

## **Starship Delivery Robots: Transportation Solution or Headache?**

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*Introduction*

At the beginning of the Colorado State University 2025 spring semester, the university deployed several Starship robots on campus. These robots operated in partnership with Grubhub, delivering food to faculty and students around the CSU campus. These have quickly become a prominent feature on campus, even though there are currently only 15 units present, and it is not uncommon to see them regularly around dorm rooms, dining halls, and the LSC plaza (Lyell, 2025). These electrically powered robots take an estimated 30 to 60 minutes to deliver food from on-campus dining halls, restaurants, and cafes to students and faculty on campus (Giordano, 2025). According to local media, students' initial perceptions of the delivery robots on campus were positive (Lyell, 2025). However, some students started to develop negative perspectives about the robots and how they operate, like posting social media posts making fun of the robots. These shifting perspectives about the robots bring up an important question: How do the Starship delivery robots affect members of the Colorado State University campus, and how is their utility

and sustainability perceived? This research aims to explore this issue and provide some clarity on how students perceive these robots now that they have been present on campus for a few months. To do this, we employed both qualitative and quantitative social science methods to gauge student opinions regarding various aspects of these robots.

## ***Methods***

For this study, we conducted both in-person interviews and distributed online surveys to gauge how students perceive the utility and sustainability of the Starship robots. These interviews and surveys were primarily connected with students in the Warner College of Natural Resources at CSU, though surveys from students outside the Warner College were also kept.

## **Interviews**

Interviewees were chosen through convenience sampling due to the limited temporal scope of the project. Interviews were conducted either digitally through video calls or in-person, depending on the preference of both the interviewer and the interviewee. During these interviews, questions were asked regarding the interviewee's general opinion of the robots, how they perceived the sustainability of the robots, and whether they supported both the current and potential future investments in these robots (Appendix).

Once the interviews were collected, they were analyzed qualitatively to determine general sentiments shared by our interviewees with the goal of discovering any repeated concerns, especially regarding elements not originally included in our initial survey question. These responses were recorded and used to inform any changes to our survey, along with providing valuable qualitative data more difficult to collect from a survey.

## Surveys

Surveys were distributed through convenience sampling, mostly by distributing the survey among various group chats and to friends within the Warner College. Surveys were designed to first ask a series of demographic questions regarding the respondent's living situation, school year, and experience with the robots, including whether they have used it to get food delivered and whether they had seen them on campus. The second section of questions employed Likert questions to quantitatively measure respondents' feelings about various aspects of the Starship robots, including their perceived sustainability, safety, and feelings about CSU's investment in these robots. For each Likert question, we also included a related open-ended question to collect additional qualitative data to supplement the qualitative data collected from our interviews.

To analyze our survey data, we created bar charts of various questions and examined the trends in the responses. Additionally, for the question "Please list the first five words or phrases that come to mind when you think about the Starship robots," we grouped responses into categories made up of similar responses and divided these categories into positive or negative sentiments. This allowed us to see how people most often perceived the robots both positively and negatively. Lastly, we conducted a thematic analysis of all of the qualitative responses we received on the survey to identify themes related to the perceived sustainability of the robots. To do this, we first identified different words and statements that appeared repeatedly across different responses. Then we developed broader themes that encompassed multiple different statements. These themes were then defined and examples were drawn from the survey respondents. With these themes, we are able to create a better picture of why our respondents felt the way they did about the sustainability of the Starship robots.

## ***Results***

### **Interviews**

A total of four interviews were conducted. Three were conducted with students in the Warner College of Natural Resources and one was conducted with a professor at CSU. All three of the students interviewed were seniors and lived in off-campus apartment complexes. They reported that they used a mix of transportation options to get to school, including walking and utilizing local public transit options. Lastly, while all of our interviewees had seen the Starship delivery robots on campus, none of the people we interviewed had actually used them to get food delivered.

