**ENED 1100 Project: Structured Ideation**

**Due:** **Sunday, October 22nd by 11:59 p.m.**

**Approved to use Generative AI:** For this assignment, you must use ChatGPT in Task 3 part 2. You will be asked to submit your chat(s) as part of this assignment.

**Team Assignment:** See the course syllabus for a definition of a team assignment.

**Objective:** To work with your team members to brainstorm ideas for the design of your team’s project and interact with generative AI as a brainstorming assistant.

In the previous assignment, the Design Specification Review, your team outlined stakeholder needs and translated them into criteria, considered constraints limiting your design, and identified the functionality the carbon sequestration robot must have to succeed. Thus, your team has a list of items the robot needs to do, but now comes the time to determine how it will accomplish each task. You may have some initial ideas of what different components of your robot might look like and have already implemented your first pass at walking. This assignment will provide structured approaches for which you can systematically generate ideas for each function. This assignment will involve leveraging structured brainstorming methods and interacting with ChatGPT to assist you in developing concepts for your robot.

**Task 1: Team Permission to Use This Assignment in a Research Project**

Considering generative AI is so new in education, the Department of Engineering and Computing Education is trying to develop the right ways to teach it in ENED 1100 and 1120 by researching how students interact with tools like ChatGPT to solve problems, like engaging in brainstorming like you did here. To be able to share what we find so other instructors can adapt and integrate this technology into courses for students like you, we’ll need your permission to use your work in this assignment in a research project. [Your permission is documented in the consent form linked here and in the Canvas submission link](https://mailuc-my.sharepoint.com/:w:/g/personal/reepindp_ucmail_uc_edu/Eci5y6mjKKlIpL8dYnJQd48BOFn0IZeqt08u9uWkdauG5w?e=OKFx67), which outlines the project's details and what participation in the research means.

Please complete the consent form first when you meet with your team if you are willing to share your work in this assignment. **Everyone who contributed to the assignment and consents needs to sign a consent form.**

Your decision *does not* have any impact on your grade in ENED 1100. If have any questions or concerns, please contact Dr. David Reeping ([reepindp@ucmail.uc.edu](mailto:reepindp@ucmail.uc.edu))

**Task 2: Implementing a Model of Brainstorming**

In class, we’ve discussed the idea of brainstorming, which is a basic group-based technique for ideating. A brainstorming session is based on two principles: deferring judgment and reaching for quantity – in other words, coming up with as many ideas as possible no matter how silly they might be. However, these sessions can be undermined by various procedural and social factors. For example, *evaluation apprehension* might occur, which is when someone with an idea is afraid to share because they believe the group may react negatively. *Production blocking* might also occur, where one group member dominates the conversation. Thus, there are other techniques to reduce the likelihood of these types of inefficiencies occurring. You are asked here to explore one of the models to explore how your design might accomplish a subset of its functions. **Read through the different methods first and decide which one you’d like to use.**

***Hybrid Brainstorming:*** Unlike traditional brainstorming, this method begins with each team member generating a list of ideas **without communication among team members.** Once everyone submits their ideas, the team meets to synthesize them and rank-order each one to develop a shorter list of promising ideas. The key here is to avoid linking ideas to specific individuals. You could do this physically by typing out the ideas, cutting them into strips, placing them into a container, and mixing them up. Writing ideas out on notecards would also work. You could also do this using a Microsoft Form ([Instructions are linked here if you choose to use Forms](https://mailuc-my.sharepoint.com/:v:/g/personal/reepindp_ucmail_uc_edu/ET7O4e_F9hdJkd8hIvOOWloBs8MjP7jhcI3RFgYOR9tHVw?nav=eyJyZWZlcnJhbEluZm8iOnsicmVmZXJyYWxBcHAiOiJPbmVEcml2ZUZvckJ1c2luZXNzIiwicmVmZXJyYWxBcHBQbGF0Zm9ybSI6IldlYiIsInJlZmVycmFsTW9kZSI6InZpZXciLCJyZWZlcnJhbFZpZXciOiJNeUZpbGVzTGlua0RpcmVjdCJ9fQ&e=tAXUZr)).

