VCU College of Engineering

CS25-303-SON-Clinicians

Project Proposal

Prepared for

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Executive Summary

This capstone project aims to develop a comprehensive health data analytics system that leverages previous participant data to improve participant outcomes in healthcare settings. The project is driven by the need for efficient data processing and analysis in the medical field, allowing healthcare providers to make informed decisions based on real-time data insights.

The primary objectives of this project include:

- Data Collection: Acquire health-related datasets to serve as a foundation for analysis.
- User Interface: Develop a user-friendly interface for healthcare professionals to access and interact with the data analytics system.

Key design requirements involve adherence to medical codes and standards to ensure the system's safety, reliability, and effectiveness. The project deliverables consist of the following:

- A functional prototype of the health data analytics system.
- Detailed documentation of the algorithms used and their effectiveness.
- User manuals for healthcare professionals.

As of now, significant progress has been made in identifying relevant datasets. The project is currently on schedule, with the timeline outlining key milestones for completion within the designated time frame. By focusing on a budget of $1,000, the project intends to utilize primarily free resources, optimizing expenditure while maximizing output quality. The successful execution of this project has the potential to significantly enhance data-driven decision-making in healthcare, ultimately leading to improved patient care and operational efficiency.

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Section A. Problem Statement

VCU's Mobile Health and Wellness Program (MHWP) aims to provide consistent and personalized care to its participants, but the current process presents challenges for clinicians. With multiple clinicians rotating between appointments, there's often limited time to review participants' past health information, goals, and progress. If the clinician who saw a participant last time is unavailable, the next clinician may lack critical context, leading to inconsistent or delayed care. This issue is especially problematic in mobile settings, where quick, on-the-go access to participant data is essential.

The primary problem is the inefficiency of accessing participant information in real-time, particularly when clinicians rely on tablets or laptops. The current system forces clinicians to spend valuable time reviewing records rather than focusing on participant needs, risking miscommunication and suboptimal care.

To solve this, we are developing a tablet-based application (also compatible with laptops) that allows clinicians to quickly access participant histories, previous goals, and current well-being before an appointment. This solution will improve care continuity, minimize delays, and ensure clinicians are fully prepared to meet participant needs, even if they are meeting them for the first time.

Stakeholders include MHWP clinicians, program participants, and VCU administrators. This project will help the MHWP deliver more efficient, personalized care, improving both participant outcomes and clinician workflow.

Section B. Engineering Design Requirements

B.1 Project Goals (i.e. Client Needs)

The overall goal of this project is to enhance the efficiency and effectiveness of VCU's Mobile Health and Wellness Program (MHWP) by improving clinicians' access to participant information. The solution will address the need for quick, easy access to health data and goal tracking, enabling clinicians to provide consistent, personalized care, regardless of which clinician meets with a participant. The goals focus on improving workflow, reducing care delays, and ensuring better health outcomes for participants.

The key project goals include:

- Improve access to participant health histories, goals, and progress before appointments.
- Enhance continuity of care by allowing clinicians to seamlessly pick up where the last clinician left off.
- Ensure compatibility of the application on both tablet and laptop devices for flexibility in various work environments.
- Reduce time spent reviewing participant information, allowing clinicians to focus more on direct care.
- Streamline data management to avoid redundancy and prevent gaps in participant care.

These goals reflect the client's need for a solution that optimizes care delivery while supporting the mobile nature of the MHWP.

B.2 Design Objectives

The design of the tablet-based application for VCU's Mobile Health and Wellness Program (MHWP) will focus on addressing the specific needs of clinicians for efficient and reliable access to participant information. These objectives outline what the design will accomplish, ensuring that it meets the functional needs of the program in a measurable and achievable way.

The key design objectives are:

- The design will provide instant access to participant health histories, goals, and progress on both tablet and laptop devices.
- The design will allow clinicians to update and review participant data in real-time with minimal loading times.
- The design will support seamless transitions between clinicians, allowing them to easily review what was last discussed or accomplished with a participant.

- The design will integrate secure data storage and retrieval, ensuring compliance with health data privacy standards (e.g., HIPAA).
- The design will offer a user-friendly interface that reduces time spent navigating records, optimizing the workflow within a mobile or fast-paced clinical setting.
- The design will be completed and fully operational within the project's set timeline, ensuring that it is deployable within the MHWP's specified schedule.
- These objectives are SMART, ensuring that the application is practical, measurable in terms of performance, achievable with available resources, and realistic for the mobile health setting.