The professor we interviewed generally took a much more positive outlook towards the presence of the delivery robots than the students, seeing it as a step towards further modernizing the campus and as a more sustainable option, at least from a business standpoint, since companies wouldn't have to pay hourly workers. However, the professor also had reservations about the service, especially the bugs present at the moment that led to inefficiencies, but otherwise seemed to support their presence on campus and their expansion if the bugs are worked out.

Of the three students interviewed, two (Interviewees 2 and 4) had a negative outlook on the robots while the other (Interviewee 3) was more ambivalent towards them. Despite these differing opinions on the robots, all shared similar concerns overall. All stated that they felt the robots were somewhat unnecessary on campus and related that the robots seemed to be too inefficient to effectively fulfill their niche. Additionally, all students stated that they felt that the robots were not a more sustainable option, mostly because they filled a relatively small niche in

Fort Collins and don't replace car deliveries, since many of the places they deliver from did not previously have traditional delivery options. Interviewee 2 worried that any expansion of the fleet would use tuition dollars and worried that this use was a waste of that money. Interviewee 2 was also concerned that their small size and low profile could potentially lead to collisions with vehicles and endanger human safety. Interviewee 4 felt that they were too energy-intensive and also stated that they seemed to detract from truly sustainable options for food delivery or pick-up, like walking or biking. Interviewee 3, on the other hand, worried more about the potential effects they could have on foot and vehicle traffic, specifically mentioning that they can worsen pedestrian traffic on parts of campus during busy periods that can result in being late for class, since the robots easily get stuck in crowds and then stay where they are. Interestingly, both interviewees 2 and 3 shared that they saw the robots most valuable for the entertainment they provide, stating that they found it humorous when they would get stuck.

## **Surveys**

26 surveys were collected for this project, though two responses were removed for incompleteness. All of our surveys were distributed to students at CSU, with 22 respondents in the Warner College of Natural Resources and 2 outside the Warner College. Of our 24 survey respondents, 12 (50%) were seniors, 4 (16.7%) were juniors, 4 (16.7%) were graduate students, 2 (8.3%) were freshmen, and we had one respondent for both the sophomore and non-traditional track categories. Of our survey respondents, we found that the majority lived off-campus, with 11 (45.8%) living in off-campus apartments, 5 (20.8%) in single-family homes, and 1 (4.2%) living in a multi-family home. Of the respondents living on campus, 4 (16.7%) lived in dorms and 3 (12.5%) lived in on-campus apartments.

Among our respondents, we found that negative and neutral sentiments were most commonly reported when asked the question: “Please list the first five words or phrases that come to mind when you think about the Starship robots.” We found that 59 (72.8%) of words fell into a negative category, with words relating to their inefficiency accounting for 21 (36%) responses, followed by words related to their annoyance and cost with 8 (14%) each. Only 22 (27.2%) words were classified as positive, with most words classified as referring to either the cuteness (7; 32%) or interest (8; 36%) of the robots.

