hub Manager

Saudi Systems Corp. / Hughes
Riyadh, Saudi Arabia

Summer 2005

Summer Intern

Atos Origin Middle East
Riyadh, Saudi Arabia

Fall 2003

Signal2 campaign product promoter

Gulflink - Unilever
Eastern Province, Saudi Arabia

PUBLICATIONS

Peer-Reviewed
Articles

Hadhrawi, M., Church, L. and Blackwell, A.F. (2017). A systematic literature review of Cognitive Dimensions. In *Proceedings of PPIG 2017 - the 28th Annual Workshop of the Psychology of Programming Interest Group*.

Hadhrawi, M. K., and Larson, K. (2016). Illuminating LEGOs with Digital Information to Create Urban Data Observatory and Intervention Simulator. In *Proceedings of the 2016 conference on Designing Interactive systems*. ACM.

Alfaris, A., Khiyami, A., Alawad, A., Alsaati, A., & Hadhrawi, M. (2015). The Integrated Energy Decision Support System. In *Systems Engineering*.

Aldawood, S., Aleissa, F., Almalki, A., Alrashed, T., Alhindi, T., Alnasser, R., ... & Al-Wabi, A. (2015). Collaborative Tangible Interface (CoTI) for Complex Decision Support Systems. In *Design, User Experience, and Usability: Users and Interactions* (pp. 415-424). Springer International Publishing.

Hadhrawi, M. K., Wang, Y., Lex, A., & Larson, K. (2014). CreativeCities: What Makes Cities Creative. In *IEEE InfoVis*. IEEE.

Hadhrawi, M. K., Nouh, M., Alfaris, A., & Sanchez, A. (2013). CoPI: a web-based collaborative planning interface platform. In *Human Interface and the Management of Information. Information and Interaction for Learning, Culture, Collaboration and Business*, (pp. 287-296). Springer Berlin Heidelberg.

Nouh, M., Hadhrawi, M., Sanchez, A., & Alfaris, A. (2013, October). Towards cloud-based decision support platform for group decision making. In *Systems, Man, and Cybernetics (SMC), 2013 IEEE International Conference on* (pp. 50-55). IEEE.

Nouh, M., Hadhrawi, M., Sanchez, A., & Alfaris, A. (2013). A Collaborative Web-based Decision Support Platform for Planning Complex Engineering Systems: A Design and Architecture Framework. In *2013 EURO Working Group on Decision Support Systems (EWG-DSS)*.

Work-in-Progress

Hadhrawi, M. K., and Blackwell, A.F. Sensation in Tangible Programming. In *Proceedings of PPIG 2018 - the 29th Annual Workshop of the Psychology of Programming Interest Group*. [to be submitted]

Hadhrawi, M. K., Miranowski, D. K., Ramasubramanian, V., Sanchez D. O. (2017) SoundScape: Sound Enabled Shape-Changing Material. In *CHI'17 extended abstracts on Human factors in computing systems*. ACM. [to be submitted]

RESEARCH

- 2018 - current **Code Block, Engineering Design Center, University of Cambridge**
- Redesigned the Tangible IFTTT to support children education in learning programming concepts
 - Setting-up a qualitative study to evaluate the use of Code Block with children in a school environment
- 2016 - 2018 **Tangible IFTTT, Computer Laboratory, University of Cambridge**
PhD Research Leader
- Research question: Can we use sensations as basis for tangible and intangible programming languages.
 - Designed and developed a tangible trigger-action (if this then that) programming language to interact with home IoT devices.
 - Investigated the sensations involved in programming IoT devices using a qualitative approach.
- 2015 - 2016 **CityGame, Changing Places Group, MIT**
Research Leader, Master Thesis
- Hypothesis: a Tangible User Interface is more effective for multi-objective group decision making than a graphical or multitouch user interface.
 - Interviewed multiple stakeholders to understand the decision making process in urban planning.
 - Defined the points of contentions and cooperation between the players (potential stakeholders).
 - Developed a web-based graphical and tangible interface for a city planning negotiation game.
 - Setup an in-between subjects study to evaluate the different interfaces with different users.
- 2013 - 2016 **CityScope, Changing Places Group, MIT**
Research Leader
- Developed tangible interface to interact with the CityScope LEGO model using object detection and image processing techniques.
 - Setup 3D projection with multiple projectors.
 - Developed a visualization tool to compare cities and to discover what makes cities creative.
 - Developing a framework to support decision makers in their analysis using interaction.
 - Designing an interface to simplify the interaction with complex system.
 - Developed a multitouch table-top display with object detection system.
 - Developing an Agent-Based Model to simulate pedestrian and transportation pattern within a neighborhood
- 2012 - 2013 **Boeing Decision Support Center, KACST - Boeing**
- Investigated digital workspaces to support large datasets interaction, visualization and simulation.
 - Investigated immersive environments to support group simulation and collaboration
- 2011 - 2013 **SIPS: Sustainable Infrastructure Planning Systems, CCES**
Research Leader
- Investigated decision process in governments and organizations.
 - CPI: developed a web based collaborative planning interface.
 - Investigated different framework architecture to develop CPI architecture.
 - Evaluated existing visualization techniques.
 - Visualized large datasets stored in non-relational database.
 - Fabricating a digital workspace for physical collaboration.
 - Conducted research in decision making.
 - Investigated different modeling techniques.