B.3 Design Specifications and Constraints

The design for the tablet-based application for VCU's Mobile Health and Wellness Program (MHWP) will have specific constraints and measurable specifications to ensure the solution meets the necessary objectives. These constraints define the limits within which the design must operate, while the specifications will be used to assess the success of the final product.

Key design specifications and constraints include:

- Compatibility constraint: The design must be fully functional on both tablets and laptops, with screen sizes ranging between 9–15 inches.
- Data security constraint: The application must comply with HIPAA regulations, ensuring all participant data is encrypted and securely stored to meet healthcare privacy standards.
- Performance specification: The application must load participant data within 3 seconds on average, to support quick decision-making in fast-paced clinical settings.
- Data storage specification: The application must handle and store information for at least 1,000 participants, ensuring scalability as the MHWP expands.
- Interoperability constraint: The design must integrate with existing MHWP systems, including current participant databases and health information software, with 100% synchronization to avoid data conflicts.
- User interface constraint: The application must be navigable within 3 clicks to reach key participant information, ensuring usability within a mobile workflow.
- Power consumption specification: On a fully charged tablet, the application must function for at least 8 hours, maintaining usability for a full clinical shift.
- Timeline constraint: The design must be completed and deployed within 6 months, aligning with the MHWP's operational schedule.

B.4 Codes and Standards

The design of the tablet-based application for VCU's Mobile Health and Wellness Program (MHWP) must adhere to various medical and computer science-related codes and standards to

ensure legal compliance, safety, data security, and system interoperability. These guidelines set crucial constraints for both the medical and technical aspects of the project.

Key codes and standards include:

- HIPAA (Health Insurance Portability and Accountability Act): This federal law requires the application to protect patient health information (PHI) through encryption, access control, and secure data transmission. Compliance with HIPAA ensures that participant data is handled with confidentiality and privacy safeguards.
- HL7 Standards (Health Level 7): HL7 sets interoperability standards for the exchange, integration, sharing, and retrieval of electronic health information. The application must adhere to HL7 protocols to ensure seamless communication with existing health information systems used by MHWP.
- ISO/IEC 27001 (Information Security Management): This standard provides a framework for managing information security. The application must meet ISO 27001 guidelines for protecting sensitive participant data and ensuring that security risks are systematically evaluated and addressed.
- ISO 9241-210 (Ergonomics of Human-System Interaction): This standard focuses on usability and user experience, ensuring the application's interface is easy to navigate and accessible for clinicians, reducing cognitive load and minimizing user error during fast-paced clinical work.
- IEEE 11073 (Health Informatics – Personal Health Device Communication): The application may need to support communication between medical devices and information systems. Compliance with IEEE 11073 ensures interoperability with personal health devices that may be used by clinicians during participant care.
- WCAG 2.1 (Web Content Accessibility Guidelines): The application must meet WCAG 2.1 standards to ensure accessibility for all users, including clinicians with disabilities. This includes ensuring proper navigation, screen reader compatibility, and color contrast.
- OSHA 1910 (Occupational Safety and Health Standards): If the application requires specific workplace practices for ergonomic or data security equipment, it should align with OSHA standards to ensure that clinicians work in safe and compliant environments.
- NIST SP 800-53 (National Institute of Standards and Technology Security and Privacy Controls): This document provides guidelines on securing information systems, which the application must follow to meet federal-level security requirements, particularly for handling health data in the U.S.

By adhering to these codes and standards, the project will ensure the safety, reliability, security, and interoperability required for a healthcare application that deals with sensitive participant information in a mobile and clinical setting.
The deliverables for this project include all key outputs that will be provided to VCU's Mobile Health and Wellness Program (MHWP) as part of the engineering design process. The deliverables will ensure the tablet-based application meets clinical needs and supports both tablet and laptop use.

Section C. Scope of Work

The project scope defines the boundaries of the project encompassing the key objectives, timeline, milestones and deliverables. It clearly defines the responsibility of the team and the process by which the proposed work will be verified and approved. A clear scope helps to facilitate understanding of the project, reduce ambiguities and risk, and manage expectations. In addition to stating the responsibilities of the team, it should also explicitly state those tasks which fall *outside* of the team's responsibilities. *Explicit bounds* on the project timeline, available funds, and promised deliverables should be clearly stated. These boundaries help to avoid *scope creep*, or changes to the scope of the project without any control. This section also defines the project approach, the development methodology used in developing the solution, such as waterfall or agile (shall be chosen in concert with the faculty advisor and/or project sponsor). Good communication with the project sponsor and faculty advisor is the most effective way to stay within scope and make sure all objectives and deliverables are met on time and on budget.

