

INTERDISCIPLINARY INITIATIVE GRANT FINAL REPORT

Bringing together faculty members to enhance teaching and learning

Name, Department, and College of each faculty participant

Jennifer Lovelace, Department of Teaching, Leadership, and Counseling, College of Education and Health Professions

Rania Hodhod, TSYS School of Computer Science, Turner College of Business

Proposed Project Title

Designing and Developing a Collaborative Research Platform for Faculty and Students

Project Description

The main goal of this project is to create a digital platform that allows for collaboration between students and faculty from multiple academic disciplines. The digital platform aimed to create opportunities for individuals to seek collaborators and opportunities to collaborate on interdisciplinary research with each other. Faculty and students will be invited to create a profile that outlines their current research interests, their strengths, any ongoing research projects, or upcoming research needs. When entering the project into the platform, researchers will be able to enter details for the types of collaborators they need (i.e., 2 undergraduate students or 4 graduate students in the School Counseling Masters program). They are also able to indicate any compensation available, a time frame for participation, any planned conference presentations or publications anticipated from the project, ...etc. At the same time, researchers can browse projects listed by other faculty/students and receive more information about those projects. As listed needs are filled, the platform should adjust the research needs as listed by the original researcher. For faculty or students not currently working on research projects or those looking to get involved in additional research projects, the platform allows those individuals to list their areas of interest, research specialities, ...etc. In addition to searching for existing research and opportunities. When a research project is posted that matches those criteria, the platform notifies the individual that a possible research project is available by adding a link to that project to the student's notifications.

The project provided a great learning opportunity for students as they were involved in a real-world project that followed business-like design and development processes. Students were able to develop and refine their teamwork skills. Faculty learned about each others' disciplines and areas of expertise. We believe that CSU faculty and students will benefit from having this digital collaborative platform that can foster various levels of research collaborations.

This project is novel to CSU and should serve the faculty and students. With our students being digital, it is important to reach out to them through the same technology they are using on a daily basis. The project aims to promote all types of research collaborations between CSU faculty and students as well as faculty and each other.

Project Outcomes

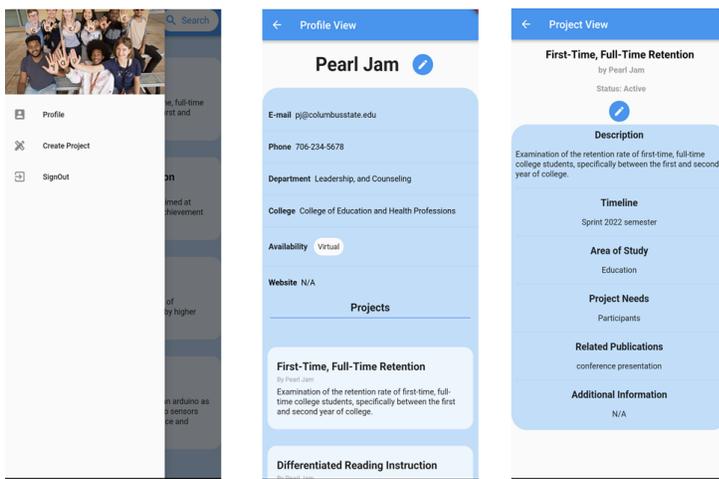
The main outcome of this project is the development of a mobile application prototype as the intended digital platform. The mobile app allows students and faculty to sign up for and create their profiles, upload their academic research or creative projects, and find other like-minded people to connect and collaborate with. Two faculty and two students from the Teaching, Leadership, and Counseling department and TSYS School of Computer Science have worked on this project following software development life cycle and the Agile Model to design and develop the mobile app. The Teaching, Leadership, and Counseling student led the design of the platform, whereas the Computer Science student led the development and deployment of the mobile app. The use of the Agile Model allows for continuous feedback and system/platform modifications over several iterations before the current system deployment.