- 20011 - 2012 **CollabEval: Collaborative Tools to Support Remote Collaboration, CCES**
- Evaluated web-based collaboration tools to support communication, file sharing and time management activities between CCES Riyadh and Cambridge sites.
 - Applied a competitive analysis comparison on the selected tools based on desirability, feasibility, reliability and viability.
- 2011 - 2012 **CDL: Collaborative Design Lab, CCES**
Project Leader
- Designed state of the art lab aimed to connect researchers between Riyadh, Saudi Arabia and Cambridge, USA into a single virtual lab.
 - Designed a visualization wall to visualize large data sets on multiple domains, in addition to helping distant researches communicate.
- 2009 - 2011 **Treatment Planning System, UMHS**
- Investigated synergies between physician, physicists and dosimetrists.
 - Investigated treatment team - tools interaction.
 - Designed and developed web portal and desktop import interfaces.
 - Designed and developed treatment machine interface.
 - Investigated physical and digital workspaces.
- 2009 - 2011 **MC Research: Ann Arbor Hands On Museum, UM**
Research Assistant (volunteered) at the School of Information
- Investigated children-exhibit interaction to enhance learning experience.
 - Developed and iPhone application to guide children in their interaction with exhibits.
- Summer 2009 **APRIL, College of Electrical Engineering and Computer Science, UM**
Investigating methods to create a motion preferences module for robots.
- Spring 2009 **ADLER Planetarium, Space Visualization Lab, Chicago, IL**
Team Leader
- Conducted a usability study on the use of Microsoft tags (TagReader app on the iPhone and other smart phones) for lab exploration.
 - Recommended ways to improve visitors experience and their interaction with exhibits.
- 2008 - 2009 **Informatics Program Website, UM**
- Created a generalized transition network for the previous Informatics website.
 - Designed and maintained a new website using css/html.
- Sep 2006 - Jun 2007 **Ministry of Foreign Affairs Satellite Network**
- Monitored the organization Very Small Aperture Terminal (VSAT) satellite network.
 - Supervised and engaged in the installation of satellite network system in multiple sites.
 - Managed effectively group of people with varying languages and background.
- Summer 2005 **SADAD, Saudi Arabian Monitory Agency Electronic Transactions**
- Designed and developed an application for electronic bill payments.
 - Monitored network operations and activities.

SCHOOL PROJECTS

- Winter 2014 **CreativeCities Visualization Tool, Harvard**
Data Visualization
- Investigating what makes cities creative within a neighborhood level.
 - Collected and analyzed BigData.
 - Visualized data using D3.
 - Developed a web-based analytic tool to compare cities.

Fall 2013	<p>SoundScape: Sound Enabled Shape-Changing Material, MIT Tangible Interfaces Designed interactive prototype of visualizing economic data of distressed communities through interactive maps.</p>
Winter 2009	<p>UM Community Economic Adjustment Program, UM <i>Project Leader, Information Visualization</i> Designed interactive prototype of visualizing economic data of distressed communities through interactive maps.</p>
Winter 2009	<p>GlobaLens: A service Design Evaluation, UM</p> <ul style="list-style-type: none"> • Applied the principles of service innovation to Globalens to enhance the existing features. • Proposed new features that would give Globalens a competitive edge over other Business Cases' providers.
Fall 2008	<p>ANDOR; Individually-Boxed Shoe Store, UM Information Architecture Designed the website wireframe that extends the physical store experience online.</p>
Fall 2008	<p>Bugs 2.0: Enhance the Collaboration between Developers and Novice Bug Reporters, UM Computer Supported Cooperative Work</p> <ul style="list-style-type: none"> • Interviewed developers and project managers to understand bug reporting response. • Designed a web interface bug reporting component to improve bug tracking process.
Winter 2008	<p>UM Wolverine Access Advisement System, UM Evaluation of Systems and Services Evaluated the success in accomplishing the user organizational goals.</p>
Winter 2008	<p>Microsoft Sync, UM Human Behavior</p> <ul style="list-style-type: none"> • Investigated how Microsoft SYNC system would affect human attention while driving. • Studied the frustration occurred in using the system, and measuring the attention level on multiple tasks while driving.
Fall 2007	<p>MuseComp: Ann Arbor Hands On Museum, UM <i>Project Leader, Interface and Interaction Design</i></p> <ul style="list-style-type: none"> • Designed a tour guide application for mobile devices. • Developed an iPhone App.
Winter 2006	<p>3 Degree of Freedom (DoF) Robot Arm, KFUPM Fabricated and designed a 3DoF robot arm</p> <ul style="list-style-type: none"> • Configured the arm control. • The robot arm is to be controlled over the university Local Area Network (LAN).
Winter 2006	<p>SEMS, KFUPM Hardware Group Leader</p> <ul style="list-style-type: none"> • Designed and built a wearable device for elderly that track their health progress. • Built a robot guide to assist people with deficiencies inside hospitals.
Winter 2006	<p>VLSI Design, KFUPM</p> <ul style="list-style-type: none"> • Designed a serial to Parallel Data converter. • This includes logic design, transistor level, and VLSI (Very Large Scale Integration) circuit design.