C.1 Deliverables

The deliverables for this project include all key outputs that will be provided to VCU's Mobile Health and Wellness Program (MHWP) as part of the engineering design process. The deliverables will ensure the tablet-based application meets clinical needs and supports both tablet and laptop use.
Project Deliverables: A fully functioning tablet-based application for MHWP, accessible on both tablet and laptop Design documentation including:

- User interface mockups and interaction flow diagrams Functional requirements and design specifications
- Data flow diagrams and system architecture Secure login and patient information retrieval features
- Integration with VCU's existing health records system (HL7-compliant) Code repository with all relevant code (frontend, backend, database)
- User manuals and training materials for clinicians
- Testing and evaluation reports demonstrating that the application meets security and usability standards (e.g., HIPAA compliance, user experience testing)

Academic deliverables including: Team contract, project proposal, and preliminary design report Fall semester poster and presentation Final design report and Capstone EXPO poster and presentation

C.2 Milestones

The following table outlines key milestones for the development of the tablet-based application for VCU's Mobile Health and Wellness Program (MHWP). These milestones are designed to ensure smooth progress, timely completion, and alignment with the project's overall goals.

Milestone	Description	Timeframe	Completion Date
Initial Requirements Gathering	Meet with MHWP team to understand clinical needs	2 weeks	Oct 10th, 2024
Prototype	Initial User interface design	2 weeks	Oct 23, 2024
Prototype Revised	User interface is revised	2 weeks	Nov 07, 2024
MVP	Minimum Viable Product	2 weeks	Nov 21, 2024
1st MVP Revision	1st Revision of MVP	2 weeks	Dec 09, 2024

C.3 Resources

Resource Type	Description	Source	Estimated Cost
Hardware	Basic laptop and iPad for prototype testing	Project Budget	$800
Software	Open-source Integrated Development Environment (IDE) for coding	Free (e.g., VS Code)	$0
Data Analysis Platform	Free tools for statistical analysis and visualization (e.g., Google Sheets)	Free	$0

Version Control System	GitHub for version control and collaboration	Free (open-source)	$0
Cloud Computing Services	Free tier of AWS or Google Cloud for limited processing and storage	Free	$0
Databases	Access to free health data sources for testing and validation	Project Budget	$0
Libraries/APIs	Open-source libraries for predictive analytics and machine learning (e.g., TensorFlow, Scikit-learn)	Free	$0

Total Estimated Cost: $800

This version reflects a focus on utilizing only free resources, maximizing the budget for any necessary purchases or other project expenses.

Section D. Concept Generation

A number of methods can be used to help generate design concepts from simple reflection and brainstorming, to working the problem backwards, using reverse thinking techniques, and looking to nature for inspiration (i.e. biomimicry). Existing solutions, or components of existing solutions, can be substituted, combined, adapted, modified, put to other uses, eliminated, or rearranged to meet new design objectives and specifications. A minimum of 3 overall design concepts is required for this section although more are welcome. Provide a brief description of how each design concept addresses the design problem. Discuss the potential pros and cons, including and potential risks of failure, of each of these concepts.

It is likely that each design concept may consist of several components. In this case, one or more of these components may offer a sub-problem that can be further explored, modified, or otherwise improved upon. These sub-problems may lead to the addition of several additional design concepts and may require the inclusion of a design concept chart or matrix to organize all ideas and potential solutions.

Provide any initial design sketches, drawings, 3D renderings, or conceptual models such as dataflow diagrams, process flows, etc. developed during the concept ideation phase. All hand drawings should be drawn to scale using basic engineering drafting tools (i.e. ruler, protractor, and compass). Geometric stencils can also be used to help produce quality hand drawings. Drawings should be presented in a profession manner, preferably done on engineering graph paper and using a high-quality scan. All sketches should be labeled to identify major components and different drawing views or projections if applicable. Basic dimensions should be provided to give a general sense of scale. Label each sketch or drawing with the name of the team member responsible for the sketch, the date it was drawn, and the drawing scale.

