

Undergraduate Research Grants Application Form

Due May 7, 2012

1. Student Information

First Name Jessica Last Name Sikoryak

Major Interior Design - BFA Student ID# ~~XXXXXXXXXX~~

Email Address ~~XXXXXXXXXX@XXXXXX~~ Phone ~~XXXXXXXXXX~~

Class Standing: Freshman Sophomore Junior Senior

GPA ~~XXXX~~ Have you been the recipient of this award before? Yes No

2. Faculty Information

First Name Virginia Last Name San Fratello

Email Address vasfsf@gmail.com Phone (510) 207-8620

Department Interior Design College/School Humanities and the Arts

3. Project Information

Title of Project 3D Printing for the Design and Fabrication of Mass Customized Metal Interior Building Components

Project Timeframe: Start Date 09/01/12 End Date 05/01/12

Will this project use (check all that apply)

- Animal Subjects
- Human Subjects
- Radiation/Isotopes/Lasers
- Biohazards/Human Blood
- Recombinant DNA
- Controlled Substances

TO BE COMPLETED JOINTLY BY THE STUDENT AND THE FACULTY MENTOR:

In a few sentences, describe the goals of the research or creative project you will be working on together.

The intended outcome of this research project is to research, design, develop, fabricate, and test new metal interior building components, such as door hardware, through the use of 3D printing. 3D printing is an additive fabrication method that creates little to no waste, eliminates the need for expensive form work and allows designers to create highly unique and customized pieces. Because the inherent nature of 3D printing offers new possibilities for shaping materials, this process will allow me to rethink the way traditional metal interior building components are designed and made, allowing for ergonomic data, site, material, program and fabrication conditions to be interwoven.

I propose to design a new line of door hardware that will consist of 6-8 pieces and will be created to address a number of different needs suitable for health and wellness facilities such as hospitals, rest homes and child care centers. The elderly, disabled, and children all have a major presence in these realms and also have special ergonomic needs. I intend to research and identify these specific needs and ultimately address them by designing accessible door hardware for a number of applications. The hardware is specifically focused on door handles that can be applied to entry and exit doors (both interior and exterior), bathroom stalls, and cabinets (in kitchens and bathing facilities). The door hardware will be mass customizable and suitable for an infinite number of endusers, locations, and a variety of metals. With door hardware comes the major potential for spreading germs and bacteria as they are touched so frequently by a large amount of people. As a result, all of the product line will be printed in bronze, stainless steel, and/or silver. Metals have a major potential to be highly sanitary, which is an evident requirement in any healthcare facility.

Enumerate the general activities the **student** will perform as part of their participation in this project. Provide a rough timeline.

09/12 - 12/12: Research and Design

I will research different products that are available to the market today. Those products will then be researched for their effectiveness in the hospital environment and to the population, I will also identify the shortfalls of the products on the market today. Additionally, the needs of the elderly, children and disabled will be researched. Any inadequacies found in current products concerning ergonomics as well as the needs of the researched demographics will then be used as the guidelines in the design process.

Simultaneously, I will begin to design the product line using a parametric modeling software that allows for digital evaluation and analysis.

1/13 - 3/13: 3D Printing

The finalized product line will be sent to a third party printer, Exone, with expertise in printing stainless steel, silver, and bronze.

3/13 - 5/13: Installation and testing

The printed product will then be installed in the given environment and tested by the three demographic groups for its ability to function.

Enumerate the general activities the **faculty mentor** will perform as they supervise or guide the student throughout this project.

I propose to act as weekly advisor and mentor to Jessica throughout this process. She will enroll in a 3 credit independent study in the fall and a 1 credit independent study in the spring. I will meet with her once a week to guide her research, and to review and critique her design proposals. Jessica already has working knowledge of the parametric software necessary for modeling and printing, and I will aid her in expanding her knowledge of the software and identifying scripts or other applications that might be suitable for her work.

I will assist her in identifying literature relevant to her ergonomic research and in the identification of suitable testing sites and persons.

