DATA VISUALIZATION

Contact: Chinmay Kulkarni <chinmayk@andrew.cmu.edu>

Building tacit expertise for stem-cell culturing. This is a joint project with Rebecca Taylor in bioengineering. We are using our past 3-4 years of research on assessment and training to create a tool that helps people learn tacit aspects of expertise in cell culture -- when to replate cells, how to tell if cells will be healthy etc. Potential impact: better procedures for growing artificial organs, personalized gene-therapy etc.

We will need the independent student to be strong in development of web applications (Rails, node.js preferred). Design skills are a plus, but not really key to this project. If they have any background in medicine, bioengineering, etc, that's a plus too.

Also available as a paid hourly position. Position ideal for students who want to write a research paper.

EDUCATION RESEARCH

PeerPresents (Developer)
Jessica Hammer / OH!Lab
Contact: Amy Cook (amyshann@andrew.cmu.edu)

PeerPresents, an existing online peer feedback system, allows students to give real-time feedback on in-class presentations and helps the presenters organize the comments they receive. While the tool works well enough from the student perspective, PeerPresents is difficult for researchers to use. It is time consuming to extract data from our studies and difficult to get appropriate access to student presentations. In addition to solving these and other existing problems, we would like to brainstorm additional features that would make it easier to run studies with this tool. For example, having the ability to quickly turn features on and off for different presentations would better support A/B testing.

We are seeking two student developers to design a solution to the problems facing PeerPresents researchers (perhaps as a research dashboard), pilot their design with the research team, and implement their design. PeerPresents was created using Node.JS, SQL, and HTML/CSS.

This opportunity can be filled as an independent study or a paid position.

EDUCATION TECHNOLOGY

Contact: Prof. Jack Mostow (mostow@cs.cmu.edu)

RoboTutor is a $1M Finalist in the $15M Global Learning XPRIZE to develop an open-source Android tablet app that can teach basic Swahili literacy and numeracy to children without requiring adult assistance. Video and log data from children beta-testing RoboTutor in Tanzania are helping us to evaluate its reliability, usability, engagement, and effect on learning gains, and to improve its design and implementation accordingly. XPRIZE's own 15-month controlled study starts in mid-December 2017 and will send us data logged by RoboTutor from hundreds of children in dozens of villages. We will have two opportunities to update RoboTutor based on these sources of data.

If interested in helping for credit, please peruse www.robotutor.org and then send Prof. Mostow the information listed on our Join the Team page.
Student requirements:

- Knowledge of any relevant areas, such as design, psychology, education, intelligent tutors, programming, HCI, linguistics, natural language processing, educational data mining, Swahili, ...
- Experience with Android app programming, educational game development, Java programming, JSON, GitHub, user testing, crowdsourcing, children, or anything else conceivably relevant

GAME RESEARCH

Audience Participation Games (Research Assistant)
Jessica Hammer / OH!Lab
Contact: Seth Glickman (glickmas@gmail.com)

We are studying how streamers and viewers might use stream customization tools on Twitch. We are looking for a research assistant to help us conduct workshops, interviews, and other qualitative research studies. If desired, you will be able to participate in research design and UI sketching.

You should be fluent in spoken English; experience conducting interviews is a plus.

GAME RESEARCH

Audience Participation Games (Playtest Coordinator)
Jessica Hammer / OH!Lab
Contact: Seth Glickman (glickmas@gmail.com)
We have developed an interface and framework for livestreamed audience participation games on the Twitch platform, and are in the game user testing stage. Come help us organize, facilitate and document these playtests while learning effective playtest design

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GAME RESEARCH

Rosenstrasse (Research Assistant)
Jessica Hammer / OH!Lab
Contact: Jessica Hammer (hammerj@andrew.cmu.edu)

Working with an external partner, we have designed a tabletop role-playing game about the erosion of civil liberties in 1930s Berlin. Our playtesting to date has been focused on improving the design of the game. We would like to begin collecting data about players' experiences in a more formal way, in particular about what they have learned from playing.

You should be fluent in spoken English; experience with tabletop role-playing games and/or conducting interviews is a plus.

