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Connecting Students: Improving Engagement and Participation Through Technological Solutions

Caleb Rice1[1], Cheng Eu Sun[2], Garret Van Dyke[3], Matthew Merlo[4]

[1-4]Senior B.S. in Computer and Information Science, Department of Computing, Mathematics, and Physics, Messiah University, PA, USA

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ABSTRACT

Student engagement and participation in extracurricular activities are vital for a thriving campus community. However, many clubs at Messiah University face challenges with low engagement due to limited information dissemination and poor communication channels. To address this, the development of goSHARC, which stands for Student Happenings and Recommendations for Clubs, is proposed. It is a comprehensive web platform designed to foster a more connected and engaged student body. goSHARC will provide a centralized hub for all club activities, featuring a user-friendly interface with a calendar of events, discussion boards, and a notification system. This platform will streamline communication, improve information accessibility, and encourage greater student involvement in campus life.
The development process will prioritize user experience and involve gathering detailed requirements through surveys and focus groups with various clubs. This collaborative approach will ensure that goSHARC effectively addresses the specific needs and preferences of the student population. By creating a sustainable technological solution that promotes a thriving and interconnected campus community, goSHARC aims to enhance the overall student experience at Messiah University.

Corresponding Author:

Caleb Rice
Student, Department of Computing, Mathematics, and Physics
Messiah University
Grantham, PA, USA 17055

Email: caleb.rice.2626@gmail.com

1 Introduction

Student engagement plays a vital role in fostering a vibrant and connected campus community. Active participation in extracurricular activities, such as clubs and organizations, significantly enhances academic performance, personal development, and overall college experience. Studies have shown that students who are engaged outside the classroom tend to have higher levels of satisfaction, are more likely to graduate, and experience a deeper sense of belonging on campus. Conversely, a lack

of student engagement can lead to feelings of isolation, decreased academic motivation, and higher dropout rates. Research indicates that disengaged students are more susceptible to emotional exhaustion, cynicism, and a sense of inadequacy, closely resembling burnout [2]. The integration of mobile applications and online platforms has been shown to positively impact student participation and motivation in academic settings [3].

1.1 Background of the Study

At Messiah University, more than 70 student-led clubs and organizations provide opportunities for students to develop leadership skills, explore interests, and build relationships. These activities encourage collaboration, creativity, and critical thinking, which are key components of a well-rounded education. However, many students find it challenging to navigate and participate in campus events due to fragmented information and poor communication channels. The existing systems for club events and student engagement lack intuitive design, efficient search functionalities, and real-time updates, limiting their effectiveness in promoting student involvement. Mobile learning applications have demonstrated their ability to improve students' academic performance and attitudes toward engagement, highlighting the need for an accessible and centralized system [5].

The current lack of communication causes students to find themselves bored and to think there is nothing happening on campus. Additionally, student leaders are often discouraged and feel they have wasted time when they consistently see low attendance at events they host. However, it is not true that nothing happens on campus, and better communication could lead to stronger student engagement at Messiah, and with it all the benefits mentioned previously. This project would also be more helpful in future years if it had a modern, user-friendly interface, making events straightforward to create and to find. Communication between student leaders and the student body is difficult across the board in many colleges, and goSHARC is at its core an attempt to fix that[2].

1.2 Problem Statement

Messiah University is very intentional about its community and strongly advertises their student engagement with their 70+ clubs and organizations, yet many students have noticed that current levels of student engagement are lacking. Being Messiah students, the team noticed that connecting with clubs on campus is challenging as there is no centralized place to get information. Some clubs rely on social media, others use email lists that can be difficult to get on outside of the semesterly engagement fair, and others use the This Week at Messiah emails and the student events calendar. While these are all great tools, none of them provide a centralized location for communication between clubs, their members, and the Messiah community at large, and none of them are easy to search through. This project aims to provide that space, with a unified calendar displaying all events that can be filtered by club or by interest, and pages for each event that allow students to ask questions and get answers, as well as signing up to receive notifications from clubs.

To address these challenges, goSHARC (Student Happenings and Recommendations for Clubs) will be introduced, a centralized online platform designed to streamline student engagement. This system aims to provide an improved user experience by integrating a comprehensive event calendar, advanced search and filtering options, interactive discussion boards, and automated event notifications. By offering a unified space for event discovery and club interactions, goSHARC will enhance accessibility, making it easier for students to find and participate in events that align with their interests. Best practices in web development and user engagement strategies, such as those outlined by Netguru [4], will guide the design and functionality of goSHARC to ensure usability and accessibility.

1.3 Project Objectives

There are a few objectives and goals set for this project. The first is to gather information from a few organizations around campus to get more information on what would be good to go into this project to make it more helpful for the student body. Another objective is to develop some core features for goSHARC, such as event scheduling, club filtering, and a modern, friendly UI. Finally, this project aims to increase the number of students that participate in clubs and extracurricular activities.

