

## Example EURēCA! Applications

*Excerpts of recently funded applications written by CU Denver undergrads just like you! Contact [undergrad.research@ucdenver.edu](mailto:undergrad.research@ucdenver.edu) for additional guidance as you prepare your application.*

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### Project Abstract (limit 250 words):

Broadly describe the project you will be working on this coming school year. Please make the description comprehensible to a non-expert reader.

#### Example #1

The tissues of your body can be crudely described as an integrated mass of cells, extracellular matrix, and blood vessels. Blood vessels are made of endothelial cells that have grown into vessel networks so that blood can flow and deliver nutrients to every part. When major tissues must be replaced, the damage can be too extensive for the body to heal. If the needed tissue has a complex shape, it may need to be 3D printed.

Bioengineers seeking to engineer tissue have seen promising results by putting endothelial cells onto gelled fibrin, a protein that is formed into a mesh at a wound site and stimulates healing. However, if the fibrin scaffold is too thick, cells won't be able to migrate through the scaffold. In addition, fibrin isn't thick enough to be printed. Another material needs to be combined with fibrin that can enhance printability and make pores in the fibrin gel to let cells penetrate.

Pluronic F127® is a polymer that gels when heated and liquefies when cooled, the opposite of most things in nature. It's also very thick as a gel, and as result, holds a shape when 3D printed. A Pluronic/fibrin mixture could print well and then be cooled and rinsed to get rid of the Pluronic, resulting in a porous/printed structure in which cells could make capillary-like vessels. This project will involve making, printing, rinsing, and analyzing the pores in such a material to see if they will allow blood vessels to form.

#### Example #2

Interdisciplinary collaboration is a key part of modern design work in all industries. This research project focuses on a set of Design Innovation (DI) methods, refined and practiced over the course of thousands of interdisciplinary projects worldwide. The DI methods integrate multiple perspectives, practices, mindsets, and principles: drawing on design thinking, engineering design, systems design, and business innovation – integrating creative, analytic, and entrepreneurial approaches. One representation of the DI methods is as a language of design, expressed as a deck of design method cards. Each card encapsulates a design method and how it can be used. The set of methods together are applicable to a wide variety of design projects, disciplines, and innovations across interdisciplinary work.

The goal of this research study is to facilitate more effective interdisciplinary collaboration and design through the use of a design language, as expressed by the design method cards (or other representation of the DI process). The specific focus of this project is studying the intersection



between art, media, engineering, and computing. Four key steps of this research project include: (1) evaluate the effectiveness of DI cards or other presentation for communicating design methods across disciplines; (2) conduct user research studies to identify what an effective intervention might be across disciplines; (3) design an intervention, i.e., design new cards or presentation of methods; and (4) test the effects of that intervention on design outcomes and designer self-efficacy. Ultimately, results from this study will contribute to facilitating more effective interdisciplinary design in education and practice.

### Example #3

The purpose of this project is to explore & develop a pedagogical approach to sound design and technology in higher education. Sound design is a fast-growing field which offers numerous job opportunities to our music students, especially in the music, film & television industries. Sound design is an abstract concept which requires a deep understanding of science and audio. Due to the growing accessibility of inexpensive computers and advances in technology, it is becoming increasingly more common to work with sound design. This is a good time to introduce this subject to our students. We will also take advantage of open-source software which can faithfully recreate modular synthesizers.

Due to the relatively unexplored nature of this field, [my mentor] and I will develop a pedagogical, affordable and easy-to-understand approach to learning sound design in a student-centered, hands-on course with a positive learning outcome. We will design the course and as well as evaluate the students' outcome through the course and compare our findings with data provided from other already-existing courses to improve our class as required. The purpose of this study is to formalize the teaching of modular synthesis and sound design.

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### Project Proposal (limit 500 words):

Provide details of your proposed project. Include references that contextualize your topic of interest and justifies the work you intend to do. Be as specific as possible about your role in the project and your duties and responsibilities. If this is a continuation of a previous semester's work, include an explanation of how you will expand on previous findings and push towards independent scholarship.