GAME RESEARCH

Playtest Night (Playtest Coordinator)
Jessica Hammer / OH!Lab
Contact: Xin Tu (7xintu@gmail.com)

We run a weekly playtest night to help game designers at CMU find playtesters and to build community among game designers at CMU. Your responsibilities will include: setup and teardown of the weekly playtest night; ordering food; publicizing the event; maintaining the group's Facebook page; and collecting data about how to improve playtesting at CMU.

This is a paid position.

GAME RESEARCH

Mental Health Games (Game Designer/Developer)
Jessica Hammer/OH!Lab
Contact: Mehar Sawhney (msawhney@andrew.cmu.edu)

Our collaborator Dr. Radovic has created two social media sites to support teens and parents who are dealing with anxiety and/or depression. She would like to explore games to improve understanding of the site's core concepts (e.g. that teens with depression are not at fault for how they feel) and to increase engagement/retention. You will be part of a team using the Tandem Transformational Game Design process to produce one or more game prototypes.

You should be willing to contribute to a game design team in one or more of the following roles: game design, visual design, paper prototyping and playtesting, and game development.

GAME RESEARCH

Human Relationships and Augmented Reality (Game Designer/Developer)
Jessica Hammer/OH!Lab
Contact: Po Bhattacharyya (pathikrb@andrew.cmu.edu)

How might augmented reality enable the exploration of human relationships? Might a game provide meaningful insights into the bonds we share with others? In a future beyond screen-based devices, might it become easier to be truly present with our loved ones? This spring, we are creating an augmented reality game that enriches human relationships through challenge, collaboration, and mutual discovery. We will use the tandem transformational game design method to create the game, and we will also develop a working prototype of the game in AR, possibly on the hololens.

You should be willing to contribute to a game design team in one or more of the following roles: game design, visual design, playtesting, and AR development.

GAME RESEARCH

SCIPR Curiosity Tabletop Games (Research Assistant)
Jessica Hammer/OH!Lab
Contact: Alexandra To (aato@cs.cmu.edu)

We are designing and studying non-digital game-based interventions to empower marginalized youth by increasing comfort with curiosity. We are looking for a research assistant who is comfortable performing a number of research tasks potentially including any of: working with local community centers to recruit adolescent participants for a lab study, running and coordinating a field study with children, designing and producing physical game materials, data collection and analysis, and paper writing.

More important than experience with any of these areas is comfort working with children and enthusiasm for learning new skills!

HCI + SOFTWARE ENGINEERING

Wanted: Programmers for research on Multi-modal End-User Programmable Intelligent Conversational Assistant for Smartphones

Brad A. Myers

Contact: Toby Li <tobyli@cs.cmu.edu>

Intelligent virtual assistants on smartphones like Siri and Google Assistant can perform tasks on the user's behalf, but their capabilities are limited to the apps and services they support, without a way for users to teach them new tasks. Prof. Brad Myers and PhD student Toby Li in the HCII (along with collaborators across SCS) have a research project on designing and building a multi-modal smartphone intelligent agent that enables the users to program it to perform new tasks by demonstration and verbal instructions. We have finished the development of a first version of the system and are looking for students to help develop new features. We need students who are experienced programmers in Java, preferably with Android development experience. More details about this project is available at http://www.cs.cmu.edu/~NatProg/sugilite.html

This project can be done for pay or for independent study credit, but for credit is preferred. We envision this taking about 9 to 12 hours per week during the Spring semester, and full-time during summer is also an option. Students are also particularly encouraged to talk with us if they have their own ideas around end-user programmable intelligent personal assistants.

Required skills: Strong Java programming skills

Preferred skills: Android development, natural language processing, dialog system, visualization, UX design and research

Please send to Toby Li <tobyli@cs.cmu.edu>:
(1) your grade or level and degree program (e.g., Masters of HCI or Junior BHCI second major), (2) if you are an undergraduate, then whether you are a US citizen, (3) your resume, (4) a list of your grades in CS classes, (5) a description of your related experience, (6) whether you want to work for money or credit, and (7) how many hours per week you want to work.