1.4 Scope and Limitations:

This project has a specific purpose: creating a unified and accessible space for student clubs and organizations on college campuses to reach their members and the university community, and for students to stay engaged with the clubs they are interested in and find things to do on campus. This is not a social media platform, nor an unstructured forum for students to chat with each other. It is designed to be used only by colleges, particularly Messiah University, but would potentially be useful for other schools as well. goSHARC will include a calendar with activities from every club with a way for students to only see club activities of clubs they subscribe to. Each club will also have a dedicated page with club information and activities. Messiah Office of Student Engagement staff will have specific accounts that can create and remove clubs from the

system. Each club will have a club president account that can add, edit, or delete club events, as well as answer questions in the forums. The rest of the student body will have student accounts that can view clubs and events and ask questions in the forums. If time permits, goSHARC will also include UI customization where colleges can edit the way the system looks to better match their own branding, and it will also incorporate a home feed where different club announcements and events will be listed/personalized for each individual user.

Given the project's strict one-year completion deadline and the team's size of four developers, the focus will be on rapid iteration and a streamlined feature set to achieve a functional proof of concept. This necessitates a targeted approach, prioritizing core functionalities within the designated scope. Post-course deployment may face budgetary constraints due to web hosting costs, which are significant for student developers. Furthermore, independent integration with Messiah University's existing systems is not feasible at this stage, requiring the platform to operate as a standalone application.

1.5 Target Audience

The primary users of the community calendar system are the students at Messiah University. This includes both undergraduate and graduate students, who will benefit from a centralized platform to discover and participate in campus events. For students who may not actively follow specific clubs but are interested in campus activities, the system will provide a convenient way to stay informed about various events.

Clubs and campus organizations are another key audience for the system. These groups will use the platform to post their events, manage visibility, and engage with a wider audience. This includes academic clubs, interest groups, sports teams, and other student organizations.

Secondary users include university staff, such as administrative and support personnel, who may monitor the system to ensure compliance with university policies. They are responsible for moderating forum posts and approving clubs and events for creation.

1.6 Significance of the Project:

The significance of this project lies in its ability to enhance student engagement and communication at Messiah University. By providing a centralized platform for event information, the system increases student participation in campus activities and fosters a stronger, more connected community. It simplifies communication between clubs and students, making it easier for all students to stay informed about various events. Additionally, the system offers valuable data insights for clubs and university staff, supporting informed decision-making and improving overall campus life. The project not only benefits the university by promoting student engagement but also serves as a model for other institutions, highlighting effective strategies for community building and engagement.

This document outlines the development of goSHARC, a platform designed to enhance student engagement and participation in extracurricular activities at Messiah University. It begins by analyzing the limitations of the existing system and then proceeds with requirement gathering, design methodology, and implementation strategies, following a structured waterfall development model. The anticipated impact of goSHARC on student engagement, along with its scalability and potential integration with Messiah University's digital infrastructure, will be discussed. By the end of this project, a functional prototype should be produced and its effectiveness in increasing student participation should be analyzed through surveys and usage analytics. The long-term vision is to establish goSHARC as a sustainable solution that enhances student life at Messiah University, promoting greater involvement and community building on campus.

2 Benchmarking

Benchmarking involves comparing the proposed system to existing solutions or similar systems to understand how well they perform, identify best practices, and find opportunities for improvement. It helps with understanding market needs and setting performance standards. Benchmarking ensures the project is user-friendly, meets target audience expectations, and offers unique value. It also validates design decisions and enhances the feasibility of the project, ensuring it stays relevant and competitive in addressing specific problems at Messiah University.

Messiah University's existing student events calendar and club listing pages were benchmarked to understand their key features, user interfaces, and functionality. The manner in which this platform handles user engagement, event posting, and notifications was also studied. By assessing their strengths and weaknesses, best practices and gaps in existing solutions were identified that could inform and enhance the design of the new system.

In the analysis of Messiah University's event calendar and clubs list, key areas such as core features (event posting, subscriptions, and notifications), user experience (ease of navigation and accessibility for students and clubs), and technical

aspects like scalability and security were the focus. These areas helped identify best practices and opportunities to enhance the design of goSHARC.

2.1 Application Identification:

For benchmarking, Messiah's existing student events calendar was chosen because it is easily accessible to the development team as it is made up of Messiah students and because it is the system that will be replaced by the product resulting from this project, goSHARC. It is also a web application and serves the same purpose as goSHARC in connecting students with clubs on campus. Like goSHARC, it has a calendar and list of events. Messiah also has a list of clubs on another webpage, and while it is much more of just a standard webpage than an application, it still provides an idea of the information needed to allow clubs to include in club listings.

2.2 Data Collection:

The team searched for features in the existing Messiah University events calendar that could be implemented in the replacement system as well as gaps that could be filled by the new system to make the system more effective. Since the current events calendar only applies to Messiah students and there are no online reviews, other students were asked what they thought of the existing events calendar.

2.3 Data Analysis

Looking at the Messiah events calendar, it is outdated and not sufficiently usable. According to Messiah's student body president it looks "old and outdated." While goSHARC is not currently finished it is expected to look more professional and refined.

The current system has several issues that need to be addressed. The number one issue is that the calendar is poorly formatted. While everything is visible, it is overstimulating and there is too much information for the user to interpret effectively. Additionally, there is no differentiation between how different events are displayed, making it difficult to find events one might be interested in. Another issue is that the current calendar does not include regular club events, which makes it difficult to learn when these happen. Another issue is that the filter menu does not function in most cases, and it is so basic anyway that it is not sufficient for sorting through what would be an overly busy calendar if it contained all the events. A final thing that should be changed is that the current system does not show any events that have already happened, which may make it difficult for someone to go back to see what events they may have missed, and what types of events are offered in general at different times of the year.

