AVITRACK

Task 1.4
Database: "Actors, scenes and events Models"

Abstract:

This document presents different results coming from the 3D modelisation of the scene and the description of the apron's activities.

Project is co-funded by Industry and the European Commission within FP6 Aeronauticis

1. OBJECTIVES

The first step for the Avitrack project was the comprehension of all activities, which take place on the apron.

So, after the description of the apron's scene, the formalism definition, the module management addition and the representative video capture, a detailed and complete numeric model was created. This deliverable presents the database results obtained after the 3D modelisation of the scene and the description of the apron's activities.

2. THE 3D MODELISATION OF THE SCENE AND THE DESCRIPTION OF THE APRON'S ACTIVITIES

2.1. DETAILED 3D MODELS

The 3D models of the scene and of the main vehicles, which contribute to the apron's activities, were obtained, by Silogic, with Image Modeler from Realviz software and pictures taken from Echo40.

The precision of the scene models enables to notice the position on the height sensors and their point of view.

The models of the main vehicles are rather precise and should be used more for output visualisation than for the tracking module.

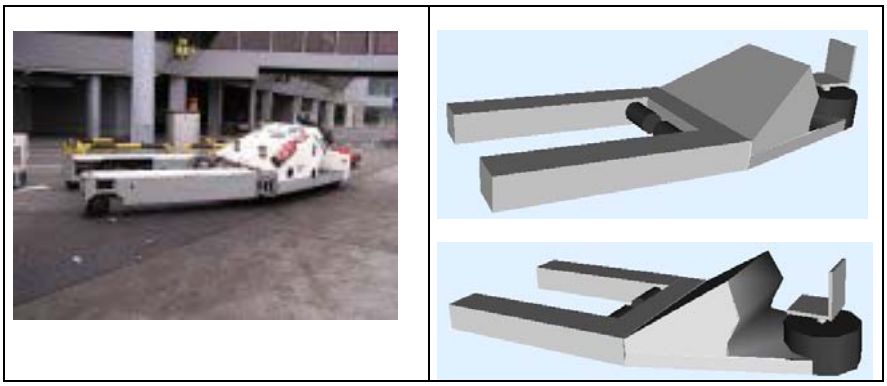

Figure 1 Example of model: Aircraft Tow Tractor

2.2. MODELS FOR THE TRACKING MODULE

The models for the tracking module are principally characterised by their dimensions, facets and lines.
Indeed, the recognition of the type of a vehicle in the scene is done by comparison and minimisation of distance between the edges of the vehicle in the image and of different existing models.

Furthermore, especially in our case where the vehicles are complex, we need to model articulation and composition. So, we will distinguish two kinds of models defined in different files:

- The primitive models in .prim files where we defined points, facets and lines in an object centred representations.
- The composite or articulated models in .mod files which are combinations of primitives models after eventually scaling and which can be linked by translation or/and rotation.

For visualisation, Silogic use POV-Ray tool for creating three dimensional graphics. Therefore, the University of Reading made an executable in Python which transform a .prim files into a .pov files.

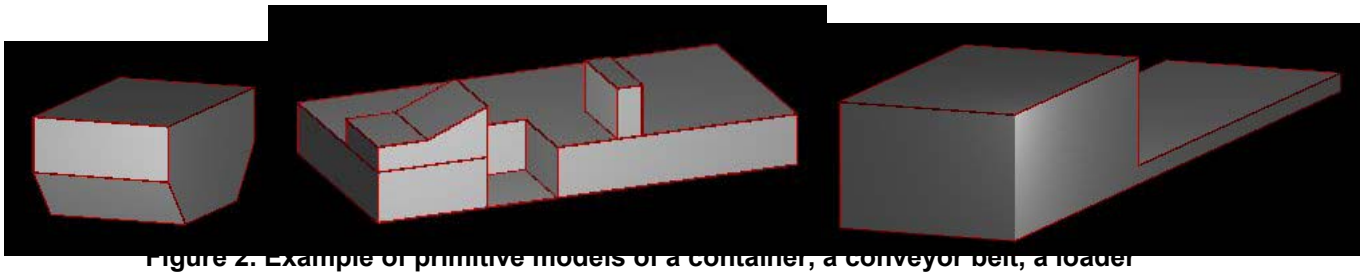

Figure 2: Example of primitive models of a container, a conveyor belt, a loader

2.3. MODELISATION OF THE SCENE AND ACTIVITIES FOR SCENARIOS RECOGNITION

In order to understand the behaviours of vehicles, Silogic have modelled the activities with the Scenario Description Language (SDL) and define the contextual modelisation of zone of interest in an xml files.