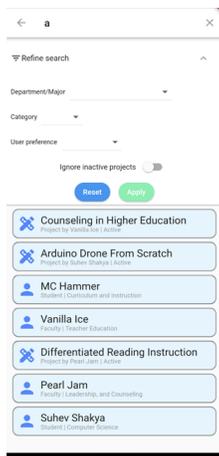
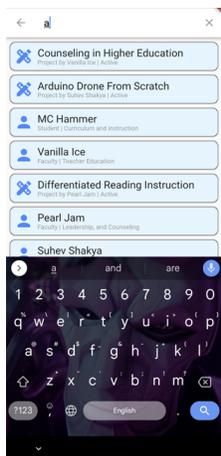
We used the Flutter toolkit which is a powerful tool by Google to create the mobile app that can be used on Android and iOS as well as desktop computers and other web platforms. The mobile app allows the user to create their profiles using the form shown on the right. The form allows the user to indicate their interests and availability and whether they are looking for collaborators or opportunities to collaborate with others. It is worth noting that the app will not ask for any personal information from the participants.

The screenshot shows a 'SignUp' form with the following fields and options:

- I am a: Student (dropdown)
- Full Name: [text input]
- Year: [dropdown]
- Major: [dropdown]
- Email: [text input] (placeholder: @columbusstate.edu email)
- Phone: [text input]
- Website: [text input]
- Availability: In-Person, Virtual
- Password: [text input] (placeholder: New Password)
- Confirm: [text input]

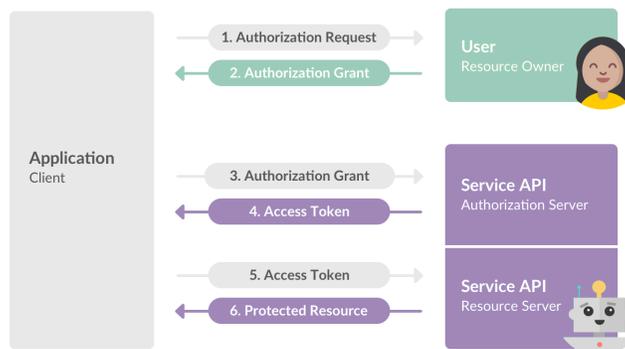
The mobile app has a graphical user interface that allows the user to edit the profiles as needed and add research projects to their profiles as shown in the screenshots below.





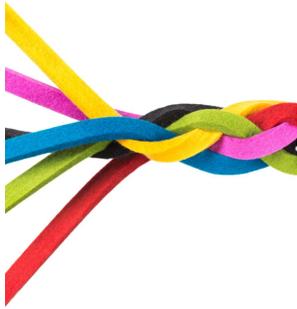
The mobile app allows the user to search for projects and researchers while identifying each with a particular icon next to it as shown in the screenshots on the left. Security and privacy is, and has been, a primary focus throughout the app development process. The user passwords are stored in hashed form in the database. Hashing, in simple terms, is permanent and irreversible encryption of a message (in this case passwords). This ensures that even people with authorized access to the database are unable to decipher passwords of the users.

We plan to implement user authentication using the industry standard OAuth for authentication delegation. We have seen implementation of OAuth in applications and mobile apps where we have the option to login and signup via google, facebook, twitter, etc. Being an industry standard protocol, we trust that OAuth will provide the utmost security when signing up and logging into our mobile app. The authentication process should take care following the diagram below.



A questionnaire was designed to collect feedback on the usability of the mobile app and its features. An IRB approval was granted early December 2021 to conduct the study. The feedback from the participants will be used to refine the platform and its functionalities. We hope that once we finish any refinements that the study might reveal, CSU will adopt this application and would use it for all CSU researchers.

Two other important outcomes of this project are the paper presentation at the Fall Faculty and Graduate Research Conference at CSU and the poster presentation by our students at the ACM Mid-Southeast conference in Nov. 2021. A snapshot of the presentation and of the poster are provided below.



