

## **Project Proposal and Initial Discovery Research**

### **Crowded Train Tracker**

#### **Executive Summary**

The following proposal consists on the creation of a train occupancy tracking system called Crowded Train Tracker. The goal of this project is to improve the overall user experience of daily commuters in the Seibu-Shinjuku trainline in Tokyo. This can be accomplished by tracking the occupancy rates in each individual train and train car and making it available to the target users in a convenient and useful way.

Throughout the research involved in this proposal I was able to discover what some of the main issues related to train usage are amongst daily commuters in Japan. I was also able to explore a wide array of creative solutions and user requirements that are critical for the successful design and implementation of such a system.

#### **Root Concept**

The Crowded Train Tracker is a system that will keep track of the occupancy rate and available seats within each train and train car for the Seibu-Shinjuku Line in Tokyo. The train occupancy data would be gathered via on-board sensors and displayed in an intuitive way via a mobile app. This app would show the train line's schedule, the overall train's occupancy percent, and each of its individual car's current number of users, empty regular and priority seats.

The goal of this system is to address the amount of frustration that daily users, specifically commuting students and workers, experience when they have been waiting for a train/train car and it happens to be full. This feeling of frustration is further exacerbated when they realize that the next train or train car happened to be empty.

This system is specifically focused on empowering daily commuting users and with useful occupancy data in order to optimize their overall commuting experience. This data will allow them to more accurately and easily plan their trips in advance, it will also smooth out the overall train usage by allowing people to self-distribute more evenly throughout the day. Not only this, but the train company itself will be able to have access to this information, which can be used to plan and justify expansions, maintenance, etc.

For further information related to the background and context of this idea look at Concept Background under the Index section.

## **Research Method**

In order to come up with the Crowded Train Tracker concept, I first started by obtaining a general feel of any issues that Japanese people are faced with on a daily basis. I did so, by asking my target group college students and working adults around me the following question: “Do you have a specific issue in your daily life that you would like an app or some technological solution to help with?”

While I received various responses, such as being unable to find public bathrooms or trash cans, the most common problem was the train being too full. Once I identified this issue, I chose to pick 1 student and 1 worker to interview in order to have more diversity in my answers.

Before scheduling one on one interviews with both individuals, I first made sure to obtain their consent for this investigation. They both agreed to share their opinions for this research, and I made sure that none of their identifiable information was recorded. A sample of the main and following questions can be found in the Appendix.

## **Findings from research**

Based on the research executed for this project, I found out that there is a latent need for a train occupancy tracking system in the Seibu-Shinjuku train line. Specifically, amongst daily commuters between the ages of 18 to 30 who are either college students or working members of society.

For this application to be successful it needs to intuitively and accurately display the live occupancy rate of the train and train cars to the intended users via a mobile app. The usage of colors, simple shapes and labels was stressed throughout the interviews. Also, the integration of both the train schedule and the train occupancy data into a single central application was an important requirement discovered throughout the interviews. These additions will make it very accessible for the target users as opposed to any other option. I believe that this is the most feasible and convenient option available at the time that will fulfill the expectations and needs of the users.

I was able to consider different approaches to address this issue, such as further increasing the frequency of service or even the expansion of the train lines in Tokyo. Other technological improvements were also touched upon, such as announcing occupancy data throughout the itinerary screens at stations, but in the end the most feasible and practical solution ended up being a mobile app.

The technology to accurately measure the occupancy number of each train and train car is already available on a commercial scale. The utilization of simple devices such as a light or ultrasound sensor embedded in each seat and either a camera or an IR sensor at each of the

train's entrance would allow for an accurate measurement of both the available seats and the number of people at each car.

With the upcoming Tokyo Olympics of 2020 this need will surely further increase. It is overall surprising that this latent need has not been thought about or already fulfilled in such a technologically reliant country such as Japan.

For UI examples of what this application would consist of look at the UI Examples section under the Appendix

## **Appendix**

### *Concept Background:*

I am currently living in Tokyo, and the train system serves as a ubiquitous means of transportation. Most people, but more specifically students and commuting workers, are required to utilize the train system on a daily basis. As such, there are times that the trains are extremely crowded, and the commute becomes a very uncomfortable experience for everyone involved. While this can't be helped during periods of full occupancy, the train cars are not always evenly filled and there are times when a person would willingly wait for the following train if he or she knew that it was going to be less packed.