Fall 2005 **Stairs-Climbing Robot, KFUPM**
Designed and fabricated the robot to detect and climb stairs with a leveled surface (load area).

- Programmed the robot controller using a RabbitCC micro controller.
- Fabricated the robot printed circuit board (PCB).

Fall 2005 **Multi-location LAN Design, KFUPM**
Group Leader

- Designed an enterprise network for MoTex (a modern textile company).
- The network connects multiple-floors building, and multiple branches in different cities.
- The network is designed to fulfill MoTex requirements of reliability, redundancy, performance, efficient manageability and cost effectiveness.

PROFESSIONAL COURSES, TRAININGS AND WORKSHOPS

July, 2012 System Dynamics Workshop, MIT.
Agent Based Modeling Workshop, MIT.

June, 2012 CX202: Complex Systems Modeling and Network Course, NECSI, Cambridge, MA.

January, 2012 GIS Training Course, KACST.

January, 2007 SKYWAN network installation, commissioning & operation, NDSatcom, Riyadh, Saudi Arabia.

April, 2006 Workshop on Business Ethics, KFUPM.

May, 2005 Workshop on How to Start a Small Business, KFUPM.
Workshop on Leadership & Teamwork Skills, KFUPM.

April, 2005 Workshop on Advanced Learning Skills, KFUPM.
Workshop on Brain and Thinking Abilities Skills, KFUPM.

March, 2005 Workshop on Developing Creativity, KFUPM.

PROFESSIONAL ACTIVITIES

Organizer Research @ ML, 2015
TEDxUofM 2010 & 2011.
First national IEEE Geographical Information System. Khobar, Saudi Arabia. 21 – 23 Nov. 2005.
International Conference on Information & Computer Science. Saudi Arabia. 29 Nov.–1 Dec. 2004.

Volunteer ACM Conference on Human Factors in Computing Systems (CHI), Boston, US. 4 - 9 April 2009.
12th Annual IEEE Technical Exchange Meeting (TEM). KFUPM, Saudi Arabia. 16 – 18 May 2005.
11th Annual IEEE TEM. KFUPM, Saudi Arabia. 13 – 14 April 2004.

Local Leader IxDA Ann Arbor 2009 - 2012.

Member IxDA, since 2009 .
ACM SIGCHI, since 2007.
IEEE, since 2003.

Reviewer IEEE International Conference on Tools with Artificial Intelligence (ICTAI) 2013 and 2014.

Co-Founder Butterfly LLC (Design and Innovation Consulting Company), since 2011.

AWARDS

2013 - 2020	King Abdulaziz City for Science and Technology, Full Scholarship: covers tuition and living expenses.
2012	New England Complex Systems Institute (NECSI) Scholarship.
2011	Startup Weekend Ann Arbor, 3rd Place Award.
2008	Best project award ExpoSition, MuseComp.
2007 - 2009	King Abdullah Full Scholarship: covers tuition and living expenses.
2006	University Distinction, KFUPM. Dean's List, CCSE, KFUPM. Best project award, 3DoF Robot Arm, KFUPM.
2005 - 2006	Atos Origin ME Scholarship: covers living expenses.

INTERESTS

Research	Human-Computer Interaction, big-data interactive visualization, tangible interfaces, decision making, collaborative digital workspaces, and visual analytics and data exploration.
Intellectual	Improving language and intercultural social skills, neuroscience, and robotics.
Activities	Competitive Rowing, fencing, horseback riding, competitive ballroom dancing, drawing, traveling, and skydiving.

SKILLS

Languages	Fluent in English & Arabic, and Beginner in German and Spanish.
Design Tools	Adobe Creative Suite, 3DsMax and Blender.
Programming	C++, Objective-C, Django, Python, Java, Assembly, PHP and C.
Scripting	Processing, HTML/CSS, Javascript, JQuery, D3
Other	Object recognition, Image processing and Agent Based Modeling