### Project Timeline:

In list format, please provide a timeline for your EURēCA! Fellowship, including all milestones, goals, and products described above. Begin with the award date (August 2021) and culminate with your required presentation at RaCAS (Friday, April 29, 2022).

### Example #1

**Proposal:** In Memoriam (1918/2020) is an artwork and social practice project that builds connections with those lost during the 1918 and 2020 pandemics in Colorado. By reaching out to descendants of the deceased to compile an online platform and self-published book that blends visual art and literature, this artwork will challenge the audience to think about death both collectively and individually. Conceived primarily as a memorial to the victims of the influenza and coronavirus pandemics, 1918/2020 explores a universal experience through a regional perspective. During the early stages of the current outbreak, I began collecting tree bark at Fairmount Cemetery for an art project that would become 1918/2020. Painting them all white with gesso and photographing each individually as floating forms against a black background transforms these scraps of nature into



surreal and otherworldly objects of veneration. By publishing in printed form as well as digitally, this work will preserve memories of the dead in a format that can reach a wide range of viewers. With an additional layer of text inspired by local cemetery epitaphs, each piece represents the deceased individuals of the 1918 and 2020 pandemics or the collective toll of disease on humanity, as well as the transformation people undergo after death. Gesso as a material also carries an association with historical conventions of painting, referencing back to the wood panels and polychrome wood sculptures of the Medieval era while expanding into other dimensions. With a style that also reflects the Modernist art of the early 20th century, this project will explore parallels to our past and layer elements of art, nature, and narrative. Immortalizing the bark with photography and typographic elements, 1918/2020 seeks to memorialize the dead in a way that reflects the present. As an artwork, it will exist in a variety of forms that can fit in a gallery context as an installation or series of photographs, as well as the palm of your hand as a printed book. Adobe software such as Photoshop, Lightroom, and InDesign are integral components for producing digital images on the website and final publication. Several drafts of the book might be required before being ready for the public and donating copies to organizations like Denver Public Library and Fairmount Cemetery, and Blurb makes it easy to upload Adobe files and print photo books on demand. By listening to those touched by loss, the main goal behind this project is to honor their memory with respect and love for all humanity.

#### **Timeline:**

##### **October:**

- Communicate with local cemeteries and funeral homes to build connections
- Contact Denver Public Library, begin reading and researching
- Photograph artwork
- Halloween and Day of the Dead

##### **November:**

- Continue researching and communicating with organizations
- Reach out to living descendants of the deceased (if possible)

##### **December:**

- Continue researching and communicating with people
- Compile stories, organize book
- Begin laying out website

##### **January:**

- Continue researching and communicating with people
- Craft images and written words for the website and book
- Experiment with rough drafts of the book

##### **February:**

- Continue researching and communicating with people
- Refine the content and details of the website and book

##### **March:**

- Prepare RACAS presentation
- Finalize website design
- Publish first draft of the book, make any necessary edits