Section E. Concept Evaluation and Selection

Using a systematic decision-making process, evaluate each of the design concepts and choose the one that is most likely to succeed in meeting the design objectives and constraints. A Decision Matrix, or Pugh Matrix, helps to analyze alternatives, eliminate biases, and make rational decisions through thought and structure. First, work to develop a set of selection criteria for which to evaluate the previously generated design concepts. Selection criteria often include concepts of performance, cost, safety, reliability, risk, etc. Note that the selection criteria developed here will likely be more general than the project design objectives. As with the design objectives, conversations with the client help define appropriate selection criteria.

In many cases, the client may value the selection criteria differently, preferring that more emphasis be placed on some than others. In this case, weighting factors may be used to place more or less importance on the various criteria in the decision making process. Again, conversations with the client can be used to define criteria weighting factors. Often times, these conversations must be analyzed and interpreted by the team to determine which criteria are more important to the client and by how much. Feel free to discuss the assigned weighting factors with the client to see if they seem accurate.

Next, define an associated metric to represent each criteria. Metrics should be specific and quantifiable, providing numerical values that quantify the often vague concepts of the selection criteria. Metrics can be obtained, generated, or estimated through a number of methods including simple background research, preliminary design calculations, or basic analyses. Note that these metrics do not need to specifically align with the design specifications although there may be some commonality between the two. Provide a brief discussion of the rationale for selecting each of the assigned metrics.

Using the defined metrics, evaluated each design concept against all selection criteria by filling out a Decision Matrix. Design concepts can be compared by using simple rank scoring, raw scoring, or weighted scoring techniques and design concept with which to move forward can be selected. This type of process provides a meaningful, unbiased means for choosing a preliminary design concept prior to moving forward with more comprehensive, detailed analyses as provided in the design methodology section below. The results of this process should be discussed with the project client prior to moving forward with the selected design. Table 1 provides an example of a simple decision matrix.

Table 1. Example of a Decision Matrix.

	Design Concept A	Design Concept B	Design Concept C	Design Concept D
Criteria 1				
Criteria 2				
Criteria 3				
Criteria 4				
Criteria 5				
Total Score				

Note: Weights can be assigned to each criterion if desired.

Section F. Design Methodology

Provide a detailed explanation of the methods that will be used to help evaluate, improve, and evolve the design through the iterative engineering design process. Consider that ultimately, the final design must be verified and validated to ensure that it meets all of the previously developed and listed design objectives and specifications. Verification ensures that the design meets all specification, while validation confirms that the design functions as intended such to meet the client's needs. While it is common for initial design concepts to first be evaluated using simplified design criteria and metrics, the chosen design should be advanced, and later verified, using engineering calculations, computational models, experimental data, and/or testing procedures.

Use this section to describe any underlying physical principles and mathematical equations that govern the design. Provide details of any computer-aided modeling techniques used to evaluate the design including the software used, prescribed boundary conditions, and assumptions. Include a detailed description of any experimental testing methods including required testing equipment, test set-up layout, data acquisition and instrumentation, and testing procedures. If one or more prototypes is to be produced and tested, provide a detailed description of how each will be evaluated.

Note: The contents of this section are expected to vary from project to project. Subsections may be appropriate for providing details of analytical, computational, experimental, and/or testing methods. Some potential subsections that may be included in this section are provided. While critical design equations may be provided here, lengthy mathematical derivations may be included in an appendix. Validation procedures are critical and all projects should address such topic.

F.1 Computational Methods (e.g. FEA or CFD Modeling, example sub-section)

F.2 Experimental Methods (example subsection)

F.3 Architecture/High-level Design (example subsection)

F.5 Validation Procedure

Describe how the design team will validate that the final design meets the client's needs. This section should include a plan to meet with the client towards the end of the project to discuss final design details and demonstrate a prototype, experimental test, and/or simulation results. Provide a relative time frame for this validation to occur (e.g. "mid-March" or "early-April"). Include a brief discussion on how client feedback will be captured, such as a

formal survey, interview, or observation notes of the client using the prototype. It may also include plans to solicit feedback from other stakeholders and/or potential users.

Section G. Results and Design Details

Use this section to highlight the major results of the design methodology described above including important analytical, computational, experimental, modeling, assembly, and testing results. This section should be one of the most substantial sections of the report showcasing all of the hard work and effort that went into the completion of the final design and delivery of the project deliverables. Show how the identified problem was solved.