HCI + SOFTWARE ENGINEERING

Wanted: Programmers for research on API Usability
Contact: Brad Myers <bam@cs.cmu.edu>

Application Programming Interfaces (APIs), including libraries, frameworks, toolkits, and software development kits (SDKs), are used by virtually all code and have significant value to companies. For example, Amazon reported a profit $1.8 billion on companies using AWS last year. The usability of companies' APIs have been reported to be crucial to having programmers use the APIs, yet are rarely studied or evaluated. We are collaborating with Google on research about ways to measure and improve the usability of APIs. For spring, 2017 (with optional continuing work through the summer), we have the following tasks in mind:

(A) There are a few aspects of API quality and usability that can be automatically checked, such as whether the right names are used for identifiers. This project would involve mining software repositories to try to evaluate other aspects of API quality. For example, how much "wrapper" or "boilerplate" code is needed to use an API? What parts of an API are heavily used vs. not much used? Are there erroneous patterns of API usage we can detect?

(B) Similar to A, this project would try to evaluate API quality and usability through studying logs of programmer editing. A number of code editors can now record a log of all the programmers' keystrokes. This project would be to create a tool that can take these detailed logs and identify situations in which programmers are attempting to use an API and are having trouble. This will provide more fine-grained but large-scale information such as which parts of an API are the most time-consuming to understand.

(C) Existing APIs for using conventional services have existed for a while, but companies are now coming out with new APIs like for Machine Learning (like Google TensorFlow), Natural Language Processing, Big Data Analytics (like Google BigQuery), etc. This project will be to analyze the usability of these new APIs. This will involve designing and hopefully also carrying out a lab usability evaluation study of these APIs.

More details about this project is available at:
http://www.cs.cmu.edu/~NatProg/apiusability.html

This project can be done for pay or for independent study credit, but for credit is preferred. We envision this taking about 9 to 12 hours per week during the Spring semester, and there is an option for full-time during summer. Students are also particularly encouraged to talk with us if they have their own ideas around API Usability.

Required skills: Strong programming skills
Preferred skills: Web services programming; strong JavaScript skills; data analysis skills; UX design and research

Please send to Brad Myers <bam@cs.cmu.edu>:
(1) your level and degree program (e.g., Senior in CSD, Masters of HCI, etc.), (2) if you are an undergraduate, then whether you are a US citizen, (3) your resume, (4) a list of your grades in CS and any HCI classes, (5) a description of your relevant experience, (6) whether you want to work for money or credit, (7) how many hours per week you want to work in the spring, and (8) which of the above task or tasks you are interested in.

HCI + SOFTWARE ENGINEERING

Wanted: Programmers for research on Knowledge Acceleration for Programming
Brad A. Myers & Niki Kittur
Contact: Michael Liu <xieyangl@cs.cmu.edu>

Programmers spend a significant proportion of their time searching for and making sense of complex information in order to accomplish their goals, whether choosing among between different APIs, adapting code snippets found on the Internet to meet their needs, or trying to learn unfamiliar code to fix an error or add a new feature. When performing tasks like these, programmers continually are making hypotheses, proposing questions, and discovering answers. However, after each sense-making episode in which a programmer gains knowledge for themselves, their work is essentially lost, with no one else benefiting. Although there are many tools to help programmers find the answers, there are very few tools to help programmers make use of the knowledge gained performing the task, or share that knowledge with others.

Professors Brad Myers and Niki Kittur, along with Ph.D. student Michael Liu in the HCII have a research project on designing, building and evaluating systems in the form of browser extensions or IDE/text editor plugins that make programmers more effective and efficient. We have done many pilot interviews with programmers about their experiences and needs, and are looking to start building these systems in the spring. We need students who are experienced with web programming, especially with

HTML/CSS/Javascript. Knowledge of back-end programming using Node.js/express/MongoDB is preferred.

This project can be done for pay or for independent study credit, but for credit is preferred. We envision this taking about 9 to 12 hours per week during the Spring semester, and full-time during summer is also an option. Students are also particularly encouraged to talk with us if they have their own ideas around making programmers more effective and efficient.

Required skills: Strong web programming skills.

Please send to Michael Liu <xieyangl@cs.cmu.edu>:
1) your grade or level and degree program (e.g., Masters of HCI or Junior CSD with BHCI second major), (2) if you are an undergraduate, then whether you are a US citizen, (3) your resume/CV, (4) a list of your grades in any CS and HCI classes, (5) a description of your related experience and why would you like to work on this project, (6) whether you want to work for money or credit, and (7) how many hours per week you want to work.

