# 5 The problem for assignments 1, 2, 4, and 5 – PowerEnJoy

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You are to develop a digital management system for a car sharing service that exclusively employs electric cars. First, the system should provide the functionality normally provided by car–sharing services. These include:

- Users must be able to register to the system by providing their credentials, payment information and required documents. The credential must be unique among all previously registered users. Documents and payment information must be verified in order to successfully create an account. Users receive back a password that can be used to access the system.

- Required documents include driving license (at least 1 year of experience). Payment information consist in credit card

- Registered users must be able to find the locations of available cars within a certain distance from their current location or from a specified address. The system also provide information about the estimated car autonomy in kilometers.

- Among the available cars in a certain geographical region, users must be able to reserve a single car for up to one hour before they pick it up, by unlocking the car.

- If a car is not picked–up within one hour from the reservation, the system tags the car as available again, and the reservation expires; the user pays a fee of 1 EUR.

- An user is able to cancel the reservation before it's expiration, paying a cost proportional to the reservation time (the minimum amount is relative to a quarter of an hour).

- A user that reaches it's reserved car must be able to tell the system he's nearby, so the system unlocks the car and the user may enter, checking that the user is within a certain threshold from the car.

- As soon as the user unlocks the car, the system starts charging the user for a given amount of money per minute; the user is notified of the current fare through a screen on the car.

- The system debits the user on his card every 10€. Whether the user is not able to pay, the system stops the car respectfully of user's safety, after notifying the user on the screen.

- The system stops charging the user as soon as the car is parked in a safe area and the user exits the car; at this point the system locks the car automatically. Then the system applies the discount to the total fare and debit/credit the difference relative to the payed amount.

- The set of safe areas for parking cars is pre–defined by the management system.

In addition to the functionality above, the system should incentivize the virtuous behaviors of the users. Specifically:

1. If the system detects the user took at least two other passengers onto the car, the system applies a discount of 10% on the last ride.

2. If a car is left with more than 50% of the battery's charge, the system applies a discount of 20% on the last ride.

3. If a car is left at special safe areas where they can be recharged and the user takes care of plugging the car into the power grid, the system applies a discount of 30% on the last ride.

4. If a car is left at more than 3 KM from the nearest power grid station or with less than 20% of the battery's charge, the system charges 30% more on the last ride to compensate for the cost required to re–charge the car on–site.

5. If the user enables the money saving option, he/she can input his/her final destination and the system provides information about where to leave the car to get the discount described above at point (3). This location is determined to ensure a uniform distribution of cars in the city and depends both on the destination of the user and on the availability of power plugs at that safe area.