There are several additional features that should be added. Firstly, goSHARC will include a comments section on each event, allowing students to discuss the events. The forum will be moderated to prevent abuse. Secondly, goSHARC aims to connect users with clubs and events they actually want to be a part of through a tag-based matching system. Additionally, there will be detailed pages for clubs and events, so sufficient information is provided. Finally, goSHARC will include stronger searching and filtering capabilities to help users find what they are looking for.

2.4 Recommendations:

The Messiah Events Calendar is not very exhaustive in terms of useful features, so there are many improvements to be made via the creation of goSHARC. The main feed should list out every upcoming event that displays basic information such as the event name, meeting time/location, cost, club, and event type. Clicking on each event should redirect to an event page where more specific information is given along with a place for the user to register for that event. On this page there should also be a forum section where users can ask questions about the event and club admin can answer, Users should be able to filter events based on which group is hosting it, what type of group is hosting it, what type of event it is, when it will take place, clubs the user is signed up for, among other constraints. Every club should have their own page where club information and club events will be located, and users should be able to directly sign up for clubs there. There should be another page where every club event will be located. There should be a calendar in which all events of clubs the user is signed up for are located. Users should also be able to toggle a certain club's events on or off. There should be a page where all upcoming events are listed on a weekly basis. The system should use a user-friendly navigation system.

Through benchmarking, it was discovered that there is significant room for improvement in Messiah's student events calendar. The calendar is only for one-off events, not regular meetings, has several views that are not styled in an appealing way, and is not mobile-friendly. The listing of clubs is on a separate webpage and is not easily navigable, nor does it provide interest-based recommendations. This shows that goSHARC has potential to provide substantial value to Messiah, and it is now apparent what features are missing that need to be the focus of goSHARC. These include interest-based recommendations,

a unified website for both club descriptions and an events calendar, the ability to subscribe to clubs, validated forums on each club and event page for students to ask questions, and a more useful and functional searching and filtering feature on both the calendar and club list.

3 Method

This section explains the process used for benchmarking the existing system and developing the replacement. The Messiah University student events calendar was used as a benchmark for this project. The events calendar includes events like student art exhibitions, chapel events, and music concerts. These events are displayed in a calendar-like view or in a list. Every Monday, an email containing that week's events is sent out to all Messiah University students.

3.1 Development Methodology

The waterfall model was used to develop the system. The model follows a rigid phase structure and the development flows from requirements analysis to design to implementation to testing to maintenance in a linear fashion [1]. The methodology is suitable for smaller projects with a shorter development timeline, clear requirements, and stable underlying technology.

3.1.1 Reasoning Behind Methodology

Although the waterfall model is not commonly used in modern software development, the circumstances surrounding this project were unique as the project was required to be built in only one year and the requirements were clear from the start. Many members of the goSHARC development team are club leaders themselves, and so much was known about the process of hosting an event and how the system would need to support that. Additionally, since the team is composed of Messiah students, the current issues with communication were well-known and so it was not difficult to determine what would be helpful and necessary to facilitate stronger communication.

Established frameworks and libraries such as React and Flask were used in the project. Because both are fairly popular and stable, long-term support should be more straightforward. React adds structure and reusability to front-end code and compartmentalizes components so that core components of the system do not need to be continuously modified. React Router enforces specific design patterns, effectively forcing us to organize our code well, which limits the need for frequent refactoring. The front-end also uses TypeScript, which adds static typing, making the goSHARC code more error-resistant and allows more errors to be caught at compile time, also limiting the need for further changes later. Flask has built-in mechanisms for code organization, and while it is less opinionated than some frameworks, the backend logic for this project is simple, which fits it well, and its blueprints feature divides code into manageable and maintainable chunks. Using these frameworks together creates a well-organized code structure that should remain serviceable throughout the project, and errors should be able to be found quickly. Considering this, it should not be necessary to majorly refactor the codebase during development, allowing the waterfall methodology to be effective.

3.2 Use Case Diagram

After benchmarking was completed and the waterfall methodology was selected, a use case diagram was created to show how users will interact with the new system. It is shown in Figure 1 below:

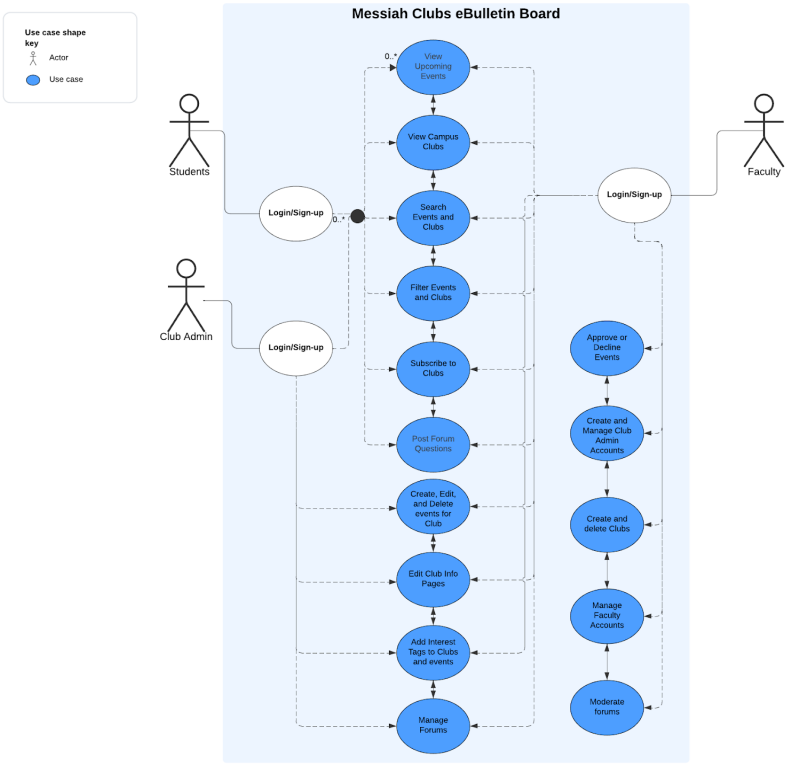

Figure 1: Use Case Diagram

4 Results and Discussion

This section explains the results of the research and at the same time gives the comprehensive discussion.

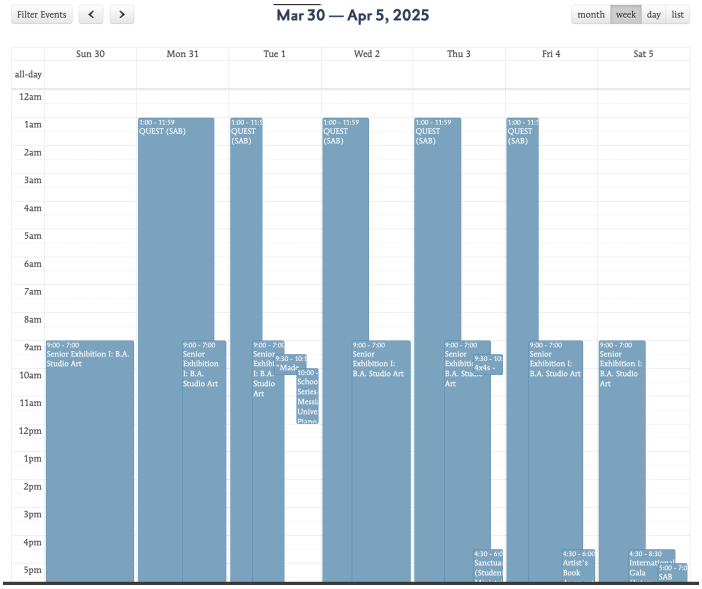

Figure 2: Current Messiah University Event Calendar

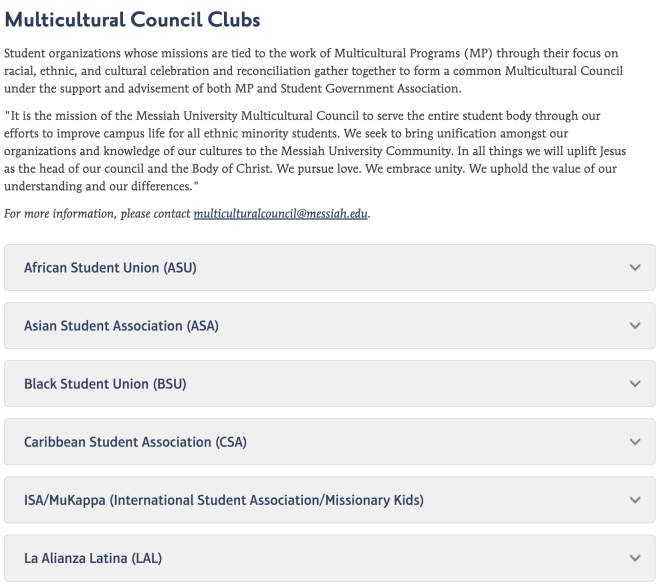

Figure 3: Current Messiah University Clubs List Page

4.1 Analysis of Existing System

The current Messiah University event calendar and club list systems serve as the prime reference for benchmarking. The university provides a web page with a list of clubs and a separate events calendar. However, analysis of the system shows there are several areas that could be improved to provide better usability, accessibility, and a better and more comprehensive list of features.

4.1.1 User Interface and Navigation

Based on Figure 2, the current system is outdated and lacks modern UI/UX elements. The event calendar is cluttered and at times overstimulating, making it difficult for users to gain relevant information. Events are displayed in a single-color scheme reducing the overall readability and engagement. Similarly, the current Messiah University clubs list page is also lacking in modern UI/UX elements as seen in Figure 3 and is simply a list of the available clubs with limited information available.

4.1.2 Feature Limitations

The current filtering options are minimal, only offering a few ways to filter events which is often insufficient for the vast quantity of events taking place around campus. Club events are not included in the existing calendar which limits students' engagement with certain club activities. The system does not display past events which prevents students from reviewing opportunities they missed. The clubs list page is not interactive and does not display respective club logos.

4.1.3 User Feedback

Informal feedback from students, including Messiah University's own student body president indicates that there is a low current level of satisfaction with the current system's outdated design and a limited amount of functionality. Multiple students have expressed a growing need for a more interactive and engaging platform as student engagement continues to grow.