HCI + SOFTWARE ENGINEERING

Programmers for research on Obsidian: a Safer Blockchain Programming Language
Contact: Michael Coblenz <mcoblenz@cs.cmu.edu>

Blockchains are a new approach to distributed computing that enable applications to process important transactions, such as financial transactions, on a network of untrusted hosts. Unfortunately, current approaches to programming blockchain systems have resulted in serious security vulnerabilities; over $80M has been stolen from vulnerable programs to date. We are working on a new programming language,

Obsidian, that eliminates certain classes of vulnerabilities by integrating sophisticated type systems. We are designing Obsidian in a user-centered way, focusing on language features that will help programmers be effective at writing correct, secure programs.

We are looking for students who are experienced programmers to work on Obsidian -- primarily working on the compiler, which is implemented in Scala and translates from Obsidian to Java. There might be additional opportunities, especially later in the semester, to work on related tools, such as editing support, making Obsidian work on a real blockchain platform, and running user studies.

Required skills: strong programming skills in an object-oriented language, such as Java

Ideal candidates would have experience or coursework in programming languages or compilers, but we will consider candidates without this background. Software engineering experience or coursework is also beneficial.

Please send to Michael Coblenz <mcoblenz@cs.cmu.edu>:
(1) your level and degree program (e.g., Senior in CSD, Masters of HCI, etc.), (2) if you are an undergraduate, then whether you are a US citizen, (3) your resume, (4) a list of your grades in relevant CS classes, (5) whether you want to work for money or credit, (6) how many hours per week you want to work in the spring, (7) a brief explanation of why you are interested in working on the project and what you're hoping to do.

INTELLIGENT AGENTS

MessageOnTap: An Intelligent Agent for Streamlining Messaging
Contact: Fanglin Chen (chenfanglintc@gmail.com)

MessageOnTap is an intelligent agent we are building for offering smart actions based on messages sent to your smartphone. For example, if you get the message "Here's my new phone# 555-5555", the agent might highlight that and make it one click to update the contact. Or, if you get the message "can we meet tomorrow?", you can click on the message, see a snippet of your calendar, and then send a quick response back confirming a time. Your smartphone might also check if you're currently driving and auto-respond to messages "I'm driving, will get back to you soon". We're looking for software developers to help improve this intelligent agent, as well as to do data collection and analysis.

Ideal Skills: Android programming, Natural Language Processing, intelligent agents, machine learning, Python, data analysis skills

IoT, PRIVACY & SECURITY

IoT Hub for Privacy and Security
Contact: Jason Hong (jasonh@cs.cmu.edu)

The Internet of Things is coming. How can we protect everyday people from all of the likely privacy and security risks? We're investigating how centralized hubs can help offer new kinds of services that can help with privacy, security, and management of lots of devices. Examples include checking for software updates for devices, easy ways of blocking unexpected network traffic, and simple kinds of end-user programming to connect devices together. We're looking for both a UX designer as well as one or more software developers. Expecting students to average about 10 hours a week on this

research (more is fine), for pay or independent study.

Ideal Skills: Some subset of Android programming, Linux, web programming, UX design, networking

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PRIVACY & SECURITY

ClearTerms: Simplifying Terms and Conditions
Contact: Shawn Hanna (shawnkarlhanna@gmail.com)

Nobody reads Terms & Conditions on web sites. What if we could predict what people would care the most about, and just highlight those? Our team has created preliminary language models and a web site to showcase our results. We're looking for software developers to help us improve functionality on our web site, help crawl more Terms & Conditions from the web, and help improve our language model for analyzing policies. Expecting students to average at least 10 hours a week on this research (more is fine), for pay or independent study.