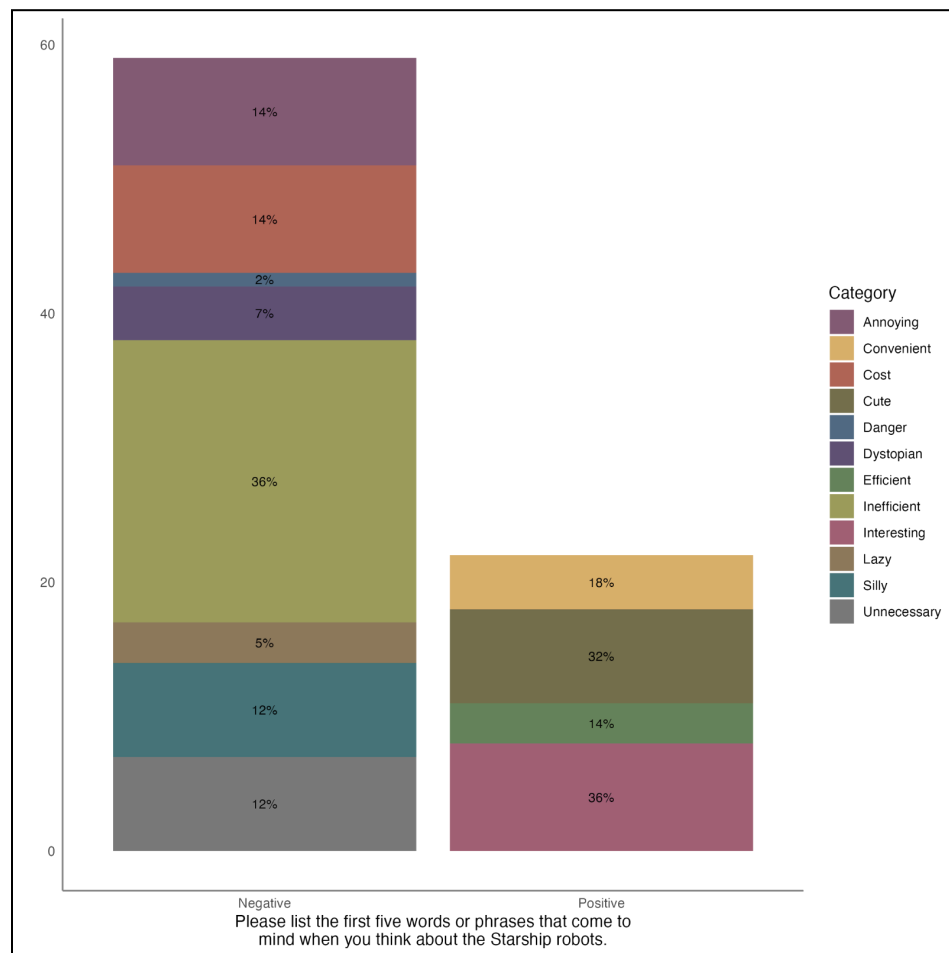


Figure 1. Qualitative data collected regarding survey participants opinion on Starship robots

We also found that 13 (56.5%) respondents had no preference for the presence of the robots on campus, 8 (24.8%) preferred campus without robots and 2 (8.7%) preferred campus with the robots. 11 (45.8%) respondents reported having been delayed, impeded, or blocked by a Starship robot at least once in the past.