***6-3-5 Brainwriting:*** This method was developed by Bernd Rohrbach in 1968 to provide teams with a method to develop over 100 ideas in 30 minutes. The best implementation of this is done by gathering your team around a table. Each team member begins with a blank sheet of paper. The session is broken down into rounds. Each round consists of writing down 3 ideas within 5 minutes – which represents the “3” and “5” in “6-3-5.” After 5 minutes, pass the paper to the teammate on your left. The next round begins, and you must come up with 3 ideas building on the previous 3 ideas on the sheet. **During this process, there is no verbal communication.** This process continues until each member of the team has completed each sheet. Classically, the “6” in “6-3-5” represented the number of people in the group, but this doesn’t limit the technique to teams of that size. **In your teams, you should aim for 6 rounds.** After the session is complete, the team then discusses the results and rank-orders the various ideas to develop a list of possible solutions to pursue.

***Wrong Theory Protocol:*** This relatively new technique was created by Vanessa Svihla and Luke Kachelmeier in 2020 to place empathy at the center of the design process and force engineers and designers to focus on the needs of diverse stakeholders. To develop the most empathetic design, this method inverses the objective of traditional brainstorming. Instead of generating “good” ideas that meet the criteria, **the goal is to develop ideas that** **harm and humiliate the user(s) and stakeholders – in other words, the worst design possible.** So, in this brainstorming session, you would consider how the design could violate the criteria to the extent that it would threaten the stakeholders in any number of ways, such as safety, health, and finances.The session lasts 60 minutes, where the first half is focused on developing the worst design possible. The second half involves breaking down the different designs and extracting ideas to best address the criteria. Often this process uncovers new criteria and constraints.

***The Six Thinking Hats:*** This technique was created by Edward de Bono in 1985, which was detailed in his book *Six Thinking Hats.* Brainstorming requires what is called **lateral thinking**, which involves a pattern of thinking that focuses on unconventional and diverse ideas. However, different individuals may default to a certain way of thinking, especially in group settings. Someone may always be a pessimist, always pointing out flaws in a possible solution; alternatively, another person may be overly focused on the data and unwilling to consider risky ideas that have not been tested. The premise of the six thinking hats is to force the team to unite around a common mode of thinking to fully explore possible solutions. Each hat is given a different kind of thinking process and a color to distinguish them, but the color does not necessarily imply any meaning.

|  |  |
| --- | --- |
| **Hat Type** | **Description of Hat’s Thinking Process** |
| Blue: The manager | Set up the problem and ask for summaries, results, and conclusions. This hat is concerned about the process. |
| White: The data guru | Scope out the problem. What data do you have? What facts about the problem do you know? What do you need to find out? |
| Green: The creative | Generate as many ideas as possible. Don’t worry about their feasibility. |
| Yellow: The optimist | Find all of the positives in the presented ideas. Only consider benefits. |
| Red: The one in their feelings | Share any initial reactions or feelings you have about the possible ideas. You don’t need to justify these feelings. |
| Black: The pessimist | Focus on all the weaknesses, dangers, or risks in the ideas. Support these with appropriate reasoning. |

To use the six thinking hats, you meet as a group and “wear” each hat for approximately

2 minutes. Start with Blue, continue with White, and continue down the table until you reach Black. **Red is typically worn for only 30 seconds.** One round will take you 8.5 minutes. **Repeat the loop at least three times.** You could adjust the timing with each hat so the process moves slower.