Highlight the prominent features of the final design through analysis results, modeling, drawings, renderings, circuit schematics, instrumentation diagrams, flow and piping diagrams, etc. to show that the design functions as intended and meets all design objectives and constraints. Overview designs such as dataflow diagrams, process flow, swim lane diagrams, as well as presentation-layer designs (e.g. storyboards for front-ends) should be included here. Detailed designs such as database designs, software designs, procedure flowcharts, or pseudocode should be included here. Support computational and experimental results with key plots and figures. All supporting figures should be clearly labeled and annotated to highlight the most important points of the figure (i.e. explicitly point out what the reader should focus on or understand about the image).

Note that while all results should be used to help inform design decisions, not all results may be necessary to include in the main body of the report. Extraneous supporting results (e.g. graphs, data, design renderings, drawings, etc.) that are not necessary for presenting the fundamental findings can be placed in one or more appendices. Detailed documentation of each program module can be provided as appendix.

G.1 Modeling Results (example subsection)

G.2 Experimental Results (example subsection)

G.3 Prototyping and Testing Results (example subsection)

G.4. Final Design Details/Specifications (example subsection)

Note that while the design constraints and specifications may have provided minimum or maximum values, or ranges or values, that the design needed to meet, the final design specifications should be listed here showing that the required design values were met. A list of final design details can also be included demonstrate fulfillment of the design objectives.

Note: Preliminary results should be included in the Preliminary Design Report to show the progress made of the selected design concept to-date. This section should be updated for the Final Design Report to include documentation of all of the work that was completed on the project throughout the entirety of the academic year.

Section H. Societal Impacts of Design

In addition to technical design considerations, contemporary engineers must consider the broader impacts that their design choices have on the world around them. These impacts include the consideration of public health, safety, and welfare as well as the potential societal, political/regulatory, economic, environmental, global, and ethical impacts of the design. As appropriate for the project design, discuss how each of these considerations influenced design choices in separate subsections. How will the design change the way people interact with each other? What are the political implications of the design? Does the technology have the potential to impact or shift markets? Does the design have any positive or negative effects on the environment? Don't forget to consider unintended consequences such as process or manufacturing byproducts. What impacts might the design have on global markets and trade? Are there any ethical questions related to the design?

While it is hard to forecast the various impacts of a technology, it is important to consider these potential impacts throughout the engineering design process. When considered during the early stages of the design phase, consideration of these impacts can help determine design objectives, constraints, and specifications and help drive design choices that may mitigate any potential negative impacts or unintended consequences.

Note: A minimum of 4 of these design considerations, including the consideration of public health, safety, and welfare, are required for the Preliminary Design Report while a section for all considerations must be included in the final design report.

H.1 Public Health, Safety, and Welfare

Provide a list of all design safety features and provide a brief description of each. Discuss the potential effects the design may have on public health, safety, and welfare. References to the codes and standards previous provided and the organizations that produced them may be summarized or referenced here.

H.2 Societal Impacts

H.3 Political/Regulatory Impacts

H.4. Economic Impacts

H.5 Environmental Impacts

H.6 Global Impacts

H.7. Ethical Considerations

Section I. Cost Analysis

Provide a simple cost analysis of the project that includes a list of all expenditures related to the project. If an experimental test set-up or prototype was developed, provide a Bill of Materials that includes part numbers, vendor names, unit costs, quantity, total costs, delivery times, dates received, etc. Do not forget to include all manufacturing costs incurred throughout the completion of the project. If the design is expected to become a commercial product, provide a production cost estimate including fixed capital, raw materials, manufacturing (including tooling and/or casting), and labor costs to produce and package the device. Note that this type of detailed cost analysis may be listed as a project deliverable.

