U.PORTO

FEUP FACULDADE DE ENGENHARIA
UNIVERSIDADE DO PORTO

Faculdade de Engenharia da Universidade do Porto

Agentes e Inteligência Artificial Distribuída

4º ANO - **MIEIC**

Sistema Multiagente

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Grupo 44

Agent-based Solution for Shared E-Scooter Service

Sustainability is certainly one key aspect of the world we live in these days. As cities grow, so does the population living in them and the infrastructure needed to support it, which unfortunately can't keep up most of the time. This introduces an excessive pressure on public services and other areas like road traffic, making commuting during rush hours extremely inefficient. This is where electric scooters come in handy: easy-to-ride, fast and portable, but especially, eco-friendly. They've become increasingly trendy as 'ride-and-share' services emerged. The drawback of this solution is the need for them to be recharged pretty often, which requires them to be placed at designated charging locations, which does not always happen as clients use them to travel pretty much anywhere they have in mind. Moreover, it is ideal to have them available in central/accessible places of the city, where they're actually needed by the clients. This requires companies to have allocated staff to pick them up and manually relocate them.

When a client rents an e-scooter, there's a flat activation fee that ensures the client isn't just stalling it and preventing other clients from using it, mostly like the coin on a shopping cart. However, this fee can be waived if the client ends their ride on a valid charging location, which eliminates the need to assign staff members to pick up the electric scooters and drop them at a charging station, as well as the costs associated with this task. The goal of this project is to study how the introduction of monetary incentives to clients can help reduce costs with staff.

Agents

- Electric Scooters
- Clients
- Companies
- Staff

Dependent Variables	Independent Variables
Average profit per e-scooter trip (€/km)	E-Scooter price rate (€/km)
Percentage of e-scooters dropped off at charging stations by the clients	Staff travel cost (€/km)
	Monetary incentive to clients (value of the activation fee that can be reimbursed)

Protocols

The following protocols will be used in order to ensure the communication between the different types of agents:

Client - Electric Scooter: The Client agent informs the Electric Scooter agent of its intention to move to a certain location (represented by an ordered pair) and receives a reply with the coordinates of the charging station closest to the Client's destination, as well as the amount the client should pay per kilometer.

Electric Scooter - Company: In case an Electric Scooter agent isn't dropped off at a charging station, it should request the Company agent (through the FIPA-request protocol) to assign a Staff agent to pick up the Initiator agent and drop it at a charging station.

Company - Staff: Once requested by an Electric Scooter agent, the Company agent should follow the FIPA Contract Protocol in order to find and instruct the closest available Staff agent to pick up the Electric Scooter agent.