Jennifer Lovelace, PhD
 Katelyn deBrabant
 Columbus State University

An Interdisciplinary Approach to Creating Collaborative Partnerships

SCI-M@ch

Suhev Shakya and Katelyn deBrabant

TSYS School of Computer Science, Columbus State University, Columbus, GA, USA
 [shakya_suhev, debrabant_katelyn@columbusstate.edu]

ABSTRACT

Collaboration is a paramount aspect of the academic field. The academic field is lacking a platform that focuses solely on collaboration in research. This work aims to create a mobile application that allows student and professors to create profiles with their research interests. This application uses AI and natural language processing techniques to match the different profiles and suggest potential collaborators to the users. The application has a centralized data server that saves profiles and project data. Android studio and flutter are used to create the application. The application will be compatible with most Android and IOS devices.

Application Development

We designed a mobile application where students and faculty can sign up and create their profiles, upload their academic research or creative projects, and find other like minded people to connect and collaborate with.

The flutter toolkit is a powerful tool by Google that lets us create beautiful applications that work with both android and ios as well as desktop and other web platforms. We used flutter for the development of our application because of its versatility and the many libraries and tools it provides.

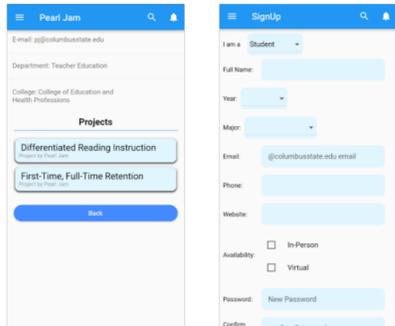


User Profile and Projects

User Profiles have the name of the user and their email address as mandatory fields with the option to include phone number and a website. They can also indicate their interests and availability and whether they are looking for collaborators or opportunities to collaborate with others.

The fields school year, and major for students and department, and college for faculty differentiate between the two kinds of users for this application.

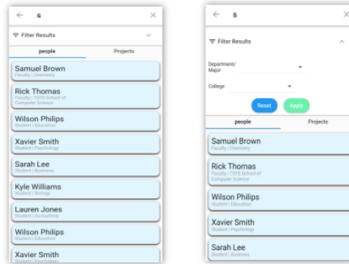
The users are also required to set up an account password as the sign-up process.



Users can create projects in the application where they can have the project title, a short

Search and Matching

The searching process and design is similar to most popular mobile applications. The search icon appears on the top right of the screen. Searching can be done using keyword in the search window. The application goes through the database (names, project title, interests, requirements, description, etc.) to return the most relevant search results.



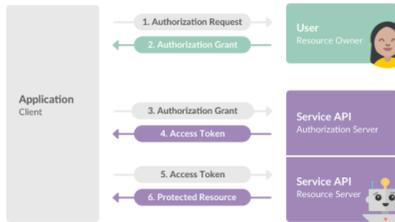
The user can open the more detailed search window where the results are separated by people and projects. the expansion panel also allows for filtering the results.

Security and Authentication

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The user passwords are stored in hashed form in the database. Hashing, in simple terms is permanent and irreversible encryption of a message (in this case passwords). This ensures that even people with authorized access to the database are unable to decipher passwords of the users.

We are in works of implementing user authentication using the industry standard OAuth for authentication delegation. We have seen implementation of OAuth in applications and mobile apps where we have the option to login and signup via google, facebook, twitter, etc. Being an industry standard protocol, we trust that OAuth will provide the utmost security when signing up and logging into our mobile app.