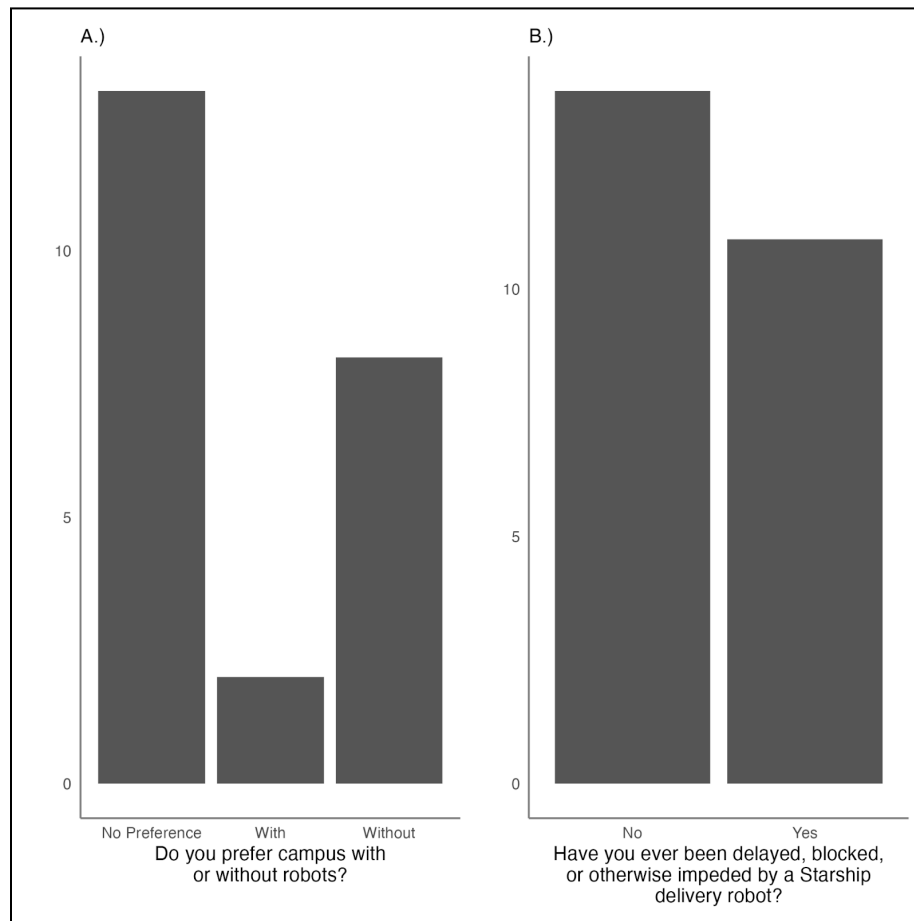


Figure 2. Survey participants' preferences and previous impediments with Starship robots

Our Likert scale questions also helped gauge respondents' sentiments regarding the robots in relation to multiple different aspects of their function and design. For all but two of our questions, a plurality of respondents answered stating they were neutral on the issue. Regarding general sentiments towards the Starship robots, 11 (45.8%) respondents responded with a 3, indicating neutrality, while 10 responded with a 1 (6; 25%) or a 2 (4; 16.7%), indicating strong



dislike and dislike, respectively (Figure 3A). Regarding how concerned people were about the sustainability of the robots, 9 (37.5%) respondents responded with a 3, while 11 respondents responded with either a 4 (8; 33.3%) or 5 (3; 12.5%), indicating concern and strong concern, respectively (Figure 3B). Regarding how sustainable people felt the robots were, 11 (45.8%) respondents responded with a 3, while 11 responded with a 1 (2; 8.3%) or a 2 (9; 37.5%), indicating they were perceived as strongly unsustainable and unsustainable, respectively (Figure 3C). Regarding how safe people felt the robots were, 9 (37.5%) respondents responded with a 3, while 10 (41.7%) responded with a 4 (7; 29.2%) or a 5 (3; 12.5%), indicating safe and very safe, respectively (Figure 3D). 5 respondents responded with a 1 (1; 4.2%) or 2 (4; 16.7%), indicating very unsafe and unsafe, respectively.

Two questions, one regarding future increases and one regarding CSU's current investment, showed slightly different patterns. When asked how likely they were to support future increases to the size of the Starship robot fleet, 15 (62.5%) respondents responded with a 1, indicating they were strongly opposed to future increases in the fleet size (Figure 3E). A similar, albeit weaker trend was also observed when respondents were asked about how they felt about CSU's current investment (Figure 3F). 16 (66.7%) respondents replied with a 1 (9, 37.5%) and a 2 (7, 29.2%).