4.2 Identified Opportunities for Improvement

To address the gaps in the current system, the proposed platform introduces several new enhancements.

4.2.1 Improved User Experience

Figure 4 shows a cleaner, more structured UI, which will enhance readability and create greater ease of navigation. goSHARC will also have a customizable calendar view with toggle options for different event categories.

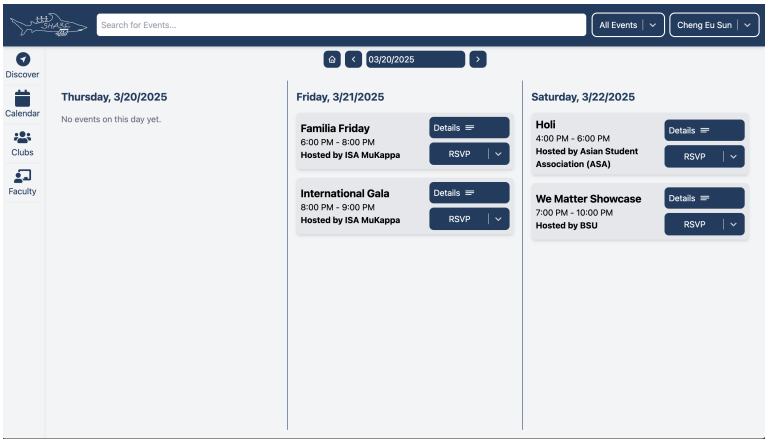

Figure 4: goSHARC Event Calendar

4.2.2 Expanded Filtering and Search Capabilities

As seen in Figure 5, filters are based on event type, hosting organization, date, and clubs to which users are subscribed. Search functionality will work with names as well as interest tags.

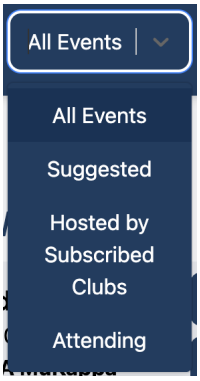

Figure 5: goSHARC Event Calendar

4.2.3 Enhanced Club Integration

The new system will include dedicated club pages that feature descriptions, events, and sign-up options, and a list of clubs for users to view that can be easily searched and filtered. Figure 6, 7 below shows an example club list and detail page. Note that these views are shown for a user who is a faculty member, and so some admin-only tools are visible, such as creating, editing, and deleting clubs, creating events, and emailing club subscribers. These would be hidden for students, though club officers can send emails and create events, subject to faculty approval.