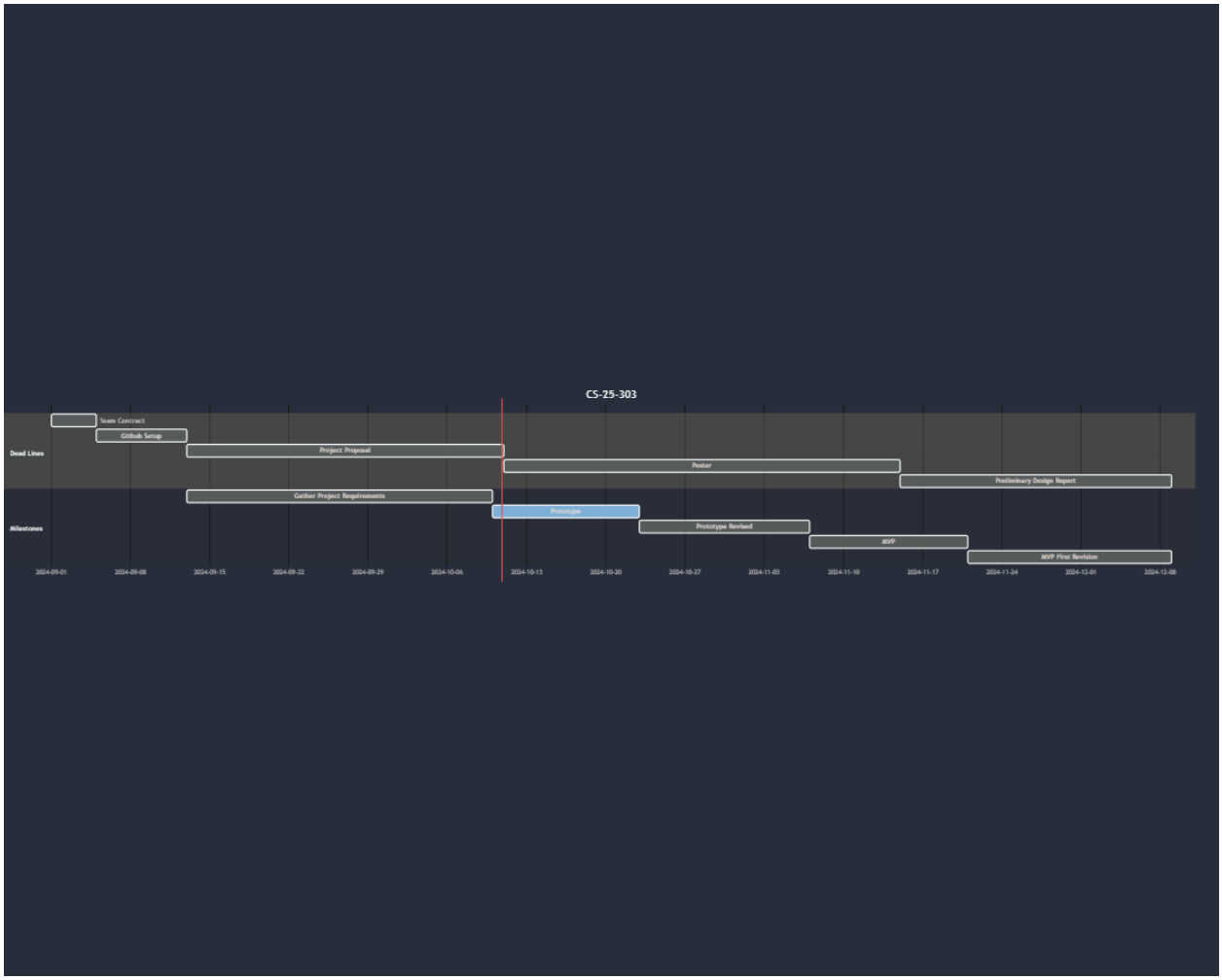
Note: The Preliminary Design Report should include all costs incurred to date. It is expected that this section will be expanded and updated between the preliminary and final design reports.

Section J. Conclusions and Recommendations

Use this section to summarize the story of how the design team arrived at the final design. Focus on the evolution of the design through the use of the engineering design process including lessons learned, obstacles overcome, and triumphs of the final design. Revisit the primary project goals and objectives. Provide a brief summary of the final design details and features paramount to the function of the design in meeting these goals and objectives.

A discussion may be included to discuss how the design could be further advanced or improved in the future. If applicable, summarize any questions or curiosities that the final results/design of this effort bring to mind or leave unanswered. If this project might continue on as a future (continuation) senior design project, detail the major milestones that have been completed to date and include any suggested testing plans, relevant machine drawings, electrical schematics, developed computer code, etc. All relevant information should be included in this section such that future researchers could pick up the project and advance the work in as seamless a manner as possible. Documents such as drawings, schematics, and codes could be referenced here and included in one or more appendix. If digital files are critical for future work, they should be saved on a thumb drive, external hard drive, cloud, etc. and left in the hands of the project advisor and/or client.

Appendix 1: Project Timeline



Appendix 2: Team Contract (i.e. Team Organization)

Step 1: Get to Know One Another. Gather Basic Information.