Ideal Skills: Experience developing websites, HTML+CSS+JavaScript, basic NLP or machine learning

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SOCIAL COMPUTING

Contact: Chinmay Kulkarni <chinmayk@andrew.cmu.edu>

Building a "calm" team communication tool: (Social computing) Current tools for team communication like Slack are creating a workplace that is continuously distracted. We are using research on ideal focus time-lengths for work/productivity to build a tool that: a) results in an order of magnitude fewer distractions (compared to current tools), b) miss important communication less often, and c) allows workers to catch up to communication quickly, and at a time when work is not interrupted. See my Medium post on the genesis of this project: https://medium.com/@chinmay/my-struggle-with-deep-work-5e326f661b15

Need someone who has super strong design skills (especially for web) -- e.g. Sketch, CSS & HTML, Vue.js. Knowledge of machine learning (e.g. how to build a neural re-ranker) also useful.

Ideal for students who want to build and deploy to real audiences, and understand how to rapidly prototype based on existing research. A paper is possible, but not likely before graduation.

SOCIAL COMPUTING, DATA VISUALIZATION, DATA SCIENCE

Understanding Emergent Social Roles and Role Effectiveness in a Crowdfunding Site
Contact: Diyi Yang, diyiy@cs.cmu.edu; Robert Kraut, robert.kraut@cmu.edu

Description: Kiva is a peer-to-peer lending platform that allows people to lend money to others. Kiva has Lending Teams, through which lenders who have something in common (e.g., interests, social identity or personal relationships) can band together and try to convince each other to support particular loans. This study aims to understand the emergent social roles that team members occupy when participating in their team discussion boards in Kiva, and how their occupied roles helps their teams contribute to more loans. For example, some members seem to specialize in advocating for loans that are about to expire (loan clean-up members) while others mainly talk to people to enlarge their social networks (social networkers). For students with social science, psychology background, this involves studying the leadership styles of team captains, observing the typical behavior patterns associated with team members, interviewing members to understand how they perform their "roles" in a qualitative way. For students with data science background, this involves extending machine learning methods to map members into different role clusters based on their behavioral profiles, and prototyping interventions to help diagnose what roles a team is missing and matching people with proper roles that best take use of their interests and skills. In either case, students will learn social roles, typical role behaviors and role influences on team performance in this crowd-funding context, from both theoretical and practical perspectives.

Student Requirements: Both HCII undergraduate students and masters who have an interest in psychology, social computing, data science and natural language processing are welcomed.

SOCIAL MEDIA RESEARCH

Activism on Twitter (Research Assistant)
Jessica Hammer/OH!Lab
Contact: Judeth Oden Choi (jochoi@cs.cmu.edu)

We are studying how tweets from social justice activists are perceived. A research assistant is needed to analyze survey data, statistical analysis and proficiency in R is required. A research assistant may also help synthesize both qualitative and quantitative data, and if motivated, may assist in writing a research paper for CSCW.

SOCIAL MEDIA RESEARCH

Race and Identity on Social Media (Research Assistant)
Jessica Hammer/OH!Lab
Contact: Alexandra To (aato@cs.cmu.edu)

We are studying how people leverage their social networks through digital media (e.g., social media platforms, text messages, video call, etc.) to cope with instances of racialized aggression (e.g., microaggressions, threats of violence, etc.). This work is in its preliminary stages and may involve conducting interviews, reading and reviewing related scientific literature related to the development of racial and ethnic identity, and qualitative data analysis.

SOCIAL MEDIA RESEARCH

Sharing and Discussing Online Video (Research Assistant)
Jessica Hammer/OH!Lab
Contact: Jessica Hammer (hammerj@andrew.cmu.edu)

We are beginning a new project on how people form and manage relationships using professionally produced online video, including both fiction and non-fiction video. We are looking for a research assistant to help us build a literature review, as well as to coordinate with our research partners to understand the data sources they have available to us.

You should have experience searching literature databases and have written at least one literature review in the past. This can be an independent study or a paid position.

USABLE PRIVACY & SECURITY

Brandeis: Designing User Interfaces for Smartphone Privacy
Contact: Jason Hong (jasonh@cs.cmu.edu)

The goal of the Brandeis project is to make it vastly easier for developers and end-users to manage privacy in the context of sensor-based smartphone apps. We are looking for students to help with the design of user interfaces to help people understand what data an app might collect about them, specify privacy policies, and check that everything is ok.

Ideal Skills: Visual design, interaction design. Experience with privacy, security, and

Android is a plus.