SAPIENZA Università di Roma
Facoltà di Ingegneria dell'Informazione, Informatica e Statistica
Corsi di Laurea in Ingegneria Informatica ed Automatica
Corso di Progettazione del Software
Exam project

Requisiti. The application to be designed concerns the management of a fleet of drones by a company. Of interest for each drone are the serial number (a string), the brand, and the current position expressed in terms of latitude, longitude, and elevation. The company has only two types of drones: delivery drones and monitoring drones. For delivery drones, the maximum payload weight is of interest (a floating-point number), while for monitoring drones, the number of installed cameras and any events to which they have been assigned are of interest. The company is involved in (i) package deliveries and (ii) security during events. For each delivery, the delivery address (a string), longitude and latitude of the delivery point, and the assigned delivery drone are of interest. For events, the name of the event, the date on which it takes place, the assigned monitoring drones (at least one), and for each of them, the role they will play in the event (a string) are of interest.

We are interested in the behavior of delivery drones. A delivery drone is initially in a *stationary* state. At this point, once it receives an *assignment* event, it transitions to the *flying* state. The assignment event includes as parameters the delivery to be made and the point represented in terms of latitude and longitude to which the drone should return after completing the delivery. As a result of receiving the assignment event, the drone performs a navigation operation (details of which are not relevant), using the coordinates of the delivery point as parameters. In the *flying* state, the drone receives *position* events that report its current position, and as a result, the drone's current position is updated. If the current position is the delivery address, the drone transitions to the *delivering* state and performs the landing operation. However, if the current position is the return point, it returns to the *stationary* state by executing the landing operation. In the *delivering* state, once it receives the *return to base* event, the drone performs the navigation operation to the return point and transitions to the *flying* state.

We are interested in the following activity that takes as parameters a set of delivery drones and a set of deliveries to be assigned. Once started, the activity opens two complex sub-activities. The first sub-activity is responsible for continuously monitoring the position of the drones. The second complex sub-activity analyzes each delivery one by one and sends an *assignment* event to the first available drone in the *stationary* state. If such a drone does not exist, it waits for one minute and tries again to find an available drone. If the drone exists, it asks the user for the return coordinates, modifies the delivery object with the assigned drone, and sends the *assignment* event to the drone for delivery. Once all deliveries are completed, the sub-activity ends and sends an `interrupt` event to the thread of the position monitoring sub-activity, which then terminates.

Project description. Implement a Java application consisting of the following parts:

- All the classes that implement the requirements following the methodology studied during the course
- A graphical user interface (GUI) developed using the SWING library that allows to start the main activity selecting the inputs. The GUI, during the execution of the activity, must show proper logs of what is happening.
- A server application that receives a drone ID and returns its position. The server application must be accessed by the position monitoring subactivity to update the position of the drones by sending position events. The communication between the client and the server must happen through a TCP connection.