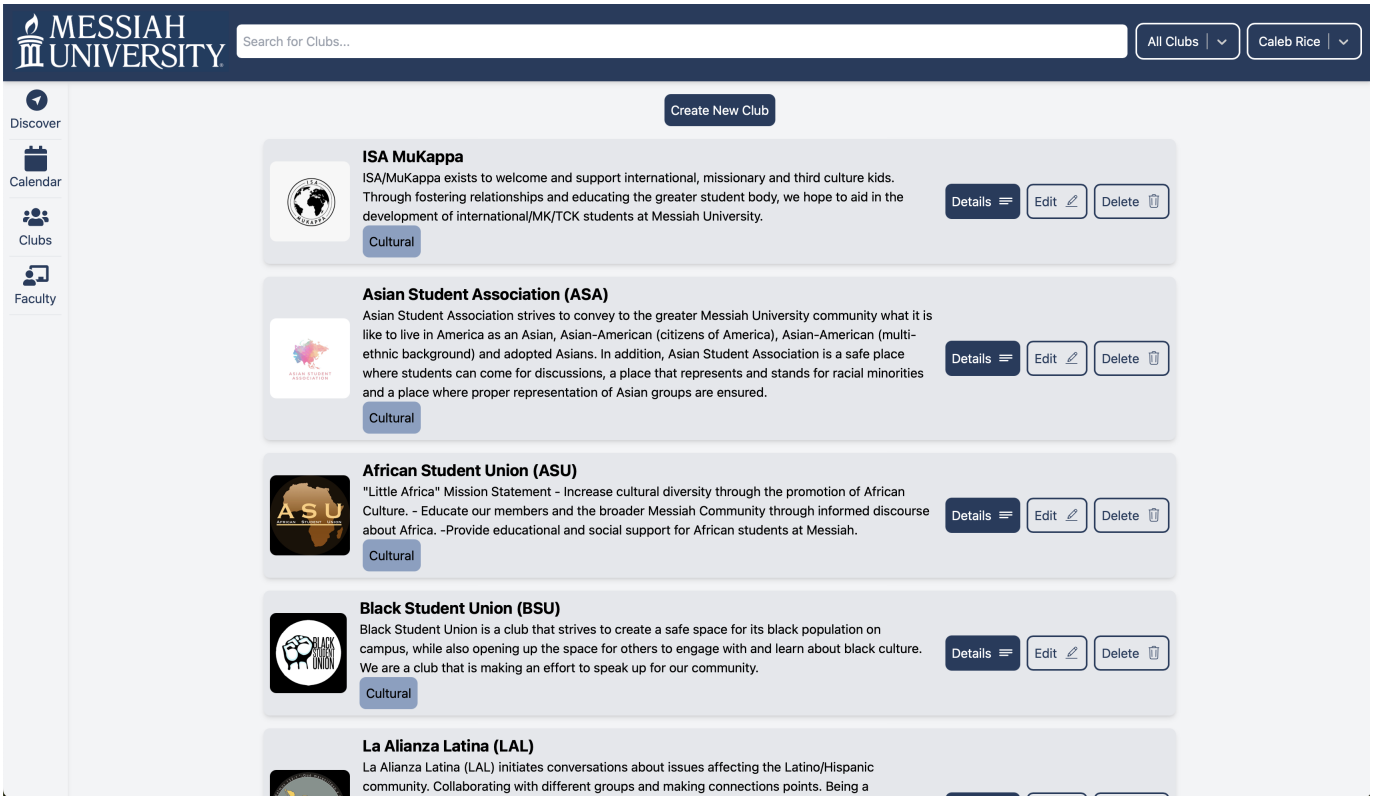

Figure 6: Club Pages

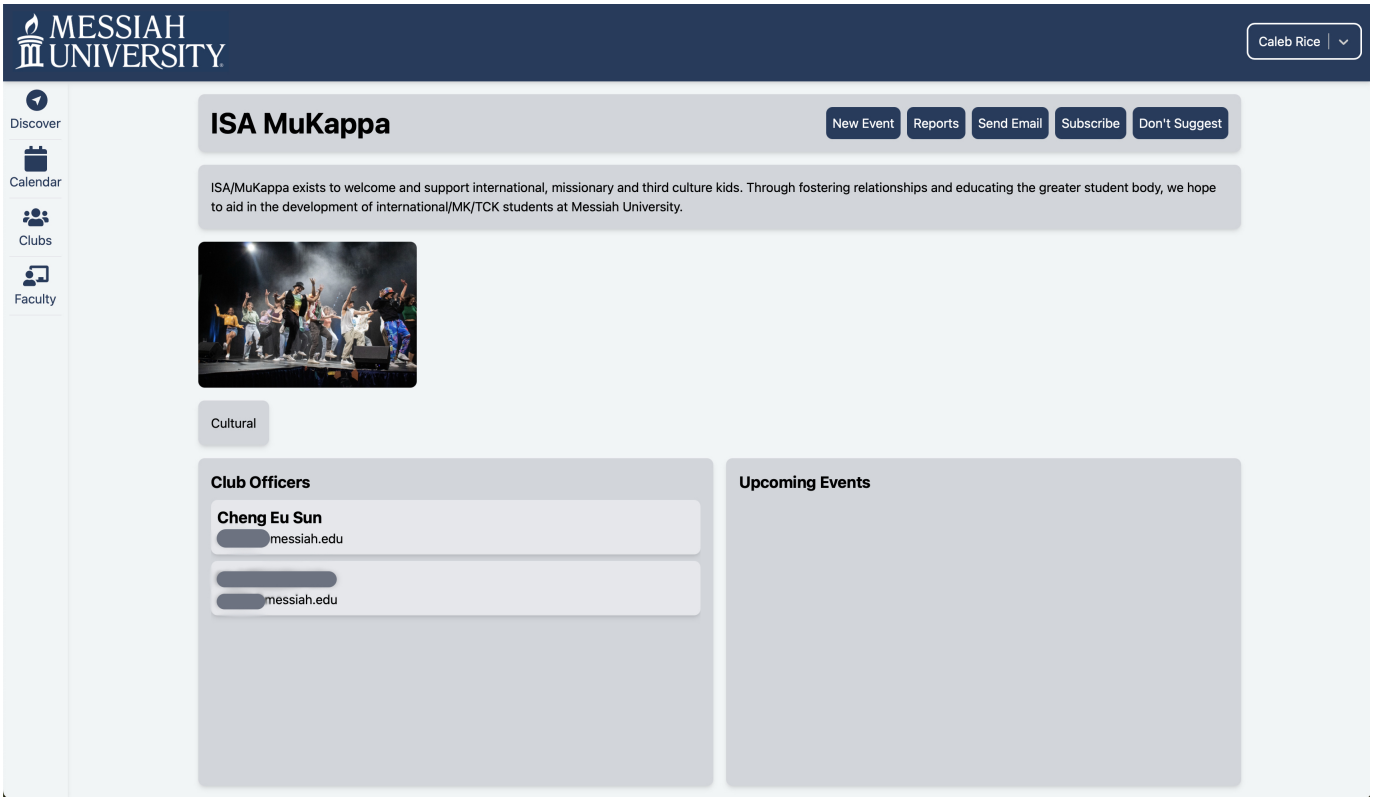

Figure 7: Club Pages

4.2.4 Comprehensive Event Management

An event feed listing all upcoming events, complete with key details like title, time, and a brief description will become available. This is shown in Figure 8 below:

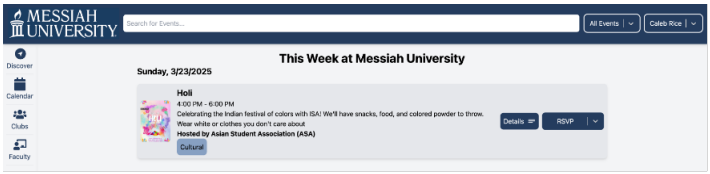

Figure 8: Events Management

As mentioned above in Figure 5 above, goSHARC will also contain a calendar view like that of Messiah's current event calendar, but with a much-needed overhaul of the UI.