Task: This initial time together is important to form a strong team dynamic and get to know each other more as people outside of class time. Consider ways to develop positive working relationships with others, while remaining open and personal. Learn each other's strengths and discuss good/bad team experiences. This is also a good opportunity to start to better understand each other's communication and working styles.

Team Member Name	***Strengths each member bring to the group***	***Other Info***	***Contact Info***
Tyree Carpenter	Very communication oriented, good public speaker, versatile.	Proficient in JavaScript-based frameworks and Java, with some experience working with relational databases.	carpentertd@vcu.edu
Shikriti Ghosh	Front-end development, organizational skills,	Proficient in Java, C, and Python; experience with Quarto, Figma prototyping, and working with databases	ghoshs2@vcu.edu
Ebenezer Hailu	Communication, leadership, organization, adaptation	Proficient in Java, C	hailuea@vcu.edu
Wyatt Herkamp	Backend development, quick learner, and database design	Proficient in Rust, Kotlin/Java, and SQL General Experience in Vue, Typescript, C, Python, and CSS	herkampwj@vcu.edu

Other Stakeholders	***Notes***	***Contact Info***
John Leonard	Professor Leonard teaches databases, user interfaces and video game design, with research interests covering modeling, analytics and visualization. Dr. Leonard will provide counsel, as well as act as a liaison between us and our sponsor.	jdleonard@vcu.edu
Lana Sargent	Associate Dean, Office of Practice and Community Engagement and Associate Professor at VCU's School of Nursing. Dr. Sargent will be our primary point of contact surrounding this project.	lsargent@vcu.edu

Step 2: Team Culture. Clarify the Group's Purpose and Culture Goals.

Task: Discuss how each team member wants to be treated to encourage them to make valuable contributions to the group and how each team member would like to feel recognized for their efforts. Discuss how the team will foster an environment where each team member feels they are accountable for their actions and the way they contribute to the project. These are your Culture Goals (left column). How do the students demonstrate these culture goals? These are your Actions (middle column). Finally, how do students deviate from the team's culture goals? What are ways that other team members can notice when that culture goal is no longer being honored in team dynamics? These are your Warning Signs (right column).

Resources: More information and an example Team Culture can be found in the Biodesign Student Guide "Intentional Teamwork" page (webpage | PDF)

Culture Goals	***Actions***	***Warning Signs***
Attend weekly meetings, and if unable to make meetings provide explanation PRIOR to meeting start time.	- Set up meetings in shared calendar - Send reminder in discord/text group chat in day before and of the meeting	- Student misses first meeting without explanation, warning is granted - Student misses meetings afterwards – issue is brought up with faculty advisor - Student consistently does not show up to meetings – issue is brought up with faculty advisor
Constructive Communication	- When feedback is given it is given constructively. - When giving feedback give a proposed solution or alternative	- If consistent negative feedback is given without proposed solutions it will be brought up with the faculty advisor
Collaboration and Teamwork	- If someone is behind on their task and ask for help, help them out if you're finished with yours - Approach collaborations with an open mind	-Start with a private conversation addressing the team's concerns. - If a member is consistently behind, bring it up to the faculty advisor.

	- Engage actively in team discussions and collaborative tasks	

Step 3: Time Commitments, Meeting Structure, and Communication

Task: Discuss the anticipated time commitments for the group project. Consider the following questions (don't answer these questions in the box below):

- What are reasonable time commitments for everyone to invest in this project?
- What other activities and commitments do group members have in their lives?
- How will we communicate with each other?
- When will we meet as a team? Where will we meet? How Often?
- Who will run the meetings? Will there be an assigned team leader or scribe? Does that position rotate or will same person take on that role for the duration of the project?

Required: How often you will meet with your faculty advisor advisor, where you will meet, and how the meetings will be conducted. Who arranges these meetings?
See examples below.

Meeting Participants	***Frequency Dates and Times / Locations***	***Meeting Goals Responsible Party***
Tyree Carpenter Shikriti Ghosh Ebenezer Hailu Wyatt Herkamp	Primary: Room 0101 at Engineering Building West Alternative: Discord Server Time: 6pm, Thursdays	Update group on challenges and accomplishments for the week. Update discord to reflect our team's current status Go through future goals of the project
Tyree Carpenter Shikriti Ghosh Ebenezer Hailu Wyatt Herkamp Faculty advisor John Leonard	Primary: As needed in Room 0101 during our regular weekly meeting Alternative: John Leonard's Office At least Once a month.	Get feedback on current progress. Ask for advice or input from John Leonard.
Tyree Carpenter Shikriti Ghosh Ebenezer Hailu Wyatt Herkamp Project sponsor Lana Sargent	At least Once a month. Location: TBD	Update the project sponsor and make sure we are on the right track. Get Input on the current product.