1. Pick one method of brainstorming (i.e., Hybrid, 6-3-5 Brainwriting, Wrong Theory Protocol, or Six Thinking Hats). **Mark an X in the box next to the one you chose.**

|  |  |
| --- | --- |
|  | Hybrid Brainstorming |
|  | 6-3-5 Brainwriting |
|  | Wrong Theory Protocol |
|  | Six Thinking Hats |

1. Implement the model of brainstorming with your team to generate ideas for your robot to accomplish one of its major functions. You may revisit functions that need additional work, such as walking. **You must provide evidence of your brainstorming.** You may consider recording any group discussion using Teams and including the transcription here ([Instructions to do this with Teams are linked here](https://mailuc-my.sharepoint.com/:v:/g/personal/reepindp_ucmail_uc_edu/EUojx5qM29FOs4UIE4AZEf0BinNPtW7UlBhNixuTU9R6pQ?nav=eyJyZWZlcnJhbEluZm8iOnsicmVmZXJyYWxBcHAiOiJPbmVEcml2ZUZvckJ1c2luZXNzIiwicmVmZXJyYWxBcHBQbGF0Zm9ybSI6IldlYiIsInJlZmVycmFsTW9kZSI6InZpZXciLCJyZWZlcnJhbFZpZXciOiJNeUZpbGVzTGlua0RpcmVjdCJ9fQ&e=9BAa3Y)). **Describe how you implemented the brainstorming method, including what tools you used, whether it was virtual or in-person, and how long you brainstormed for.**

Enter text here

1. Copy all individual brainstorming notes and team brainstorming below.

[copy any notes, pictures, or drawings from your brainstorming here; **submit any**

**transcriptions from Teams or spreadsheets as a separate document called *ENED1100Project\_SupplementaryFile\_TeamXXX\_FileNumber***]

1. Organize your ideas for methods to accomplish the major function of your robot using a morphological chart. Then, **develop 1 concept per team member** and provide a short description to outline its uniqueness compared to other concepts.

[Insert your morphological chart here]

|  |  |  |
| --- | --- | --- |
| **Concept** | **Concept Name** | **Description** |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |

1. Use a decision matrix to compare the concepts against one another **based on the criteria you identified in the Design Specifications Review.**

[insert your decision matrix based on your criteria here]

**Task 3: Leveraging Generative Artificial Intelligence (AI) to Brainstorm**

Across industries, the proposed use cases of Generative AI, such as large language models (often abbreviated as LLMs) implemented in ChatGPT, have been numerous: supplementing code development, personalized tutoring, more authentic video game non-player characters, text summarization, and customer support – to name a few. However, as companies have sloppily rushed to integrate these technologies into their products, it has become apparent that not all applications are appropriate. For example, an eating disorder helpline laid off a significant portion of its staff in favor of a chatbot called “Tessa,” powered by the technology behind ChatGPT. Shortly after, within a month, they shut down the chatbot after users complained that Tessa would frequently provide incorrect and harmful advice. Generative AI has the potential to produce factually incorrect information but present it convincingly. Thus, these tools can present issues in your workflow if you don’t have the knowledge to evaluate if the output is correct. However, what if accuracy doesn’t matter? What if we’re looking for several ideas and don’t care if they’re realistic or feasible? We just need a starting point. **This sounds like the premise of brainstorming!**

Let’s explore how tools like ChatGPT might be used to supplement your brainstorming processes. Go to the following website, <https://openai.com/blog/chatgpt>, and click on “Try ChatGPT.” You will be asked to log in. If no one on your team has an account, create one using your UC or personal email. After logging in, you will be greeted with a screen with a box at the bottom with the text “Send a message.” This is where you will enter your prompt. Once you give ChatGPT (or similar tools) a prompt, it will start a new “chat” or conversation with its response. You can prompt again based on its response or go in a different direction.