Timeline

Fall 2021

1 hour bi-weekly meeting that covered the following:

- Introduction to software development cycle and the Agile Model
- Brainstorming the development platforms
- Features of Accessible applications
- Gather the requirements for the mobile app
- Design the user interface for the mobile app
- Fill the IRB application
- First development phase
- Design the questionnaire and attach it to the IRB application
- Second development phase based on feedback from the first phase
- An attempt to work with UITS to host the mobile app on a CSU server
- Feedback on the poster presentation
- Third development phase and hosting the mobile app on an external server (Firebase)
- The mobile app prototype is completed and ready for testing

Rania Hodhod: Evaluation

This project was valuable and interesting to both faculty and students. My main responsibility was to guide the development process of the mobile app. The project allowed us, the faculty, to apply a number of high impact practices throughout the project timeline where students invested significant amounts of time and effort on this project on a weekly basis. Constructive and timely feedback was frequently provided. Our bi-weekly meetings allowed periodic and structured opportunities to reflect and integrate learning. The students' poster presentations allowed for public demonstrations of competence, and one of the most significant practices in this project is the fact that our students worked on a real-world application.

Another positive outcome of this project is that it helped our students to develop important soft skills, such as effective communication and team work. It was great to see my student collaborating and having good discussions with the Teaching, Leadership, and Counseling students outside our meetings.

Last but not least, as a computer science faculty I enjoyed this real-world project and I learned a lot from Dr. Lovelace and her student.

Jennifer Lovelace: Evaluation

This project has been both a learning experience and a challenging endeavour. My main responsibility was to guide the design of the mobile application and submit the IRB application for approval. Through bi-weekly meetings with the project team, we were able to apply several high impact practices throughout the project timeline and were able to engage in meaningful and regular collaboration. Our research students were able to engage with faculty on a project that has the potential to impact university stakeholders in a real-world setting. Because university departments tend to operate in educational silos with limited interaction with those from other silos, this project allowed students the rare opportunity to work with one another, to receive feedback from faculty, and to develop essential skills (i.e., communication, teamwork, presentation skills). As a new faculty member, this experience has been extremely rewarding. I have enjoyed working with Dr. Hodhod and her student and have learned so much about mobile application development.

Achievements:

1. Development of Sci-M@ch, a mobile application to match researchers' profiles based on research interests and identified collaborators.
2. Knowledge transfer between students from different disciplines - the student from computer science learned about questionnaire design and how to satisfy project requirements, in addition to. Similarly, students from the Department of Teaching, Leadership, and Counseling learned about the software development process and the Agile model.
3. Students' have had a poster presentation at the ACM Mid-Southeast conference and an oral presentation at CS Colloquium.

Conclusion:

This interdisciplinary research project provided a great learning experience to all project members on different levels. All team members were excited by this project and admitted that they had a very good learning experience. In particular, we believe our students gained significant knowledge in software development and more confidence with poster design and presentations. In this project, our students were involved in a problem solving process that includes looking at the problem in hand, analyzing the problem and gathering requirements, deciding on approaches to solutions, picking a solution to implement and then evaluating that solution. The outcome of this project was the creation of a mobile app, Sci-M@ch, i.e. Scientific Match that can match different users based on their scientific and research interest. We hope that we can continue with the last phase of this project that is testing and deploying Sci-M@ch to CSU faculty and students.

This project utilized the “High Impact Practices: Eight Key Elements,” published by the Pikes Peak Community College library website (<https://libguides.ppec.edu/c.php?g=675604&p=5376723>) as well. From the initial grant application and the first meeting, performance expectations were set for the students and faculty. The project required the time and effort of our research students throughout the semester as well. Students were required to communicate and interact with faculty and peers to aid in the design and development of the mobile application; many of those interactions were with faculty and students from different departments and from different backgrounds than their own. Additionally, through our bi-weekly meetings, all team members were able to both provide and receive timely and constructive feedback as well as reflect and integrate learning. The application development project as a whole has been an invaluable experience in learning through real-world applications. The impact of this project is much more far reaching than we originally anticipated. Students from both programs have had opportunities to present publicly on the different aspects of the project and we hope to continue working with these students through the second phase of the research project.