

Project 1 - PromoBot

What can a Starship do?

CGT-17208: Section 001

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Project Introduction

Our team consists of two Game Development majors and two UX Design majors. This project explores the untapped possibilities of Starship robots, researching how these autonomous systems can foster new forms of human interaction and community engagement on campus. By examining user attitudes and designing innovative applications, we aim to transform these robots from mere delivery vehicles into platforms that facilitate meaningful connections, enhance campus navigation, and create engaging experiences for the Purdue community. For instance, other than the food delivery, we plan to have ways to give event flyers for clubs, snacks, signs on top to indicate you can open them, and custom voice messages. Through careful research, prototyping, and user feedback, we will reimagine what a Starship robot can do and how it can better serve the diverse needs of our campus population.

Note: In this documentation, the word "Storyboard" is shortened to SB when showing which frame of the final storyboard was influenced by a part of the process (ex. SB 4 means the part influenced final storyboard 4).

Design Space

Problem Statement: How might we redesign the Starship robots for clubs to promote special club event engagement for students so more human-to-human interaction occurs on campus?

Solution: **Promo-Bot** – An advertising service that broadcasts special club events across campus to a larger range of students.

Stakeholders: Starship, Purdue, Club Officers

User Group: Club Officers, All Students

What counts as a special club event?

Any event hosted by the club that allows the general student population to participate without prior knowledge or experience in the club (not general meetings). Examples include: food/goods sales, movie nights, parties, game nights, or any other social events.

Exploration

When we started exploring ideas for our project, we discussed possible areas to expand the potential of Starships. We looked at how much human-to-human interaction was involved and also some of the pros and cons of each.

• Message Delivery — Gifts and Letters

Using Starships for gifts and letters incorporates human-to-human interaction as the focal point, utilizing existing Starship use cases to create this service. However, if a lot of people wanted to use the system, there would be a lot of destinations the Starship would go to, resulting in security concerns about theft and privacy. Also, with the existence of social media and mail in dorms, we did not think this idea would be used often.

Tours — Tour Guides

Starships could pull facts from a database that guides might not know using AI and limiting the workload of tour guides. However, human-guided tours have more emotion and engagement. Starships also might struggle to lead, as their movement is slow and often clunky. They would also be required to stay outdoors, limiting the experience of the tour. This idea would also not promote any type of human-to-human interaction as people just follow the bot around or ask it questions.

• Navigation — Info Guide or Direction Leader

 Giving directions to someone or guiding them around campus would be useful in certain situations. However, existing platforms would be much more efficient, and following the robot could be time-consuming. This idea would also not promote any type of human-to-human interaction, rather only human-to-robot.

• Events — Event Announcements

 Starships could use its **built-in speakers** to tell students around campus about events coming up and allowing students to grab flyers. Starships may become **annoying over time** and many people do not care about taking flyers. **Promotes human-to-human interaction** in a sense, however requires the user to make their own choice whether to meet others.

Why Events?

Event announcements were one of the last ideas we came up with. **Using the prior ideas**, we saw that Starships are capable of storage and transportation of items, navigation, and announcing things. Combining those ideas, we came up with event announcements. Doing so also **avoided many of the concerns** such as staying outdoors or being slow. Even with the concerns of events, we thought we could come up with creative solutions to solve those problems or see if they were problems at all. Along with that, events are an area that could use more awareness. Most people only find out about them through social media, however, if they are not following specific accounts, they will miss it. Overall, announcing events is a great way to **promote human-to-human interaction** as it gets people to be **aware of more events** and hopefully to go to them and **bond with likeminded people**.

Secondary Research

Our goal for secondary research was to see whether this way of advertising was useful for club officers to get the word out for their events. Since we were unable to contact that many people, we wanted to see what professionals think good ways of advertising events would be.

