

## Statement of Purpose

### of Katsuya Fujii (Massachusetts Institute of Technology Fall—2015)

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I am applying for Media Arts and Science, MIT Media Lab, at the Massachusetts Institute of Technology and wish to specialize in the Human Computer Interaction (HCI). I am very much attracted by MIT Media Lab's unique culture such as antidisciplinary, highly collaborative and strongly academic yet entrepreneurial culture. I have been engaging myself in broadening a wide variety of understanding of HCI, obtaining knowledge expanding from software and hardware skills and richening leadership skill on collaborative working through experiences. With those strong abilities, I strongly believe that I will fit well into the program and I want to use graduate study to expand my knowledge, gain more experience, and after that go into the industry and start my own company.

**Why I wish to attend graduate school:** I decided to attend the Massachusetts Institute of Technology as a Media Arts and Science major with the intention of working in the Human Computer Interaction one day.

5 years ago, I majored in Electrical Engineering at college and decided to do an internship as a software developer in Barcelona to obtain some international experience. To be honest, I still was not a great programmer then, however, I put my maximum effort on finalizing tasks and managed to develop two different softwares from scratch. This experience gave me a confidence to challenge new things without being afraid of them. I then made up my mind to change my major from Electrical Engineering to Computer Science in order to obtain a wide variety of knowledge. I only had vague ideas then and didn't really know what I wanted to do. Doing some research on it, I +You across this TED video, called "SixSenth", conducted by MIT Media Lab Fluid Interfaces Group. I clearly remember that as if I got struck by lightning I immediately decide to lead myself to this field called Human Computer Interaction.

As the first stepping stone, I decided to attend my home country's University, the University of Tokyo with the supervision of Prof. Jun Rekimoto. Prof. Jun is a world-widely well known researcher by his remarkable works in HCI. Even though that was my first experience in HCI, working with Jun made it possible for me to do research at the cutting edge environment. I started with broadening my understanding of HCI by taking some courses and spending time on checking up some major conferences like CHI, SIGGRAPH, UIST or Ubicomp. I've done a lot of discussions with my colleagues and there I found myself good at filtering promising ideas out of hundreds of silly ideas. As a result, in these 2 years of my master course, I got accepted by two international conferences as well as a journal. I also got an opportunity to work as a research assistant at Sony Computer Science Laboratory.

**What I would like to study :** Currently, my interest in HCI is about learning. Currently I have two projects going on: "Realtime Task Teaching/Learning System using Haptic Feedback" The idea is to remotely connect an expert and a beginner via 2 haptic robots to help the beginner learn manual tasks. A master in some task can in real time guide and/or correct an apprentice in a given task (while still giving them some freedom). Actual task applications for this system are to be discussed but I'm thinking about kitchen knife technique or 3D sculpting. In Fluid Interfaces Group. Judith and Xavier worked on project called Show me. The main concept is pretty similar to

my idea:: Immersive mobile collaboration system that allows users to communicate remotely. This project will develop wearable technologies to capture the expressions of hands and non-invasive actuation technologies to transfer these expressions to others to enabling learning of new hand skills. Augmenting hands will allow for the safeguarding of ancient crafts and skills as well as enabling remote experts to aid and teach people at a distance. We record human knowledge today through text, images and video; this project will enable recording the nuances and precise skills, motions and expressions of the human hand through a wearable device. We will develop prototypes of this technology and present a series of innovative applications.

"Computer Supported Errorless Learning" I'd like to introduce this new method for learning to the HCI community. Error-less Learning is a method introduced by B.F Skinner in 1930, who said that errors sometimes are not necessary for task learning. It is the opposite of the conventional "Trial and Error" method. I'd like to take advantage of computer technology so that users can rely on them and they won't make mistakes when they try to conduct a task. Users learn tasks by repeating correct movement guided by a computer. As they can learn tasks from successful experience, it possibly can help them maintain motivation for task learning. The specific tasks I am looking at are things such as balancing a long stick on the tip of your finger. In Fluid Interfaces Group, Roy and Amit have been exploring the similar field.

Free-D allows unskilled makers to produce complex carving tasks, as well as personalizing and modifying the digital 3D models while physically carving. The control software offers guidance according to static virtual models or dynamic ones, which may be altered directly or parametrically. In addition, the FreeD is also able to semi-autonomously move and carve. This creates synergistic cooperation between human and machine that ensures accuracy in recreation of the model while preserving the expressiveness of manual carving.

Digital Air brush acts both as a physical spraying device and an intelligent digital guiding tool, that maintains both manual and computerized control.

**Research experience and accomplishments:** I've been working on Human Computer Interaction for several years. It is often said that automation technologies such as auto-translating or auto-driving system have a potential to deteriorate human abilities. In stead of letting computers replace human ability, I'd like to create a future where computer helps us learn new tasks, enhance human abilities. Error-less learning is a method that I'd like to introduce as a new way of task learning. As it literally says, people won't make mistakes when they learn a new task as opposed to a conventional trial and error learning method. Error-less learning provide us with a physical support and an optimal environment for task learning. By letting users have successful experience, it makes it efficient for us to learn a task and moreover it helps us maintain a motivation. I believe that realizing this concept has a potential to contribute to HCI community. Fluid Interfaces group has been focusing on learning by using technology.

**Conclusion:** In my bachelor's and master's course, I majored in Electrical Engineering and Computer Science respectively, thus my skill expands from hardware to software development. One of my great strengths is communicating and leadership skill, especially in a global environment. I've been attending a lot of events such as organizing a workshop, hackathon or class projects that required me to work as a team. I've always taken a leadership in those opportunities and most of the time I've brought the best result to our team, like awarding the first prize or having a research paper

accepted by a conference. After graduate school, I wish to go into the industry, so I believe a master's degree is the ideal choice. I see my future work in areas such as the interactive use of graphics, like real-time rendering in animation and especially video games, and creating therefore I believe working with the people from the Graphics, Games Multimedia Research Area, especially the GamePipe Lab, will be very beneficial for me. I am looking forward to collaborating with the top professors in the field and I hope that with my background and the knowledge I will gain at USC I can make worthwhile contributions in the future.