The system will also have a detailed page for each event, as shown in Figure 7 below. Note that the cancel event button would not show up for users who are not faculty members or administrators of the hosting club. There will also be discussion forums on each event page so that students can discuss the event with each other if they choose. There is a reporting system so that faculty members can be notified of and remove inappropriate comments.

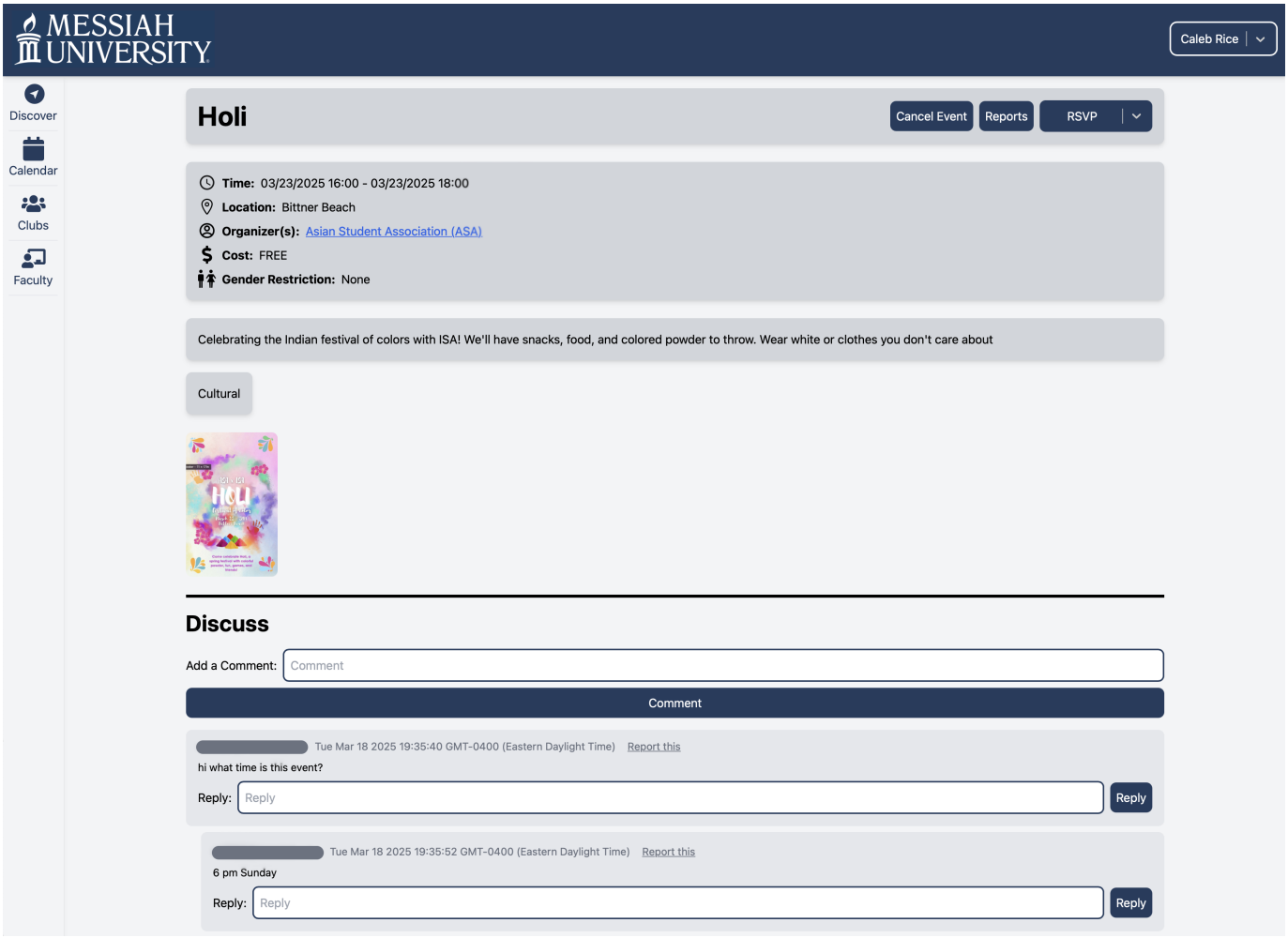

Figure 9: Event Details Page

4.3 Technical Considerations

The new system will be designed for scalability and security. This includes a few of the following considerations in its design. A mobile responsive interface will be included for accessibility on various devices. goSHARC will aim to protect user data, and unlike the current system, it will require authentication to access. Passwords in the database are hashed, and the system uses session IDs that expire after a certain amount of time to ensure logins are secure. goSHARC will use cloud-based hosting for better performance and reliability, and our hosting plan can easily be upgraded to support additional users.

4.4 Addressing Concerns

The features of goSHARC directly line up with the initial concerns about student engagement at Messiah University and with concerns identified in benchmarking, as shown in Table 1 below.