In this research, we investigated event participation in college events, promoting campus events, student campus clubs, and robot advertisement to explore how to promote special club event engagement using the Starship bot. Prior work by Lubbers and Joyce (2014) looks into encouraging student participation in campus activities through marketing and promotion. One of the key points of successful marketing to students is to have **repetitive messages** where they are constantly looking for it. (SB 5). It is also important that many of the commonly used ways of promotion like posters and flyers are not good enough for this new generation of advertising to students (SB 3). Organizations need to find ways to connect their promotional material to event experience and their brand to market their events. They also mentioned that one of the primary reasons for not attending an event was due to students not knowing about them in the first place. Another work by Duan, Wang, Zhu, and Zhang (2024) discusses relations between students and clubs. They found that unless students believe they can develop themselves in a club, the club will do poorly as enthusiasm for the club will fade and less people will show up. They also included suggestions for improving good promotion of clubs. Two of them are creating innovative methods of promotions to increase enthusiasm and a **feedback mechanism** to track progress (SB 12). Finally, a work by Shiomi, Shinozawa, Nakagawa, et al. (2013) studies how using robots to advertise in a mall affects visitors. They found that many people like interacting with robots and that they were good for advertising as they brought more attention to stores when the robot was present compared to when it was not. They also saw that when robots had to do a long action, people stayed and interacted with it for longer, compared to when they just needed a simple task completed by the robot. Using this research, we were able to validate our idea and think about ways we can use the Starship to follow these effective ways.

Recent industry insights from Kiwibot's comprehensive guide on campus advertising further validate our approach to using autonomous robots for campus promotion. As Kiwibot operates similarly to Starship robots in terms of autonomous navigation and campus delivery services, their insights are particularly relevant to our project. The guide emphasizes that successful campus advertising requires understanding the unique campus environment where students are constantly moving between classes, social events, and extracurricular activities. This aligns perfectly with our mobile Starship robot concept, as it can reach students throughout their daily campus routines. The guide particularly highlights the importance of creative, interactive advertising that goes beyond traditional methods, noting that students are more receptive to innovative approaches that align with their lifestyle and preferences. Additionally, the research emphasizes the value of high foot traffic areas and the need for engaging experiences that resonate with the student community - both aspects that our Promo-Bot concept directly addresses through its mobile presence and interactive capabilities. This industry perspective reinforces our strategy of using autonomous robots as an advertising medium, as it combines the guide's key recommendations for successful campus marketing: visibility in high-traffic areas, interactive engagement, and innovative approach to student outreach.

Research Application

We found that using innovative ways to advertise is beneficial to gaining interest. Most of the research validated our idea of using the Starships to advertise as they mentioned a few ideas that we implemented. The first being repetition. For our design, we wanted to have the Starship go around a loop and repeat the same message over and over again (SB 5). This will hopefully help those interested remember the event coming up or make others think about going. Another is using different promotional materials. We are hoping for clubs to have some special items for each event where they advertise it for students to take and remember the event (SB 3). Lastly, having a feedback mechanism to track how the club is doing or how advertisements are affecting club engagement is helpful. While we have an RSVP system to track (SB 12), due to time limitations we were unable to go further into gathering data. However, the RSVP system is capable of comparing events to each other to see whether the ads or something else helped to improve the amount of people showing up.

Additional research from Kiwibot's comprehensive guide on campus advertising supports our approach to mobile robot advertising link. The guide emphasizes that college campuses are ideal for reaching students as they move between classes and activities, which aligns with our mobile advertising strategy. Their research shows that creative and interactive advertising in high-traffic areas is particularly effective, supporting our decision to program Starship routes through busy campus locations. The guide also highlights the importance of measuring advertising impact through engagement tracking, which validates our implementation of the RSVP system for monitoring event participation rates.