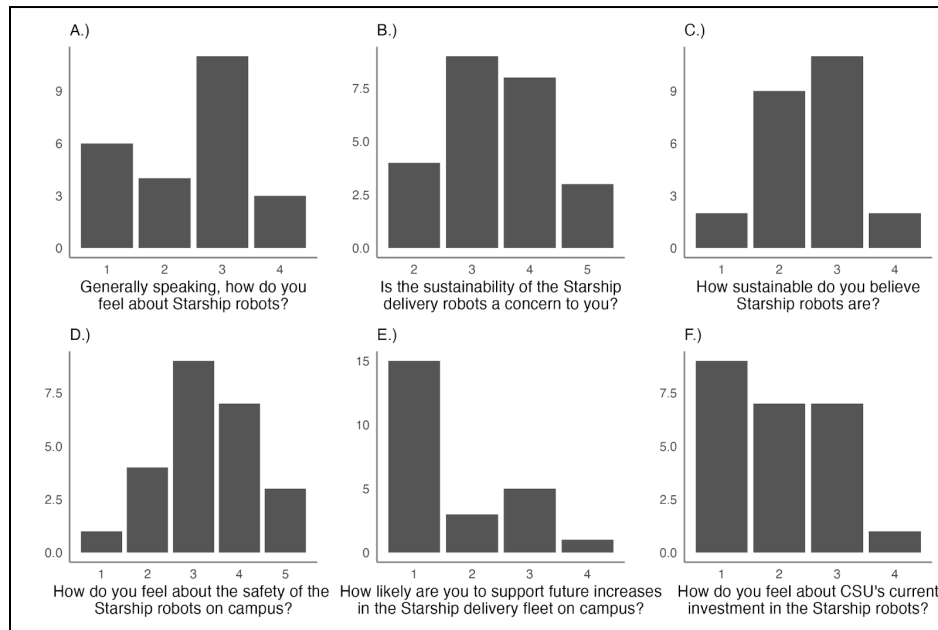


Figure 3. Quantitative survey data ratings of starship interactions and impact on CSU community

### Thematic Analysis of Sustainability-Related Qualitative Survey Data

Our thematic analysis revealed a number of different patterns associated with sustainability among the responses to the open-ended, qualitative questions included in our survey. This allowed for the development of four distinct themes regarding how the sustainability of these robots was perceived. The first of these themes was “Economic and Material Cost” and encompassed all responses related to the cost of manufacturing, purchasing, and maintaining these robots on campus. The second theme was “Misprioritization of Resources,” which encompassed concerns regarding how purchasing these robots could have taken away from other projects, especially those meant to improve CSU’s sustainability. The third theme was “Replacing Healthier or More Sustainable Alternatives,” which included all statements that brought up any concerns related to how the presence of robots on campus could replace alternative methods of getting food, like walking or biking. The fourth and final theme was “Lack of Knowledge,” which captures all responses related to the respondent not having enough knowledge about the robots. The first three themes largely represent the responses of those who

felt the robots were not sustainable, and the fourth theme mostly represents responses from those with more neutral opinions.

Theme	Description of Theme	Examples
Economic and Material Cost	Responses related to the cost of manufacturing, purchasing, and maintaining these robots on campus.	“How is it more sustainable to build a little robot out of rare earth metals...” “They are made of plastic.”
Misprioritization of Resources	Concerns regarding how purchasing these robots could take away from other projects, especially those meant to improve CSU’s sustainability or support for students.	“I’d rather CSU put the funding toward the RAH pantry and pocket pantries, and meal swipe programs.” “... put all of that money into rooftop solar.”
Replacing Healthier or More Sustainable Alternatives	Concerns related to how the presence of robots on campus could replace more sustainable and healthier alternative methods of getting food, like walking or biking.	“Walking is very sustainable, almost anything else is less so.” “... they discourage walking, being outdoors, breathing fresh air--things that are essential for mental and physical health.”
Lack of Knowledge	Responses related to the respondent not having enough knowledge about the robots.	“I don't know much about them, but since they're so small, I assume they don't have that big of an impact.” “I’m not well-versed in the sustainability of the robots, so I remain neutral.”

Table 1. Thematic analysis of survey responses to qualitative questions, with a focus on capturing themes related to the sustainability of the robots.

## ***Discussion***

Our analyses of the integration of Starship food delivery robots at Colorado State University revealed the inherent ties these robots have to sustainable development in this community. Through our methods of collecting face-to-face qualitative data from members of

the community, as well as receiving responses through online survey interviews, our knowledge base of the public's opinion on the Starship food delivery robots significantly increased. We were able to successfully acknowledge four major themes that each qualitative response could be categorized into: Economic and Material Cost, Misprioritization of Resources, Replacing Healthier or More Sustainable Alternatives, and Lack of Knowledge. A pattern we noticed across themes is if an interviewee had an opinion on the robots, more often than not (<50% of responses), reception of the robots was negative, as seen in Figure 1. Across the board, interviewees shared common concerns regarding Starship delivery robots, specifically the notion that these robots seemed too slow and inefficient to be a sustainable or even convenient alternative to food delivery.

