

6.1800 Design Project Update, Spring 2024

Newplace has decided to enhance their bikeshare system with the addition of six *superstations*. Superstations are mobile stations that can store more bikes than a regular station, and can be sent to locations as demand requires. Newplace plans to use them to accommodate large events and other scenarios. For instance, much like Boston's, Newplace's Fourth of July event takes place on the waterfront and involves a widely broadcast concert and fireworks. Many people bike down to the waterfront for the event since vehicle traffic is heavy.

Your job is to expand your system to utilize these superstations when they are deployed.

Superstation Specs + Interactions with Riders

Superstations are composed of the following:

- Two people known as “station controllers”. The station controllers handle some of the management of the superstation (see below).
- One truck. This truck can hold up to 45 extra bikes. It is equipped with a kiosk with the same specs as the regular station kiosks (e.g., the same processor, same network capabilities, etc.).
- 10 USB/Power “docks”; these docks do not lock.
- A combination of batteries and a generator that lets the station run for up to twelve hours. These devices power the docks and the kiosk on the truck.
- A geofence that can hold up to 100 bikes and has battery power for 24 hours of independent operation. The geofence can be left in place even as the truck leaves the area; this is useful in cases when the truck needs to transport excess bikes from this superstation to a different station, but can't carry all of the excess bikes at once. Bikes left in the geofence cannot be unlocked by riders, and can be picked up by trucks at a later date.

The interactions that riders have with a superstation are slightly different than the interactions they have with normal stations:

- To check out a bike from a mobile superstation, a rider interacts with either the app or the kiosk on the side of the superstation truck to “sign in”. This action notifies the station controllers, who, in turn, actually select and unlock a bike for the rider.
- To return a bike to a superstation, a rider hands it off to one of the station controllers. The station controllers then check in the bike using a handheld device that can scan the bike's QR codes.

When a bike is returned to a superstation, the station controllers perform a few actions:

- If one of the superstation docks is available, a station controller will dock the bike until it is fully charged and all videos and tracking information from the previous ride have been

extracted. Once the bike is ready, it will be locked and stored in the geofenced area (where it can later be given to another rider).

- If a superstation dock is not available, the station controllers will lock the bike in the geofenced area until one becomes available.

Once a superstation “session” is complete, the station controllers will take as many bikes back as possible on the truck. Any remaining bikes will remain in the geofence, locked, until another truck can come by and collect them. All such bikes will be collected along with the geofence equipment within 24 hours.

As stated above, your job is to incorporate superstations into your design, not to make decisions about where and when to deploy them. However, you should think about what data might Bikes4All need in order to make decisions about where/when to deploy superstations. Your system should collect and store enough data that another team could make these sorts of decisions.