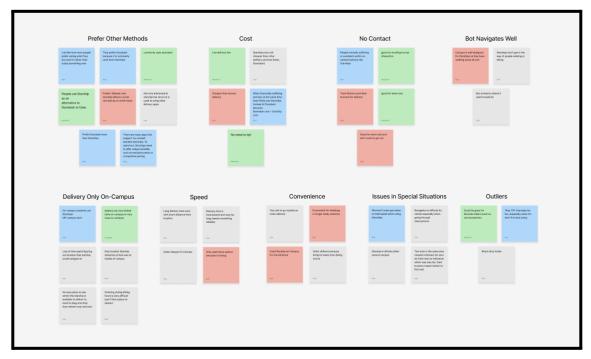
Initial Interviews

Our goal from interviewing was focused on **figuring out how people felt about the existing Starships** and gaining an **understanding of their experiences using it**. We hoped the insights would help us come up with a design space that utilized the pros of the Starship while avoiding some of the cons. The main points we wanted to question were:

- Experience using the Starship for food delivery
- Pain points during the process

Interview Analysis

Our team recorded and wrote down notes from **four different interviews**. Using those, we created an affinity diagram to group similar points from the four interviewees we talked to. Doing this activity helped us visualize the data collected and find insights to what the Starship experience currently is like. While **some of the information did not end up influencing our design**, it was useful to understand how Starships worked as most of us had never used one.



Affinity diagram of interview data (summary below)

Insights:

- People enjoyed using the Starships because it has less human interaction, helping if they are sick or introverted by not having to talk to another person.
- People also enjoyed the convenience of not having to go out for food if they were busy or conditions were bad.
- The bots navigate campus well as Starships are designed for most places that support walking (SB 4,5).
- The service cost of using Starships is cheaper than ordering from other delivery apps since there is only a \$2.49 (as of Feb 2025) service fee with no tipping required.
- The Starships were convenient when the person was on-campus as it delivers to places far away from dining halls.

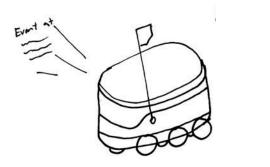
Initial Prototyping

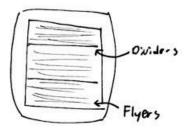
Our goal for this step was to create some ideas of what we wanted the Starship to look like to help brainstorm for our initial storyboard using sketches. We also wanted to try and find solutions to some of the issues we originally came up with and also have a starting point. After doing a few sketches, we came up with a storyboard to show for feedback.

Starship Ideation

Starting Ideas - Starship Sketch

When we initially thought of doing an event bot, we had no feedback on the topic to plan from. We started by thinking about using it as a flyer carrier for events. Then we thought of how we could add a more appealing aspect to the advertising so we added spoken announcements to increase discoverability as the bot already had voice built-in...

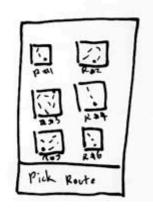


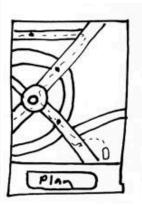


Simple sketches of the Starship robot in action and the original design of the inside.

Starting Ideas - App Routing

Initially for the app, we were thinking about whether we wanted to have set routes or to allow users to customize. However, after talking with people about using the map in the Starship app, it was difficult to use, so we decided a pre-planned route would be better.





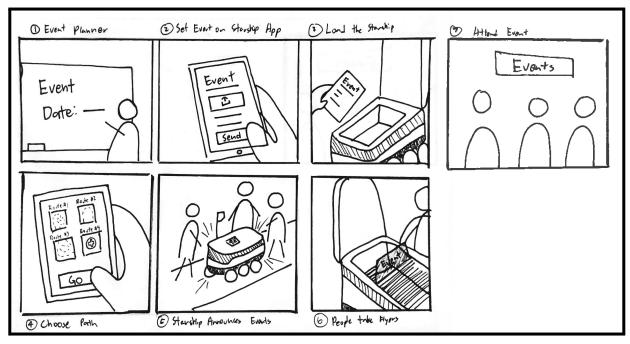
Sketches of the two route ideas

Storyboard

In the final storyboard, all existing storyboards were used, however the numbers have changed. For reference, ISB (Initial Storyboard) 5 = SB 6, ISB 6 = SB 9, and ISB 7 = SB 10.