##### **April:**

- Organize digital exhibition
- Donate final copies
- Present at RaCAS



## Example #2

**Proposal:** Gastrointestinal (GI) bacteria perform functions important to the health of the host organism. Therefore, disruptions to compositions of the GI microbial community may produce far-reaching long-term effects on the host organism. Per- and polyfluorinated alkyl substances (PFAS) are a class of organic pollutants known as "forever chemicals" used in many applications such as non-stick cooking pans, water-resistant coatings, food wrappers, and fire-fighting foam. PFASs global occurrence, persistence in the environment, and bioaccumulation in living organisms have increased the concerns about its possible toxic effects on aquatic ecosystems. By examining the effect of exposure to PFAS the presented research will provide an understanding of PFAS-induced effects on the GI microbial communities, and its far-reaching physiological impact on the host organism. From October 2019 to March 2020, I gained valuable wet-lab research experience on the effect of PFAS exposure on the gut microbiome of fishes. My research consisted of DNA extractions on 180 gut tissue samples using specialized DNA extraction kits and troubleshooting the procedure when the level of DNA extracted per sample was lower than the necessary level for gene sequencing. After every DNA extraction, I reported complications and data to my supervisor thus enhancing my scientific communication skills which were then applied to articulating the methods conducted and our future directions at the 2020 RACAS. The goal by May 2021 is to publish the research findings. Thus, over the course of the summer I conducted scientific literature searches learning how to interpret and summarize scientific literature. Now that I have the lab skills and the background research skills my next goal is to expand my role to computational analysis with the goal of publishing our findings in May 2021. Now on the verge of analyzing and obtaining significant results for publication I fear that my opportunities to advance my research and statistical skills are very limited. My prior internal funding is dwindling fast. However, with [URCA] funding my research experience would continue as the grant would allow me to spend more time in the [Mentor] lab than in other employment. [My faculty mentor] has expertise in the bioinformatics and the QIIM 2 computational analysis program thus extra time and funding in the lab would allow me to allot more time to self-guided workshops for QIIME2. In-turn I would be working collaboratively with the supervisor thus expanding my computational skills overall allowing me to analyze and conclude accurate, unbiased, findings to publish.

**Timeline:** *Note that this was a 1-semester project*

October:

- Run crude PCR to determine ratio of bacterial DNA to fish DNA; select samples for analysis
- Practice purifying protein-free genomic DNA using Ampure Bead cleanup protocol
- Participate in QIME software training

November:

- Purify Genomic DNA using XP/SPRIselect Bead Cleanup protocol
- Attend QIME Workshop, complete QIME trainings
- Perform computational analysis

December:

- Write up final report
- Graduate

January-April

- Work with mentor to complete project write up and paper submission
- Return to CU Denver to present at RaCAS 2021



### Example #3

**Proposal:** My study will examine the relationship between biological motion detection, facial emotion discrimination and autistic-like traits in the typical adult population, with the objective to better understand how action detection and emotion discrimination relates to measures of individual differences. To test this, I plan to examine perceptual performance through the use of point-light displays containing clips of moving bodies and faces. These will be used to measure a participant's ability to identify the presence of biological motion or emotional content. The perception of biological motion refers to the ability to recognize a moving, animate creature when presented with minimal visual information. Point light displays are considered a useful research tool as they contain enough information to recognize actions (Dittrich, 1993) and emotions (Dittrich, Troscianko, Lea, & Morgan, 1996). The results of this task will be correlated with three questionnaires that measure aspects of personality including the BIS/BAS scale (Carver & White, 1994), the Five Factor Personality Questionnaire (Goldberg, 1999), and the Autism-Spectrum Quotient (AQ) (Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley, 2001). This study is significant as there has been little conclusive research examining the relationship between biological motion perception and the presence of phenotypical traits associated with Autism Spectrum Disorder (ASD) within the general adult population, which the AQ provides. The ability to perceive biological motion is important as it is rich in subtle social cues necessary for interpreting one's social environment (van Boxtel, Peng, Su, and Lu, 2017). The phenomenon is specifically relevant to ASD, which is defined by impairments in social and communicative skills, many of which are believed to result from core impairments in face processing (Webb, Neuhaus, & Faja, 2016). Working on this project will contribute to my professional development by allowing me to design and carry out a unique research study from beginning to end that combines my interest in neurodevelopment and perception. In doing so, I will refine my knowledge of research methods, sharpen my communication skills and further develop my project management abilities, all of which are essential to my success as a future graduate student in clinical psychology.

### Timeline:

1. Experiment design and data collection – Fall semester 2020
    - Programming and debugging (underway)
    - Pilot data collection
    - Data collection of 75 participants online
    - Initial data analysis
  2. Submit abstract for Vision Sciences Society (VSS) Conference – December 3rd, 2020
  3. Data Analysis – Ongoing with data collection, finalized by April 2021
    - Planned analyses
    - Exploratory analyses
  4. Write-up of findings – April 2021
  5. Present at RaCas – April 2021
  6. Attend VSS Conference – May 14-19, 2021
  7. Defend thesis and graduate – April/May 2021
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