

PS

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Note: I am currently revising my Personal Statement, and changes are likely to occur on a daily basis. For the most up to date version, visit: shiliangzuo.github.io/PS.pdf.

My objective is to pursue a Ph.D. degree in computer science, with a focus in Human-Computer Interaction (HCI). My research interests include educational technology, novel interaction experiences, design and gamification, etc.

My background is mainly in the areas of math and theory which is evident from my participation in Math and Informatics Olympiad in high school as well as courses during my undergraduate studies focusing primarily on theoretical computer science. Theoretical research can provide foundations for a field, but has less direct impact on society when compared with other applied research. HCI is a field in which a lot of its research projects are more practical and have a more direct positive impact on society. My interest in HCI stems from this reasoning.

One of my aspirations is to create novel technology that assists people in education. During the summer of my junior year, I worked on a spatial training platform, “Cubicle”, under the supervision of Professor Wai-tat Fu in the Cascade Lab at UIUC. Cubicle is a visuospatial game aimed at training spatial skills of undergraduate STEM major students. Spatial skills are essential for STEM studies and careers, and my work addresses the problem of the low retention rate of current spatial training platforms (such as web-based workshops), and uses a gamified approach to motivate students. I designed the game, and led a group of four people on the development of the project. I implemented the overall structure of the project which takes a modularized form: the game consists of eight modules, of which I contributed two, each aimed at training a different aspect of spatial reasoning. My proposed modularized approach allows for rapid addition and modification of modules in the game, thus providing a high scalability of the platform, solving the low scalability rate of current platforms. Our project also records players’ in-game behaviors, allowing researchers to analyze players’ problem solving strategies, and in turn being able to provide a more personalized training.

Our project has shown to be quite effective in terms of motivating students and training spatial skills, and is currently in submission of IUI 2018 [1]. Our studies show that there is a positive correlation between students’ spatial skills and their performance in the game,

which implies our game is a reliable metric in terms of measuring spatial skills; it also shows that students' generally have a positive impression of our gamified approach. Our project has also received positive feedbacks from professors in the mechanical engineering department; we are currently also looking for larger deployment of our project.

Another attempt at utilizing gamification in education was during my spring semester of my junior year. I was a visiting research intern at Cornell working with Professor Erik Andersen, where I joined the development of "Reduct", a game aimed at teaching programming concepts to programming novices. Beginners usually find self-learning programming languages hard and tedious, and extreme care and thought has to be taken in designing applications that teaches programming to novices. A common problem among beginners in learning programming is that the discovery of program constructs becomes very difficult without mentorship, and our project amends this by using a comprehension based approach. I contributed to the project in adding new functions and features to the game, as well as designing and implementing levels that teaches concepts including strings, objects, methods, recursion, etc. My levels consisted of a series of progressions in different constructs, which eventually led to a final level of "string reversion": the player has to fill out a string reversion program, which has proven to be a tricky task for beginners.

Most recently I've been working in the Pervasive Computing Group at Tsinghua, led by Professor Yuanchun Shi and Professor Chun Yu. I've been working on a platform that allows for remote interaction between distant people via mixed reality. Specifically, by using tools such as the Microsoft Kinect and HoloLens, we are creating a scene where two people in different rooms can play chess with each other as if face to face. In this project, I learnt about image processing and computer graphics as my work has mainly been concerned with the generation of the body's mesh data from Kinect's depth and color image. The reason for choosing a "chess scene" is because it serves as a typical setting for interactions, and includes most of the interaction elements in real life, which suggests that this setting can be easily extended to other more general settings. Our project will also serve as a foundation for future research topics on interaction via mixed reality between distant people.

To conclude, I am open to a wide variety of research within HCI, and my experience in building gamified applications has inspired an interest in building engaging and helpful systems that people can benefit from in their daily lives. I have formulated my interest into the term "engaging systems with a purpose". More concretely, I am interested in applying such systems to areas such as education, machine learning (annotation tasks), assistive technologies etc.

[Specific School Related ...]