Assignment 2: Cooperative Electric Vehicles in the Electric Grid

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1.Introduction

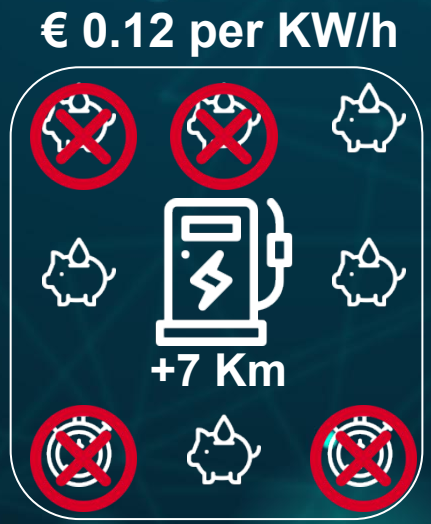
Cheaper

Faster

Money Driven Car

Time Driven Car

- Variable energy cost by location
- Manage Charging Spots & Schedules
- Slow / Fast Charging
- Handle Emergencies



2. Methodology & Implementation

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FIPA Standards

Contract Net

3. Car Agent

Money Driven Car

Time Driven Car

- Location through Field class
- Goal, schedule, battery
- Act as Manager & Decide which proposal to Accept
- Activates Emergency Operations

Charging Station Agent

Slow Charger 

Fast Charger 

```
public void ChargingStation(Field field, final i
    this.field = field;
    this.id = idGenerator.incrementAndGet();
    this.fastChargers = fastChargers;
    this.slowChargers = slowChargers;
    this.unitPriceFast = 2 * slowPrice;
    this.unitPriceSlow = slowPrice;
    this.chargingRateFast = 0.2;
    this.chargingRateSlow = 0.1;
```

- Act as Contractor Providing proposals with required information for the Manager
- Location through Field class
- Available Number of Fast and Slow Chargers
- Price and Rate of Fast and Slow Charging

Charging Event

- Connects CS with V Agents
- Stores Charging type, Start and End time

```
 */
public ChargingEvent(final Charging_Station_
    this.id = idGenerator.incrementAndGet();
    this.station = station;
    this.kindOfCharging = kindOfCharging;
    this.vehicle = vehicle;
    this.startTime = startTime;
    this.endTime = endTime;
}
```

4. Yellow Pages

- Provided through

```
Agent: VehicleAgent3 is looking for a slow charger.

On Time 01:04:13
Agent VehicleAgent3 found the following Charging-Points services:
- Service "CSAgent2-Charging-Points" provided by agent CSAgent2
- Service "CSAgent2-Charging-Points" provided by agent CSAgent2
- Service "CSAgent1-Charging-Points" provided by agent CSAgent1
- Service "CSAgent1-Charging-Points" provided by agent CSAgent1
```

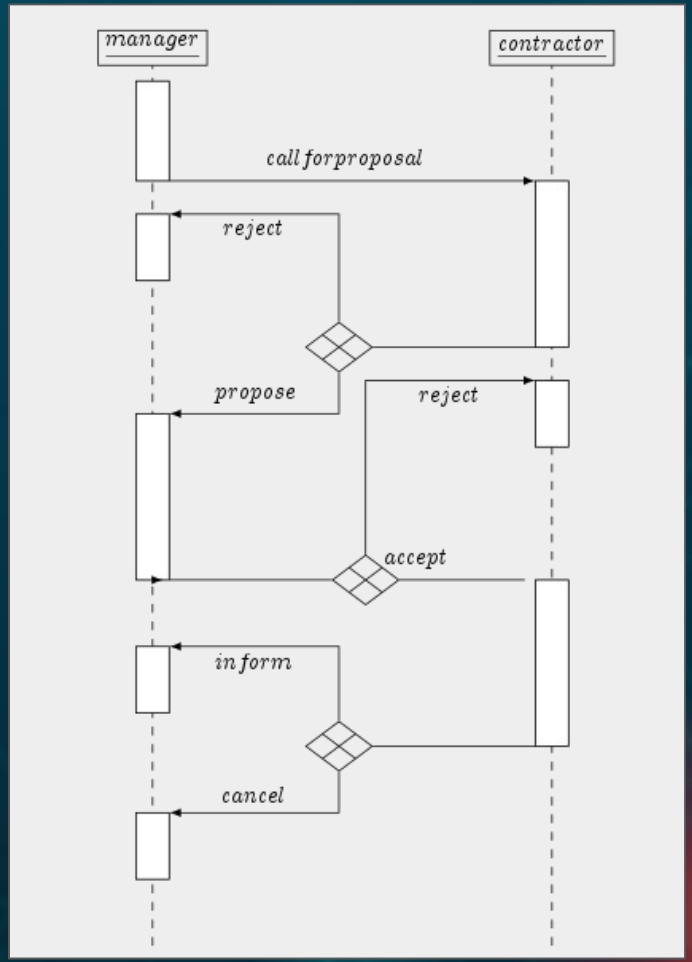
- Based on charging type :
  - Service entries of non fully booked CS Agents
  - Request entries of V Agents

Contract Net

- Provided through

Responses {

- Negative for no charging place at specific time slot.
- Ration number (based on distance, V agent goal)



5. Simulation

Emergency Case

- No rules
- High Priority on low battery car
  - Ratio Proposal highly based on distance
  - Randomly kick out car, which will search again for charging stations

6. Problems

With a Big number of Agents interacting simultaneously

{

- Cause problems on the simulator
- Need more complex rule for emergency situation
- Need locks on threads

FUTURE IDEAS

- Charging Event linked to Chargers
- Time agent for coordination
- Map Agent for taking care the distances
- Power Grid Agent to handle problems of current, overloading, etc
- Adaptive Charging algorithms for achieving optimal cost/time

QUESTIONS ?

THANK YOU