1. In this task, you will engage with ChatGPT to generate ideas for your robot to accomplish three major functions. **Develop a list of at least 5 prompts** you would use to engage in conversation with ChatGPT. Consider the following kinds of things you might want it to do by asking it questions and giving it instructions to generate, compare, and summarize different things.

|  |  |
| --- | --- |
| **Prompt** | **Prompt to ChatGPT** |
| 1 |  |
| 2 |  |
| 3 |  |
| 4 |  |
| 5 |  |
| 6 |  |
| 7 |  |
| 8 |  |

1. Start a chat with ChatGPT to engage in a brainstorming session. **Engage in this chat for at least 30 minutes.** Although we will not provide a specific minimum number of prompts, your conversation should contain the 5 prompts (or some variation) from the previous step and follow-up prompts. When you are finished, look in the top right-hand corner of your screen to find the symbol pictured on the left. Then click on the “Copy Link” button (pictured on the right).





**Create a .txt file by opening Notepad on your computer. Paste the link to your chat into that file. Save it as *ENED1100Project\_Links\_TeamXXX.txt***

1. Synthesize the ideas you generated collaboratively with ChatGPT and the ideas from the brainstorming in Task 1. Then, integrate those ideas into the morphological chart. **Develop 1 concept per team member** and provide a short description to outline its uniqueness compared to other concepts.

[insert your morphological chart here]

|  |  |  |
| --- | --- | --- |
| **Concept** | **Concept Name** | **Description** |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |

1. Use a decision matrix to compare the concepts against one another **based on the criteria you identified in the Design Specifications Review.**

[insert your decision matrix based on your criteria here]

**Task 4: Reflecting on the Ideate Phase**

Now that you have engaged in “traditional” brainstorming and used a new tool to accomplish similar goals, you will reflect on your processes using the following prompts. **You will respond to them as a team.** You should aim for at least one full paragraph for each prompt; please be descriptive.

1. What benefits did you find in performing structured brainstorming versus unstructured brainstorming in the past? What drawbacks or challenges did you face?

Enter text here

1. Describe your process for engaging with ChatGPT. Summarize the prompts you used and the way in which you followed up on its responses.

Enter text here

1. What benefits did you find in performing brainstorming with ChatGPT? What drawbacks or challenges did you face?

Enter text here

1. If you could create your own version of ChatGPT to act like another team member, how would you envision training it to provide you with better outputs?

Enter text here

1. Describe how you integrated the ChatGPT ideas with your team’s original ideas. What concepts did you generate based on that integration of ideas?

Enter text here

**Submission Instructions**

Please follow the next steps carefully to ensure you have submitted all the necessary files for credit on this assignment.

**(1) For your consent forms (if you are allowing your work to be used in research)**

**Save these documents as .pdf** using the file name ***ENED1100Project\_StructuredIdeation\_Consent\_Your6+2.pdf***

**(2) For work typed into this Word document and supplemental files**

**Save these documents as .docx** using the file name ***ENED1100Project\_StructuredIdeation\_TeamXXX.pdf***, where X*XX* is your 3-digit team number.

**Save any supplemental documents**, like transcriptions from Teams or outputs from Microsoft Forms, that aren’t easily pasted into this document using the filename: ***ENED1100Project\_SupplementalFiles\_TeamXXX\_FileNumber***. Where FileNumber starts at 1 and increases for each additional file you have.

**(3) For the conversation with ChatGPT**

**Save this as a .txt document containing the link to your chat with ChatGPT**. You created this in Task 3. As a reminder, the .txt file is created by opening “Notepad” on your computer.This file should be titled ***ENED1100Project\_ChatGPT\_TeamXXX.txt.*** If you are having trouble generating the link for ChatGPT, refer to the following information: <https://help.openai.com/en/articles/7925741-chatgpt-shared-links-faq>

**(4) Combine your documents from items (1), (2), and (3) into a single folder. Right-click on the folder and select “Compress to ZIP file.”** Name this folder ***ENED1100Project\_StructuredIdeation\_TeamXXX.zip*.**

**(5) If your team is allowing your work to be used in the research,** name this folder ***ENED1100Project\_StructuredIdeation\_TeamXXX\_Yes.zip*. If not,** name this folder ***ENED1100Project\_StructuredIdeation\_TeamXXX\_No.zip***

**(6) You will submit the zip file from step (5).**