VCU College of Engineering

Project CS-25-317 and *Reminder App with Zoom and Telehealth Integration for Improved Independence for TBI/PTSD Patients*

Project Proposal

Prepared for

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Quality of Life Plus

By

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Under the supervision of

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Date

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Executive Summary

Soldiers, first responders, and many others on the front line during emergencies and disasters may become diagnosed with TBI/PTSD if their jobs put them in traumatic situations. These experiences haunt them for years or even the rest of their lives. People who have TBI/PTSD may need help throughout their day-to-day lives, or need help occasionally so that they can live in the way they hope to.

For this project, we are creating a reminder application with Zoom integration that allows users to have more control over their lives and more freedom to live their lives without the need to rely on others as heavily. In order to accomplish this, we are working with someone who has PTSD and can tell us what works for them versus what doesn't work so that it is more customized to their situation. This is not the first version of this app as in previous years other students made headway in integrating a reminder app with Alexa and RokuTV for general use. However, this year, we are creating the app with specific client needs in mind. It will be a whole new app that builds from the aspects of previous years that apply to what the client requests. The app will incorporate text-to-speech technology to go along with reminders so that users will know what upcoming events they have throughout the day rather than just hearing an alarm that can easily be ignored.

In order to accomplish the goals of the app, our team has weekly meetings to ensure our team is completing milestones in time as well as separate weekly meetings with our faculty advisor to ensure we are on the right track and that what we are trying to accomplish is feasible. In addition, we meet with our sponsor and client bi-weekly. This way, our design goes along with what the client needs, and the app works in a way that aligns with the client's technological literacy.

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Section A. Problem Statement

Traumatic Brain Injury (TBI), Post Traumatic Stress Disorder (PTSD) or other related conditions can often make it difficult to manage daily tasks. Time management and concentration can pose greater challenges for those living with these medical conditions. Keeping track of appointment times or managing medications may require additional assistance.

PTSD can occur after experiencing a traumatic event. Veterans and first responders have a higher risk for developing TBI or PTSD, due to the nature of their work. It is difficult to find the exact number of people who have been diagnosed with PTSD. The U.S Department of Veteran affairs estimates 5 out of 100 adults will have PTSD for a given year. Roughly 13 million Americans had PTSD in 2020 [2]. Between 2000 and 2017, the Department of Defense documented over 375,000 cases of TBI diagnosed among U.S. military personnel worldwide [3]. These conditions can make it difficult to adjust to civilian life or navigate daily routines.

Our client for this project is Karina Medina. She has been diagnosed with PTSD and will collaborate with us to develop an application tailored to her specific needs, while also ensuring it will be useful for others as well. Karina has told us that she would like to be more self-reliant to gain a greater sense of independence in her life.

This project centers on software development, accessibility, and inclusive design, requiring a solid understanding of design principles and web development technologies. Karina has mentioned that she isn't well-versed in complex technology, so we're also prioritizing the creation of a user-friendly application that can accommodate a wide range of users. The sponsor of this project is the Quality of Life Plus Program (QL Plus), a non-profit organization founded in 2009 to develop tailored solutions for veterans and first responders. QL Plus partners with universities, providing engineering students the opportunity to collaborate with veterans and design solutions that have real-world impact.

Several technological initiatives have been developed to assist individuals with these conditions. Digital assistants like Alexa and Siri enhance accessibility, providing powerful yet general support. Wearable devices, such as the Apple Watch, offer features like reminders and notifications, but some smartwatches can be overly complex to set up for specific needs. Additionally, mobile apps like PTSD Coach, launched in 2011, focus on psychological support through features such as coping skills, symptom monitoring, and access to social or professional resources [4]. However, this app lacks personalized reminders, which may be a key feature that users desire.

