# Autonomous Public Transportation Project
# Multi-Agent Systems

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## Week Five Milestone

Based on the implementation delivered in the previous weeks, we keep the same strategy for picking and delivering passengers, and for choosing the following station to travel to. In this week submission, we implement a voting mechanism that allows the buses to collectively decide when it is appropriate to buy a bus, and the corresponding type of bus.

The basic idea is that the initial bus $B_0$ in the simulation will act as a coordinator for the voting procedure. During the first 50 ticks of the simulation, $B_0$ hatches a new bus of alternating type every five ticks. After this initial bus creation, the voting procedure takes place.

Every $T$ ticks $B_0$ broadcasts a voting request to all the other buses in the system to collect their preferences regarding the purchase of a new bus. Each of the buses maintains a local table that describes their current ranking for each option *No - Small - Medium - Large*, and is updated every time this bus arrives at a new station in the following manner:

- In the moment a bus appears in the simulation its table is filled with zeros for all options.

- Every time a bus arrives at a station, it decides which passengers to pick up and, depending on the number of passengers left at the station, casts one point for the smallest bus type that could transport the missing passengers. If there are no passengers left, one point is awarded to option *No*. If the are more passengers left in the station than the capacity of a *Large* bus, one point is awarded to this option.

- Upon receiving a vote request, each bus replies with its current ranking (without the point counts) for the options. After this, the bus resets the count of all options to zero.

- Finally, $B_0$ aggregates all the received bus rankings using a Borda count and executes the corresponding bus purchase decision.