In the initial storyboard, we have a scenario of a person planning an event for their club and having people interact with the Starship and then going to the event. Here, the Starship has only the basic features: Putting the event on the app, placing flyers in the starship, picking a route for the Starship, and the event announcements. The **main issues** of this storyboard was:

- 1. People did not understand the "Choose Path" frame (4) as they suggested the same idea even though the storyboard was in front of them (SB 4,5)
- 2. People thought the Starship only went around giving flyers, meaning they did not get that the Starship was announcing events as well (SB 6)
- 3. People were not sure how the bot opened. It was supposed to have a mechanical way to open but we did not display that (SB 7,8)
- 4. We never drew a frame for what happens to the flyers inside the Starship after the event was over (SB 11)



Initial Storyboard Drawing

Feedback Changes

After the initial ideas were created, our team went through the process of receiving feedback from peers and professors in our class, three members of clubs, and a club officer to see what they thought. Using all the feedback, we **iterated on our original storyboard** by adding more frames and creating new elements in the initial storyboard to provide clarity.

Feedback	
Curious about how the app would promote events better than existing solutions.	→
Hesitant about the security of promotional materials inside.	→
Wanted ways to target students in areas relevant to the event.	→
Questioned how to prevent overloading the Starship with events.	→
Concerned students would not hear the Starship announcements.	→
Suggested creating incentives for engaging with Starship.	→
Unsure how the Starship would deal with promo after the event ends.	→

	Changes	SB
→	Notifications for the event to remind users to go to the event. Rewards for attendance to encourage participation.	10, 12
→	QR Code to app system that forces users to take more steps to open the bot.	7,8
→	Improved clarity of routes feature by adding another frame as people did not understand the original storyboard.	4,5
→	Set a limit of three events per robot by only putting three boxes and only showing those three events when scanning each QR code.	3,8
→	Added a visual ad on the top so people can read it like a moving billboard. Also added QR code for people to scan and find events.	3,7,8
→	Added rewards for going to multiple events to hopefully get more people to participate in advertised events.	12
→	Added a frame to show how the clubs would need to remove the items for their event after it ends.	11

Worried about the announcements becoming annoying.
Thought a visual aids would be better.
Questioned the ability of the Starship to work in poor weather.
Wondered how the Starship would be monetized.

→	Added a frame showing "wait points" where the Starship announces events and waits for people in case they want to open it.	5
→	Added an ad space on the top of the robot that clubs could use.	3
→	Custom boxes inside the robot would have lids so items inside would be exposed to weather less.	Э
→	Showed a pay feature where clubs need to pay a small fee before using the bot.	2

While we were able to address most of the concerns, time constraints forced us to focus more on the advertising and engagement part of the Starships. As a result, we could not address ideas for more detailed app improvements, ways to customize the bot, questions about specific costs, and adding this feature to food delivery bots as well.

Final Storyboard

The final storyboard envisions a **club hosting an event**. This new Starship platform allows clubs to broadcast and advertise their events across campus by adding app features and redesigning aspects of the Starship.

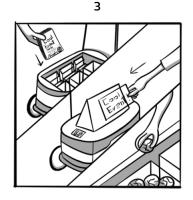
The frames are grouped into **four phases**. The first is the **planning** phase where the club prepares the Starship to advertise. The second is the **promotion** phase, showing the Starship robot being sent around campus days or hours before the event to advertise. The third is the **interaction** phase, where students find more details about an event through robot interactions. Finally, the fourth phase is the **conclusion**, where the results of the ad campaign happen.

Cool Event Planned!