Jessica will be required to present design work for critique each week and I will act as design critic and assist her in identifying other experts in the field who can also give her relevant, meaningful and valuable feedback.

Ultimately, Jessica will prepare a final exhibit of her work which will include the actual renderings, drawings, 3D prints, photographs and documentation of the user experience and a 3 page report describing her research and findings. I will oversee the preparation and presentation of this exhibit in May 2013.

How will the student's participation in this project contribute to their educational and/or career goals?

This research project will take place during my senior year. The design process will allow me to create a successful product line that can service people in need while addressing sanitary conditions and aesthetics. Likewise, the printing process will allow me to explore the benefits through the use of non-standard printing materials and methods. Additionally, the application of a 3D printed object will also be explored. Typically, 3D printing is used for creating house-hold objects (vases, lamps, etc.), jewelry, and other objects not related to architecture. Yet the outcome of this project will present the ability of 3D printing to create objects to be used as actual components of a building's interior.

Because this project would take place during my senior year, it would allow me to take a three credit independent studies course with my mentor. Thus, I can explore a rapidly growing industry, one that is gaining crucial importance in the design field; leaving me with hugely beneficial experience and knowledge of the subject.

4. Budget and Justification (Budget itself to be submitted on Budget Form)

Explain how the funds requested for this project will be expended. Grant funds can be used to cover project related software, equipment, materials, supplies, travel, data collection and analysis, and other project related expenses. Up to one half the grant can be used as student assistant funds. Funds may not be used for faculty compensation or travel or to purchase food.

Budget: \$1000

3D Modeling software: \$150 for an annual license

This portion of the budget will go to the 3D modeling software, MODO. This is necessary to the design process and the final printing files. This software is able to create files that are recognizable to the 3D printing companies.

3D Printing a 6-8 piece product line through ExOne: \$650

This portion of the budget will cover the costs associated with 3D printing in metal. Depending on the quotes provided by the 3D printing company, the final amount of pieces will be determined.

Door lock sets: \$200

5. Signatures

| | | | |
|-------------------|--|------|--------|
| Student Signature | | Date | 5/4/12 |
|-------------------|--|------|--------|

| | | | | |
|-------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------|
| Faculty Signature | Virginia San Fratello | Digitally signed by Virginia San Fratello DN: cn=Virginia San Fratello, o=SJSU, ou=SJSU, email=vasfsf@gmail.com, c=US Date: 2012.05.04 10:26:33 -08'00' | Date | 5/4/12 |
|-------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------|

| | | | |
|----------------------------|--|------|--------|
| Department Chair Signature | | Date | 5/7/12 |
|----------------------------|--|------|--------|

Save & Print Form

Submit completed application with supporting documents to the Center for Faculty Development (IRC 213) or email to cfid@sjsu.edu no later than 5:00 p.m. Monday, May 7, 2012.

Undergraduate Research Grant Budget Form

Project Title

| Budget item | Quantity | Unit Cost | Total Cost |
|----------------------------------------------------------------------------------|----------|-----------|-------------------|
| <i>Supplies</i> | | | |
| 3D Modeling Software - MODO | 1 | \$150.00 | \$150.00 |
| 3D printing up to ten hardware pieces | 10 | \$65.00 | \$650.00 |
| Locksets | 10 | \$20.00 | \$200.00 |
| | | | \$0.00 |
| | | | \$0.00 |
| | | | \$0.00 |
| <i>Travel</i> | | | |
| | | | \$0.00 |
| | | | \$0.00 |
| | | | \$0.00 |
| | | | \$0.00 |
| <i>Other</i> | | | |
| | | | \$0.00 |
| | | | \$0.00 |
| <i>Student Assistant Funds</i> Specify number of hours and hourly rate | | | \$0.00 |
| <i>Total Costs</i> (may not exceed \$1000) | | | \$1,000.00 |

Reset Form

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Include separate lines for software, equipment, materials, supplies, travel, data collection and analysis. You may also use the "other " line to insert additional lines as needed.