

**iSTUDIO: An Interactive Form-making Environment for Art and Architectural Teaching**  
**MUITC – IIF 2013-2014**

**Final Project Report**

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***Proposal Summary***

Our MUITC-IIF proposal involved a proof-of-concept for an interactive form-making environment for Art and Architectural Studies. We created a 3D digital environment intended to foster interaction between students and instructors for creative generation of ideas, critique and debate. This is a platform in which students and instructors can ‘visualize’ their designs in a shared forum. The 3D environment is intended to extend and enhance physical artifacts that students already do in visualizing art and space.

***iSTUDIO Technology Implementation***



Architecture 3D Environment in zSpace



Art 3D Environment in zSpace



We have successfully procured and implemented the 3D environment through two zSpace machines. These machines were mobile and affordable compared to the EON iBench Mobile systems that we originally proposed. The EON iBench Mobile consisted of zSpace hardware for display and EON virtual reality software to drive the display. We decided to optimize the cost and improvise by buying the zSpace systems directly and using Unity 3D gaming platform to generate content. This proved to be more versatile and more economically viable. We spent \$11,028 on the two zSpace units. As proposed we developed a digital studio kit-of-parts. We used Unity 3D, a game development software we use at the Architectural Studies iLab (Immersive Visualization Laboratory). This kit-of-parts is made up of artifacts with primitive geometry and presentable via the stereoscopic 3-D display of the zSpace. We developed this as a standalone application that took advantage of the user-interaction features of the zSpace using the stylus. The application we developed included transformation features such as move, rotate, scale to suit our pedagogical needs. For the art studio this kit-of-parts is used for exercises consisting of studies of form, still life, figure drawing and light and shade exercises. For architectural studios it will be used in studies of composition, balance, symmetry among others.

We developed and refined a series of prototypes and conducted usability studies to have a robust application that met our pedagogical needs. We involved beginning and advanced design students to give us feedback on the pros and cons of using some of the preliminary prototypes after which we refined the project. We then created separate exercises for art and architecture studios. Students and instructors will use this together or independently to facilitate beginning design studio activities such as demonstration, annotation and replication of design artifacts.

Since we didn't want to invest in all zSpace machines without testing their full capacity, we have money reserved to buy two more. In our preliminary discussions, we felt that two zSpace machines would suffice for our purposes and we could invest the remaining funds to develop and implement detailed pedagogical exercises. Plans are at hand to test the interface with other input devices such as 14-sensor data gloves or Leap systems for gesture input so we could have more natural, gestural-based interaction with the interface. We also want to test out the use of our products on hand-held devices so students could use it in their own time to reflect upon their creative process. This success of this project opens new possibilities when combined with the ongoing efforts of another project in the iLab aimed at the potential of 3-D technologies that developed successful workflows for digitizing historic artifacts. For example, we can create a fully interactive, 3-D digital archive of the cast gallery that is accessible in the classroom or studio on a zSpace display.

### ***Usability Evaluation***

We evaluated the usability of the iStudio environment informally during each stage of the implementation at the Architectural Studies iLab. This preliminary experience provided us several cues on the strengths and weaknesses of the interface. We saw an immense potential with the environment in terms of rapid digital replication of the artifacts at minimal time and labor, assembling and disassembling compositions quickly, awareness of sight, and annotation. We also see a potential to use it as a digital tutoring system for art and design because most of the activities could be recorded digitally.

The challenges we faced is the tediousness in handling of artifacts using the stylus. Since beginning studios are scheduled every other semester we are waiting for fall semester 2015 to fully evaluate its capability and use in the design studios. One machine will be kept in the architectural studio and the other will be kept in the art studio and will be used for Fall beginning design studio classes with enrolled students.

### ***Ongoing Work beyond Objectives of the grant***

While we have accomplished our primary goals as described above, we are building on both the infrastructure and the skills acquired through this project. We are ensuring that the impact of the grant extends beyond that of the funding period in three ways. This includes fully integrating the machines into our art and design studios' curriculum. We are exploring grants both within the UM System with other departments such as the medical school. The zSpace system and the applications we developed seem to generate great interest among prospective students and during our iLab open houses.

### ***Request for a no-cost extension until end of Fall 2015***

Since we have \$9,791.36 in unused funds we want to request a no-cost extension to the grant so we could fully implement it when the Fall Studios become available. We will use these funds to fund a Graduate Research Assistant to provide us services in refining and developing additional digital-kit-of parts as well as to supplement any expenses that might incur while we experiment with other input devices.

### ***Expense Report***

#### **HARDWARE EXPENSES**

Description	Location	Qty	Cost
zSpace system and the zView projection plus shipping	Architectural Studies Department	1	5,549.00
zSpace system and the zView projection hardware kit plus shipping	Art Department	1	5,479.34
<b>Total Hardware Expense</b>			<b>11,028.34</b>

#### **PERSONNEL EXPENSES:**

Graduate Research Assistant	@17.06/hour for 238 hours	4060.30
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#### **TOTAL EXPENSES**

<b>TOTAL GRANT FUNDING</b>	<b>24,880.00</b>
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<b>UNUSED FUNDS as of May 5, 2015</b>	<b>9,791.36</b>
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