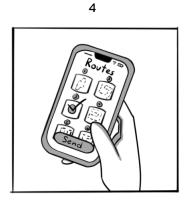
Club plans event and finds out Starship app has new event feature



Organizer puts the event on the Starship app and pays



Organizer loads the Starship with promotional items



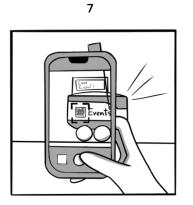
Organizer sets path for Starship to follow and area to target



Organizer sends the Starship out to announce at specific locations

Starship goes around campus announcing the event

(Continued Below)

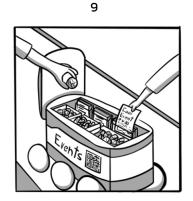


Students scan QR codes on the side of the Starship

10



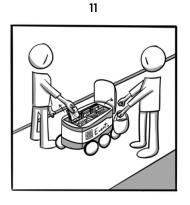
Students interact with the app to open the Starship and RSVP



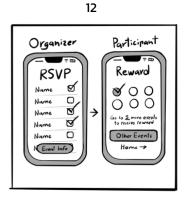
Students take promotional materials from inside the Starship

Cool Event
@ 6:00 -> Room 17

Students go to event later and interacts with new people



Club removes their promotional material from Starship



Organizers tracks attendance and give points to participants

Design Rationale

Initially, we wanted to keep the Starship focused on the physical robot itself. However, after receiving feedback and ideating, we concluded that managing the robot digitally would be important to the use of our robot. It helped solve many issues people saw with the idea like security, viewing flyers digitally, and adding incentives. When considering integrating the digital aspect, QR codes were an easy solution. They provide direct access to the website or app, show flyers digitally, and provide security by requiring you to go onto it to open the Starship. Additionally, an unintended discovery of this feature was that it could promote more human-to-human interaction than before. If someone was interested in an event and opened the Starship, others may also simultaneously grab promotional items

from it. This allows for people with similar interests to find each other and maybe even let them have a person to go to the event.

However, the other issue we found with the Starship was that students are often wearing headphones or earbuds while walking to class, making the Starship announcement useless to those students. To remedy this, we designed a taxi ad-like feature to place on top of the Starship. Now, the Starship would have two forms of communication: auditory and visual.

For the final storyboard, we wanted to create a storyboard where users could easily see the process of using the Promo-Bot. We designed it in a way where it looks simplistic enough to understand easily, but also detail to emphasize parts of the frame.

Initially, we wanted to have the Promo-Bot advertise any event on the Purdue campus: whether that be club meetings, events, Purdue shows, etc. However, each group has different needs so we limited the scope to special club events (not general meetings) to prioritize people who are not part of the club to explore clubs on campus and prevent overloading the bot. However, with more time we would look to expand the scope of events being advertised.

Conclusions

Starship robots display a wide range of possibilities outside of food delivery. Throughout this project, we researched Starships, club-student relations, advertising methods, and more. After researching these topics, we interviewed students who have used Starship robots to receive input on the app experience and information regarding possible pain points users experienced. After gathering insights on the current experience using the delivery service, we began prototyping and discussing possible solutions for our event promotion idea, dubbed Promo-Bot. After receiving feedback from peers, teachers, and club members, we ideated our concept and created our final storyboard. We worked to create possible solutions for every critique and suggestion. Overall, our team worked thoroughly throughout this process and ideation of what else a Starship robot can do.