All of these findings illustrate that the perception of these robots by at least part of the student body largely does not match the marketing and official reasoning for the purchase of these robots by CSU. In press releases and news articles published shortly after the robots were first introduced on campus, one of the most prominent selling points was that these robots are “eco-friendly” and produce zero emissions (Howerton, 2025). However, our findings show that part of the student body does not buy into this marketing. Some of our respondents raised concerns about the sustainability of the robots, with multiple people questioning the sustainability of the materials used to produce them and their energy costs. Other respondents were concerned that CSU's investment in these robots resulted in a misprioritization of resources and potentially subtracted from investment in other projects that could further sustainability on campus.

Unfortunately, our study was limited by a small sample size, meaning our findings cannot be considered representative of the entire student body. However, while there are undoubtedly

more varied opinions than we were able to capture with our interviews and surveys, the strong negative sentiments among our respondents indicate that there are legitimate concerns among the student body. The presence of these concerns, combined with our findings that showed there was a significant lack of knowledge among students about the technical side of the robots, highlights that any future investment in expanding the fleet should be considered carefully. Ideally, CSU should try to address some of the concerns that students have regarding the robots and, if they are unable to do so, CSU should limit future expansions. Lastly, we also feel it is important to acknowledge that the responses to our survey likely did not capture all concerns or potential issues associated with these robots. For instance, the robots could have impacts on campus accessibility due to their bulky size. Sidewalk standards recommend that sidewalks be no smaller than 5-6 feet across (NACTO, 2024). Starship robots are roughly two feet wide, meaning that on the narrowest sidewalks on campus, they could make it challenging for wheelchair-bound individuals to navigate around them (Starship, n.d.). Though the company claims to have programmed their robots to avoid situations like this, there have nonetheless been past accessibility complaints and some still raise concerns about accessibility (Rose, 2023).

## ***Conclusion***

In conclusion, while the introduction of the Starship delivery robots was originally met with positivity and even amusement, our research that we conducted revealed a growing skepticism of the robots on campus regarding how they operate and their sustainability. Through the interviews and surveys conducted on Warner College students, we were able to find out that many of the students viewed the robots as inefficient, unnecessary, and that the robots may not align with CSU's long-term sustainability goals. Concerns ranged from such aspects as material

and energy costs. Although these robots are advertised as green innovation, our findings suggest a disconnect between the green narrative and how they are actually perceived by students.

Ultimately, the study that we conducted outlines the importance of not just implementing green technologies on campus with sustainability in mind, but also to consider student feedback before implementing futuristic technologies based on their environmental and community values.

### ***Lessons Learned***

Over the course of this project, we learned a lot about both project management and conducting social science research, along with learning and overcoming many challenges associated with both. We learned how to coordinate effort between group members and also faced significant challenges regarding delegating work efficiently and effectively. Despite this challenge, we were still able to both conduct and present our research in both oral and written form. We also gained valuable experience conducting interviews about a specific topic and learned about the difficulties associated with social science research, especially relating to reaching participants for both interviews and surveys. We originally planned to conduct more interviews but ended up with only a few, due to both the difficulty of finding willing interviewees and the limited temporal scope of this project. We faced similar difficulties when distributing our survey, often only receiving a few responses for each different way we tried to advertise the survey. Though relying on group chats and friends proved sufficient for this project, it also prevented us from capturing the opinions of those outside our personal circles. This is one of the key elements we would like to expand upon were we to continue this project, as we feel it would be valuable to hear from a broader selection of CSU students regarding these new additions to CSU's campus. While we believe continuing this research would be valuable, we

also feel that we are not currently in a position to expand upon this work and likely will not conduct any additional research on this subject.

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### *Appendix: Interview Script*

- What year are you? Do you live on campus?
- Have you seen the Starship food delivery robots on campus?
- Have you used a delivery robot service?
- What do you know about the delivery robot service and how they operate?
- What are 3-5 descriptive adjectives that best describe your current thoughts or feelings regarding the delivery robots.
- How do you feel about the Starship robots? OR what are your thoughts about the delivery robots?
- Has your commute been affected by a delivery robot? If so, how did the delivery robot delay you?
- Do you have any concerns regarding the robots on campus?
- Do you believe that food delivery robots are a more sustainable option for food delivery? Why?
- How supportive are you of future increases to the robot fleet and why?
- Do you prefer campus with or without fleet robots?