Now with the upcoming 2020 Tokyo Olympics, this issue will be further exacerbated by the number of incoming tourists throughout the city. While I realize that this concept may be somewhat broad, I decided to present this idea since no solution has been developed yet, and it solves a real latent issue that affects many people today.

### *Questionnaire*

#### *Main Questions*

- Do you have a specific issue in your daily life that you would like an app or some technological solution to help with?
- How old are you and what is your occupation?
- How often do you encounter this issue?
- What do you think is the source of this issue?
- Do you have any professional/educational background related to this issue?

#### *Follow Up Questions*

- How often do you utilize the train system?
- At what time do you use it most often?
- If you were to propose a solution what would it be?

- Do you think this solution is feasible?
- Is there a specific feature that you would like it to have for it to be useful?
- If there was a way to measure the train occupancy how would you like this information to be delivered to you?
- What information related to the train occupancy would you like to have access to?

### *Interview Notes*

#### *Subject A*

Japanese / Female / 28 years old / daily commuting sales worker

Experiences frustration when waiting in line to enter a train car and realizing that the following car was less crowded or had empty seats. Wishes for a way to know beforehand if a given car has available seats or is less crowded in order to line up for that car instead.

Encounters this issue at least twice per day when trying to commute from and back to work. The issue is also experienced during holidays/special events/festivals.

Subject had no professional or educational background related to public transportation or trains in general. Nevertheless, the subject did have exposure to IT/CS related classes during university.

As a solution, the expansion of the train service (with more trains or lines) was proposed in order to alleviate the crowdedness of the train but proved to be unfeasible due to the property costs and overall available space around Tokyo.

Alternate viable solutions were also offered in the form of tv screens showcasing the current occupancy of the oncoming train throughout the station. Nevertheless, this would make the information harder to access and overall less convenient.

The subject utilizes the train service every morning around 9 am and evening ranging between 6 and 10 pm.

#### *Subject B*

Japanese / Female / 18 years old / daily commuting media college student

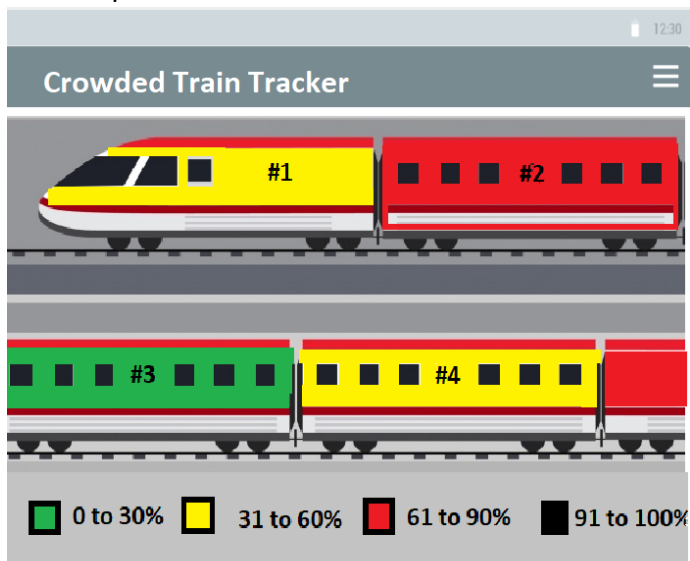
Really dislikes the fact that when noticing that a train is full, she has no idea if the following train would be equally as full or if she should just endure it and board try to board the currently packed train. Wants a means to know if the following train will be less packed than the current train.

This issue is experienced at least once a day, it is more common close to peak hour. It is also evident during the weekend at random times.

She did not have any educational or professional background related to this topic.

No alternative solutions were given, she proposed the utilization of a mobile app and the integration of its functions to the schedule information for the train line. She also highlighted the need of an easy to understand/use UI that showcases the train occupancy through changes in color and clear graphics.

### UI Examples



5:00 PM Headed to Seibu Shinjuku

For Seibu Shinjuku