Our final concept focuses on utilizing Starship robots as a promotional tool for student clubs and organizations on campus. Throughout this semester-long project, we engaged in activities including market research, competitor analysis, and multiple rounds of user interviews with over 10 regular Starship users. We organized focus group sessions with various student clubs, created multiple prototypes from paper sketches to high-fidelity digital mockups, and continuously refined our ideas through stakeholder feedback. By implementing a new feature in the Starship app that allows clubs to advertise their events through robot deliveries, we aim to create a more engaging and interactive way for clubs to reach potential members. The Promo-Bot concept not only addresses the challenge of effective club promotion but also adds value to the existing Starship service by creating a new revenue stream and enhancing student engagement on campus. Our solution, thoroughly documented through detailed storyboards, technical specifications, and implementation guidelines, offers a unique opportunity to bridge the gap between student organizations and their audience while maintaining the core functionality of the Starship delivery service. This project has demonstrated that autonomous delivery robots can serve multiple purposes beyond their primary function, opening new possibilities for campus community engagement and organizational promotion.

Team Contributions

Team Member: Ethan Basham

Contributions: Exploration, Initial Interviews/Interview Analysis, Feedback Changes, initial presentation design, Conclusions, References, Interview Protocol, Feedback Protocol, Interview Data

Team Member: Kyle Elliott

Contribution: Design Space, Exploration/Starship Ideation, Initial Interviews, Initial Prototyping, References, Interview Protocol, Feedback Protocol

Team Member: Ivan Hsu

Contribution: Title, Design Space, Secondary Research, Initial Prototyping (all), Initial Interviews (all), Feedback Changes, Final Storyboard, Appendix (all), All Storyboard and Sketch drawings

Team Member: Alex Kim

Contribution: Project Introduction, Design Space, Secondary Research, Research Application, Conclusions, Appendix A - Interview Protocol, Affinity Diagram (memos), References, Interview Data

Individual Reflections

Team Member: Alex Kim

Reflection:

Throughout this project, I gained valuable insights into how technology can be reimagined for different purposes. Working on the Promo-Bot concept helped me understand that innovation doesn't always mean creating something entirely new, but rather finding creative ways to enhance existing systems. The process of conducting research, from interviewing students to analyzing professional studies, taught me the importance of thorough investigation before proposing solutions. I particularly enjoyed learning how similar delivery robots like Kiwibot and Starship can be adapted for promotional purposes while maintaining their core functionality. This project has strengthened my ability to think critically about user needs and develop solutions that can benefit the campus community.

<u> Feam Member: Ethan Basham</u>
Reflection:
<u>Feam Member:</u>
Reflection:
<u> Team Member:</u>
Reflection:

References

- Duan, Z., Wang, Y., Zhu, W., & Zhang, X. (2024). Relationship between the college student and the campus club: An evolutionary game theory analysis.

 Behavioral Sciences, 14(3), 182. https://doi.org/10.3390/bs14030182
- Shinozawa, Y., Sakamoto, D., & Ogata, T. (2013). Effects of robot presence on advertisement usage: A field trial of social robots in a shopping mall.

 Journal of Ambient Intelligence and Smart Environments, 5(6), 511-523. https://doi.org/10.1007/s12369-013-0180-4
- Lubbers, C. A., & Joyce, T. A. (2014). Promoting campus activities: Encouraging student participation. *Quality Research in Business & Development*, 9(5), 1–12. https://faculty.utrgv.edu/louis.falk/grbd/QRBDmay14.pdf
- Starship Technologies. (2024a, September 25). FAQ Starship Technologies.

 Starship Technologies: Autonomous robot delivery The future of delivery today! https://www.starship.xyz/faq/
- Kiwibot blog. How to Advertise On & Around College Campuses: A Comprehensive Guide. (n.d.).

https://www.kiwibot.com/articles/how-to-advertise-on-around-college-campuses-a-comprehensive-guide

OpenAI. (2024). ChatGPT (GPT-4). https://chat.openai.com/
Assisted with proofreading and refining text for clarity and grammatical accuracy.

Appendix A - Interviews

Interview Protocol

Icebreaker:

• What types of food do you order/did you order?