Step 4: Determine Individual Roles and Responsibilities

Task: As part of the Capstone Team experience, each member will take on a leadership role, ***in addition to*** contributing to the overall weekly action items for the project. Some common leadership roles for Capstone projects are listed below. Other roles may be assigned with approval of your faculty advisor as deemed fit for the project. For the entirety of the project, you should communicate progress to your advisor specifically with regard to your role.

- **Before meeting with your team**, take some time to ask yourself: what is my "natural" role in this group (strengths)? How can I use this experience to help me grow and develop more?
- **As a group,** discuss the various tasks needed for the project and role preferences. Then assign roles in the table on the next page. Try to create a team dynamic that is fair and equitable, while promoting the strengths of each member.

Communication Leaders

Suggested: Assign a team member to be the primary contact for the client/sponsor. This person will schedule meetings, send updates, and ensure deliverables are met.

Suggested: Assign a team member to be the primary contact for faculty advisor. This person will schedule meetings, send updates, and ensure deliverables are met.

Common Leadership Roles for Capstone

1. **Project Manager:** Manages all tasks; develops overall schedule for project; writes agendas and runs meetings; reviews and monitors individual action items; creates an environment where team members are respected, take risks and feel safe expressing their ideas.
   Required: On Edusourced, under the Team tab, make sure that this student is assigned the Project Manager role. This is required so that Capstone program staff can easily identify a single contact person, especially for items like Purchasing and Receiving project supplies.
2. **Logistics Manager:** coordinates all internal and external interactions; lead in establishing contact within and outside of organization, following up on communication of commitments, obtaining information for the team; documents meeting minutes; manages facility and resource usage.
3. **Financial Manager:** researches/benchmarks technical purchases and acquisitions; conducts pricing analysis and budget justifications on proposed purchases; carries out team purchase requests; monitors team budget.
4. **Systems Engineer:** analyzes Client initial design specification and leads establishment of product specifications; monitors, coordinates and manages integration of sub-systems in the prototype; develops and recommends system architecture and manages product interfaces.
5. **Test Engineer:** oversees experimental design, test plan, procedures and data analysis; acquires data acquisition equipment and any necessary software; establishes test protocols and schedules; oversees statistical analysis of results; leads presentation of experimental finding and resulting recommendations.
6. **Manufacturing Engineer:** coordinates all fabrication required to meet final prototype requirements; oversees that all engineering drawings meet the requirements of machine shop or vendor; reviews designs to ensure design for manufacturing; determines realistic timing for fabrication and quality; develops schedule for all manufacturing.

Team Member	*Role(s)*	*Responsibilities*
Tyree Carpenter	Project Manager	Manages all tasks; develops overall schedule for project; writes agendas and runs meetings; reviews and monitors individual action items; creates an environment where team members are respected, take risks and feel safe expressing their ideas.
Shikriti Ghosh	Front-end Developer	Oversee UI/UX, develop and refine Figma prototype, App Layout Design
Ebenezer Hailu	Financial Manager	Researches/benchmarks technical purchases and acquisitions; conducts pricing analysis and budget justifications on proposed purchases; carries out team purchase requests; monitors team budget.
Wyatt Herkamp	Systems Engineer	- Designing Database

Step 5: Agree to the above team contract

Team Member: Tyree Carpenter *Signature: Tyree Carpenter*

Team Member: Shikriti Ghosh *Signature: Shikriti Ghosh*

Team Member: Ebenezer Hailu *Signature: Ebenzer Hailu*

Team Member: Wyatt Herkamp *Signature: Wyatt Jacob Herkamp*

References

Provide a numbered list of all references in order of appearance using APA citation format. The reference page should begin on a new page as shown here.

[1] VCU Writing Center. (2021, September 8). *APA Citation: A guide to formatting in APA style.* Retrieved September 2, 2024. https://writing.vcu.edu/student-resources/apa-citations/
[2] Teach Engineering. *Engineering Design Process*. TeachEngineering.org. Retreived September 2, 2024. https://www.teachengineering.org/populartopics/designprocess