Previous iterations of this project aimed to create an application with similar objectives, primarily focusing on facilitating communication between users and caregivers. This included features such as reminders for appointments and medications, as well as integrating with RokuTV or Alexa to enhance user's access to the application. This year, we have shifted our focus from the user-caregiver dynamic to promote greater independence. Karina has expressed that regaining this independence can profoundly impact the lives of individuals in situations similar to hers. The current application builds upon the integration with Alexa, emphasizing the reminder feature derived from the user's calendar.

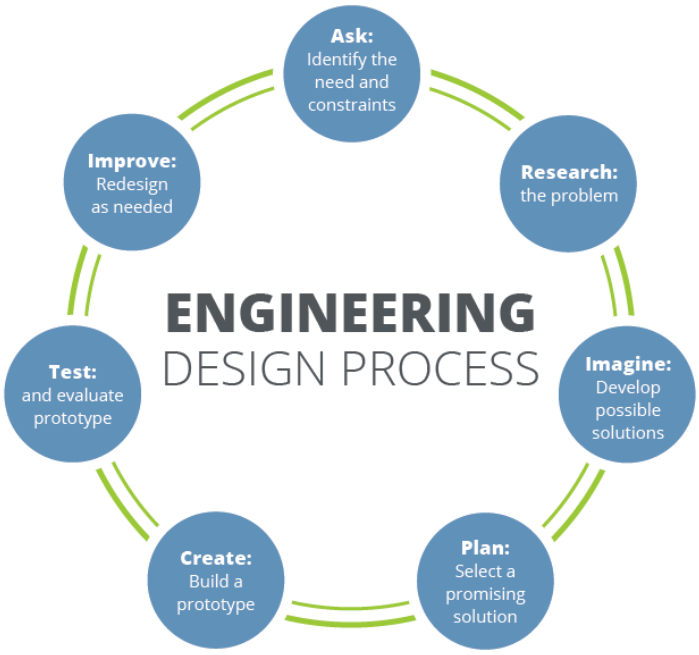

Figure 1. The iterative nature of the engineering design process [1].

Section B. Engineering Design Requirements

This section describes the goals and objectives to make an effective reminder application that meets the needs of our client. This includes the specifications and constraints of the design that has more explanation on how the objectives will be met. Specifically, this section outlines client needs that are the basis for the entire design, objectives that describe how the application should work in order to fulfill the client needs, and ensures that we, as the designers, adhere to what we have promised the client.

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

Sponsored by QLPlus, we're creating a web application for our client who was diagnosed with PTSD and does not have good time perception when it comes to keeping track of tasks. Within our bi-weekly meetings with our client and sponsor, we have come up with the main goals to be achieved as the end result of the web application.

- To design a notification system that uses text-to-speech integration
- To host all calendar events, meetings, and tasks to do in one place
- To have an application that works in the home and at work
- To integrate with Alexa to announce notifications or reminders
- To have reminders occur in constant intervals from a certain time before the event up until the start of the event

B.2 Design Objectives (SMART: Delete once completed)

- The design will be simple and easy to use for those who are not familiar with technology.
- The design will allow for Alexa to announce main notifications or reminders for the user.
- The design will allow for the user to customize reminders to ensure that the reminders align with the importance of the task.
- The design will have default settings for users in the case that they do not wish to have to alter any details of the reminder.
- The design will have device priority to ensure that the reminder is seen by the user on one of their devices, but not so that the reminder is on every device at the same time.
- The design will have an icon to guide the user to the web application to ensure ease of access for the user.
- The design will allow for the user to save their information on the website via account creation.
- The design will allow for events and tasks to be added by the user directly on the website as well as by importing them from other apps.

B.3 Design Specifications and Constraints

- Design must be completed by the beginning of April 2025

- Development cost of the design must not exceed the $1,000 allocated for the project by VCU
- Design must adhere to standard security protocols for data protection to ensure a safe to use web application
- Design must include a way to introduce the aspects of the web application to the user to ensure an ease of use for the user
- Design must have a customization tool for users to allow for changing of information regarding the reminders they set.
- Design must extract information from Google Calendar and Outlook using their APIs so that events can be imported to the web application
- Design must be able to be used on a variety of devices with an icon for easy access to the web application
- Design must have text-to-speech functionality to ensure users know what the reminder they're getting is for.