Interview Question Topics:

- The first experience using a Starship
 - o If you ordered more than once, why?
 - Would you use it again?
- What made you choose using Starship compared to other companies?
- Have you ever used Starship's autonomous delivery robot? When and why do you use Starship? How was your experience?
- Are you satisfied with the speed and quality of the Starship delivery? Is there anything that could be improved?
- Which delivery service do you prefer more? Starship vs Human Driven models (Uber Eats, Grubhub, Doordash, etc)
- Even in areas where Starship robots are implemented, why are Human-driven models(Uber Eats, Grubhub, Doordash, etc) still necessary?
- Which technology will play a more significant role in the future of delivery services?

Feedback Protocol

Screening

- Are you in a club?
- What is your position in the club?

Club Members

- Do you see yourself using the event feature on the Starship app?
- How do you usually find out about club events?

Club Officers

- What do you currently use for advertising events?
- Do you think using this starship platform would be better than your current solution?
- How much would you pay for Starship Advertising?

Non-Club Members

- Have you ever participated in a club?
- Why have you not joined a club?

Either

- How do you typically hear about events?
- Would you be open to an "Events" tab on the Starship app that features events (and your own event) on the page?
- Do you see any issues with these robots going around campus advertising?
- Would you pay attention to a Starship going around announcing events, any prohibiting factors like headphones?

Interview Data

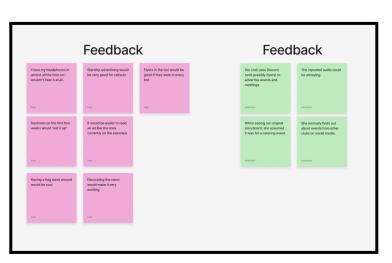
Affinity Diagram:

We wanted to organize all our data into groups to easily see the similarities between all our interviewees. We color coded each interviewee to see the different insights. We ended up with eight categories and an outlier group. The categories are "Prefer other members," "Cost," "No Contact," "Bot Navigates Well," "Delivery Only On-Campus," "Speed," "Convenience," and "Issues in Special Situations."



Feedback Protocol Notes:

For some of the feedback we got on the initial storyboard, we took a few notes and organized them together to see if there was any overlap. However, both were quite different as they had different perspectives on which parts had the most issues..

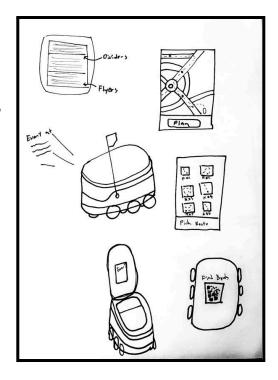


Recordings for interviews: here

Appendix B - Sketches

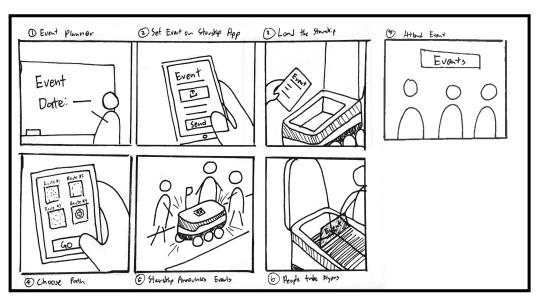
Initial Ideation Sketch:

We wanted to draw out some of the ideas we had to discuss what additions and changes we could do for the event announcement robot we wanted to design.



Initial Storyboard:

For our first storyboard, we wanted to keep it simple to see how easily people would be able to understand the frames. We knew we would get a lot of feedback so it was important to be able to communicate our idea effectively.



Final Storyboard Sketches:

We came up with multiple ways to display each step of the event process. We then looked at which ones would be the easiest to understand and detailed the one we chose in the final storyboard.



Final Storyboard:

For the final, we made sure to make our drawings as clear as possible, while still including all the story elements. We wanted to include each step of the process as detailed as possible, but simple enough to not get overwhelmed.



Appendix C - Scenarios

Creating scenarios helped us to think about different use cases for our designs, however most of the pain points found were also mentioned by our feedback, as a result, we did not include the data in our main documentation.