Table 1: Feature Motivation

Concern	goSHARC Feature
Limited communication exists between student body and student leaders.	goSHARC is a centralized online platform to facilitate this communication. Additionally, club leaders can email their subscribers directly withing goSHARC for communication the system cannot directly facilitate.
The current student engagement calendar is cluttered and not sufficiently structured.	Events are displayed in a structured list, and only a few days are displayed at a time.
Event details are not displayed on the current calendar, and there is no way to differentiate between types of events.	Event details are displayed on the calendar, differentiating events, and the dashboard shows even more information about events that are coming up soon.
The current calendar cannot be effectively filtered.	goSHARC enables searching the event and club lists by name or by interest tags, and both can be filtered by matching interests or by clubs the user is subscribed to.
There is no easy way to ask club leaders questions about events.	goSHARC provides forums on each event for students and club leaders to discuss the event.
Clubs must manage their own communication channels and email lists.	Students can subscribe to clubs to receive information about their events in their feed and receive emails from club leaders.
The current calendar is not user-friendly and does not scale well to different screen sizes.	goSHARC uses many best practices in modern web development, follows a predictable user interface, and is specifically designed to be mobile-friendly.
Insufficient details about clubs and events can be easily obtained.	Each club and event page provides many details about the club or event.

4.5 Expected Outcomes

By implementing these improvements, goSHARC aims to achieve several goals. Increasing student engagement with clubs and events would allow for inclusion on campus. Providing a centralized hub for all campus activities will allow students to easily find events. Offering a more intuitive and feature-rich experience than the existing system will benefit the university. This can be evaluated through surveys of the student body before and after goSHARC is released to gauge levels of student

participation in clubs and satisfaction rates with the process of finding clubs and events and the process of hosting an event. Ideally, a statistically significant increase would be achieved in both categories.

4.6 Future Plans

While goSHARC is now a functioning system, there are still many ways in which it can be improved. Going forward, planned features for additional development include support for repeating events, use of AI and additional parameters in addition to interest tags in the suggestion algorithm, and the ability for students to integrate their goSHARC events calendar with their personal digital calendar. Ideally, goSHARC would also be tested with the student body at large, so that the system's performance in the real world can be evaluated and its expected outcomes can be tested, though this is dependent on the University approving the use of the system for this purpose. While the design of goSHARC is intended to fit the University's process for hosting events, there are likely changes that would need to be made to enhance security and fully comply with the University's regulations. In doing this, goSHARC would also need to be integrated with Messiah University's authentication system, which could be challenging, though the authentication system in goSHARC is designed to be easily swapped out.

5 Conclusion

The significance of the project goes beyond simply improving the university's current calendar system. By developing a more comprehensive and accessible event management system, the project can contribute to the broad discussion on digital engagement as a tool to help academic institutions promote and display inclusion diversity, and engagement. This project demonstrates how thoughtful design and technological advancements effectively and directly impact students' participation and organizational efficiency in campus life.

From an economic perspective, a well-designed platform will extend and encourage higher event attendance leading to better resource utilization and an increase in opportunities for student organizations. Additionally, by providing the University with an intuitive interface that includes relevant filtering options there will be a decrease in information overload and will help students make more informed decisions about their extracurricular involvement on campus.

In a broader scientific and academic community, this project will work and serve as an example of how digital transformation can enhance community engagement and streamline event management processes. By implementing these improvements goSHARC sets a standard for user-centered design in higher education digital systems, ensuring long-term usability and adaptability to evolving institutional needs. This research highlights the essential role of technology in creating vibrant and well-connected campuses.

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This research was originally conducted as part of a university course, and thus was not paid for and did not require funding. The project itself has now received a small amount of funding through the initial stages of Messiah University's Impact Venture Challenge and have won 3rd price with an award of $2000.

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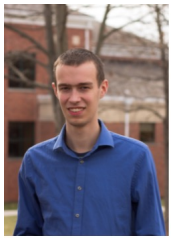
BIOGRAPHIES OF AUTHORS



Caleb Rice is studying at Messiah University to earn a B.S. in Computer and Information Science, with concentrations in Computer Science and Software Development, in addition to a Mathematics minor. He has experience in both front-end and back-end software development and leads the goSHARC team in its efforts to streamline student engagement at Messiah University. In addition to programming, he also possesses technical skills in software engineering, statistics, and data analysis, and is a strong communicator and leader. He can be contacted by email: caleb.rice.2626@gmail.com, or on LinkedIn: https://www.linkedin.com/in/caleb-rice-2626-cs/.

Cheng Eu Sun is pursuing a B.S. in Computer and Information Science at Messiah University, with a concentration in Computer Science. As a key contributor to the goSHARC project, he focuses on backend development and system architecture to enhance student engagement through digital solutions. He can be contacted via email: eusunkv25@gmail.com or LinkedIn: www.linkedin.com/in/chengeu2525

Garret Van Dyke is currently a student at Messiah University earning a B.S. in Computer and Information Science with a concentration in Business Information Systems and a minor in International Business. Contributing to goSHARC in both front-end and back-end software development. He can be contacted by email: vandykegl4@gmail.com

Matthew Merlo is currently studying at Messiah University to earn a B.S. in Computer and Information Science, with a concentration in Computer Science. As a member of the goSHARC team, he has dealt with both front- and back-end development as well as database management. He can be contacted via email: mdmerlo1@gmail.com