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.

C.1 Deliverables

List of Deliverables:

- Team Contract | September 6th, 2024
- Code and Document Repository (Github) | September 13th, 2024
- Project Proposal | October 11th, 2024
- Fall Design Poster/Presentation | November 15th, 2024
- Preliminary Design Report | December 9th, 2024
- Final Design Report | Spring 2025
- Capstone EXPO Poster | Spring 2025

Addressable Issues:

- Access to campus resources might have limited access to necessary facilities for deliverables.
- Variability in team members' schedules and commuting challenges
- Potential technology issues (e.g., software access, internet connectivity).
- Importance of shared drives/folders for efficient document management.
- Possible delays in receiving feedback from stakeholders.

C.2 Milestones

The following milestones represent the key phases of our project, essential for delivering successful outcomes from the initial brainstorming session to the Capstone Expo Poster presentation.

During the first two weeks, our team focused on organizing ourselves, assigning roles, and scheduling our regular meetings. We took the time to learn about each other's strengths and interests, ultimately selecting Aryan Garg as our Project Manager. We also defined specific roles for each team member and established weekly meeting times with our advisor and sponsor. This groundwork was crucial for completing the Team Contract deliverable by September 6, 2024.

As we prepared for our Project Proposal (Introduction) deliverable due on October 11, 2024, we encountered several important milestones. In the two to three weeks following our initial meeting with our advisor, we had the opportunity to connect with our sponsor, QLPlus, and our client, Karina Medina, for the first time. During this meeting, we received a comprehensive overview of the project, which emphasized the necessity of tailoring our application to meet Karina's specific preferences.

To effectively brainstorm ideas, we sought her input on her goals and expectations for the project, allowing us to gain valuable insights into her vision. Following this discussion, our team engaged in collaborative sessions to generate potential ideas. In preparation for the Project Proposal, we worked on refining our final concepts to present to Karina, carefully analyzing the features we could prioritize, those we would aim to include, and others that might need to be set aside due to the project's scope.

After our Project Proposal on October 11, 2024, we will take the following two weeks to create a mockup design of the user interface for the web application. We will also work on a prototype to demonstrate how the application will be accessed from multiple devices. We will be able to present these to our sponsor and client for their feedback.

Once we finalize our design, we will shift our focus toward preparing for the Fall Design Poster, due on November 15, 2024. This phase will involve making any necessary purchases and laying the groundwork for developing our application. Key features, such as Bluetooth capability, text-to-speech functionality, and personalized reminders, will be addressed and ready for implementation. Additionally, we will determine the software applications and programming languages needed to move forward.

The final milestones in the fall semester lead to the Preliminary Design Report, due December 9th, 2024. We should be working out any problem areas with our prototypes and prepare them to present to our sponsor and client.

During the beginning of the spring semester, we will be going through iterations of testing, evaluating, and refining the application. After those few weeks, we will have our final project with our documentation and report. Once our project is done, we will focus on preparing for the Capstone EXPO. We will prepare an abstract and poster to present our project.

C.3 Resources

The physical resources essential to this project will be access to a smartwatch and a bluetooth earpiece. We will coordinate with Karina to order the specific models she would like to test our application on. We will get a Fitbit smartwatch and a Fitpolo, as well as multiple bluetooth earpieces to test on. Additionally, our project requires access to digital resources, including the Outlook Calendar API, Google Calendar API, and Google Workspace, to develop our application and integrate the user's digital calendars. Furthermore, we will need ElevenLabs to enhance our text-to-speech functionality and improve overall usability. The Project Budget will be allocated to purchase these resources.

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 specifications, 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 topics.

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

Provide a Gantt chart of similarly composed visual timeline showing the start and end dates of all completed tasks and how they are grouped together, overlapped, and linked together. Include all senior design requirements including design reports and Expo materials (i.e. Abstract, Poster, and Presentation). All major milestones should be included in the 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***
Rebecca Browder	Organization, Communication, and Open-mindedness	I enjoy creative projects and activities.	browderrj@vcu.edu
Aryan Garg	Communication, Dedication, and Flexibility	I enjoy being a part of a team and meeting new people.	garga8@vcu.edu
Lavale Butterfield	Communication, time-management, and problem solving	I enjoy making projects and being a part of a team.	butterfieldl@vcu.edu
Parker Dizon	Adaptability, Positive, and Determination	I enjoy meeting new people and learning new information to create new projects.	dizonpr@vcu.edu

Other Stakeholders	***Notes***	***Contact Info***
Tamer Nadeem	Technical Advisor.	tnadeem@vcu.edu
Kristie Yelinek,	Project Sponsor, Facilitator between client	kristie.yelinek@qlplus.org

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***
Being on time	- Meeting times are added to group Calendar - Reminder message sent day of meetings	- Student is late consistently - Student is issued a warning. - Student misses meetings without explanations - Issue is brought up with the professor.
Work split-up evenly	- Ensure that nobody does too much work - Keep in contact with team members to make sure everyone is able to complete their work	- A student works a lot longer than other people in the group - A student takes a lot less time to complete their task than others
Contribute strengths and learn from other team members.	- Continuously learn from team members by asking questions.	- Not communicating effectively - Not putting in effort

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***
Students Only	As Needed, On Discord Voice Channel	Update group on day-to-day challenges and accomplishments (Parker will record the information that we go over to keep faculty advisor updated in meetings)
Students Only	Every Thursday after 2:30PM in the Cabell Library	Actively work on project (Parker will record necessary information for future meetings and keeping the faculty advisor up to date)
Students + Faculty advisor	Thursdays 12:00PM-12:30PM either on Zoom or in-person in ERB 2330	Update faculty advisor and get answers to our questions (Parker will take down meeting notes)
Project Sponsor/Client	Bi-weekly on Zoom Time: 12:00PM - 12:30PM	Update project sponsor, make sure we are on the right track, and ask questions about what the client would want (Parker will take down meeting notes)

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***
Rebecca Browder	Logistics Manager/System Engineer	- Organize meetings, obtaining information for the team, establishing contact with outside organizations - Analyzes Client design specifications, recommends system architecture and manages product interfaces
Parker Dizon	Recorder/Financial Manager/Test Engineer	- Keep a record of meeting notes, what was accomplished, who's doing what - Research what purchases/subscriptions we may need to complete the project - Tests for errors or bugs and ensure that the product is functioning how it should after lead tester
Lavale Butterfield	Lead Test engineer/ Project Manager	- Test for bugs and make sure the product is functioning correctly. - Make sure deadlines are met.
Aryan Garg	Project Manager/ System Engineer	- Write a schedule for the team - Oversee team - Make specifications for designs

Step 5: Agree to the above team contract

Team Member: Aryan Garg *Signature: Aryan Garg*

Team Member: Lavale Butterfield *Signature: Lavale Butterfield*

Team Member: Parker Dizon *Signature: Parker Dizon*

Team Member: Rebecca Browder *Signature: Rebecca Browder*

References

[1] Teach Engineering. *Engineering Design Process.* TeachEngineering.org. Retrieved September 2, 2024. https://www.teachengineering.org/populartopics/designprocess

[2] Veterans Affairs. (2018, September 13). *Va.gov: Veterans Affairs.* How Common is PTSD in Adults? Retrieved September 28, 2024. https://www.ptsd.va.gov/understand/common/common_adults.asp

[3] Veterans Affairs. (2018, November 29). *Va.gov: Veterans Affairs*. TBI Symptoms, Effects, & Veteran Support. Retrieved September 28, 2024. https://www.mentalhealth.va.gov/tbi/index.asp

[4] Kuhn, E. (2019, August 1). *PTSD Coach App*. Office of Research & Development. Retrieved September 29, 2024. https://www.mentalhealth.va.gov/tbi/index.asp