For the **modelisation of the activities with scenarios**, the first goal was to identify the primitive states and events that we will have to recognise. These primitive scenarios will be the bases of more complex ones that correspond to actions of the stopover.
After, the first files composed of basic states and events were done.
In a second time, we will use these basic scenarios for more complex activities description. To model more in details and according to basic events defined above we completed this description with automates. The states and changes of states are composed with the primary scenarios.

For the **contextual modelisation of the scene**, Silogic need to consider the context description in term of definition of zones of interest. The entire contextual scene is defined in an xml files.

There are two classes of context:

1/ the context of the empty scene, which will not change along the time,

Figure 3: context of the empty scene

2/ a dynamic context related to the aircraft, which will be loaded when the aircraft is stopped. Indeed, the zones of interest around the aircraft are different according to the type of the aircraft and depend on its stop position.

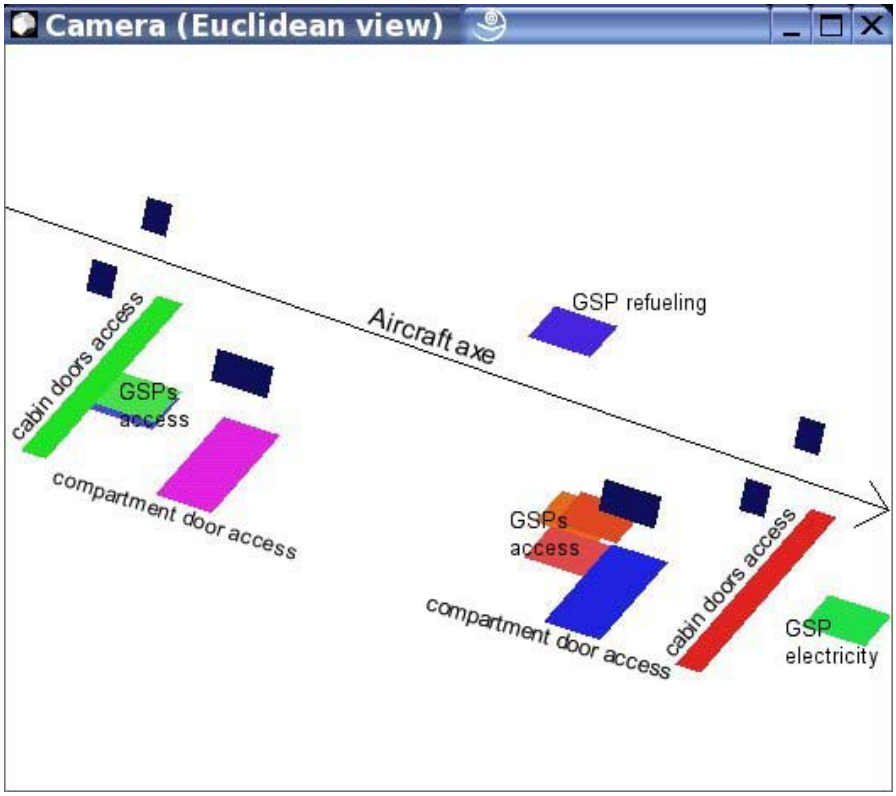

Figure 4: Contextual scene of the A319

Areas of interest or other contextual elements can be added according to the needs of the scenario.

3. CONCLUSION

All these models (models for visualisation, models for tracking, models of activities and contextual scene models) are place in the AVITRACK framework prototype, and are manager referring to the model manager protocol. Each processing module that needs one model will have to subscribe to the server to be able to retrieve it.

This cooperative model generation is an important step in the project progression, as all the partners to set up the prototype will use these data (example following tasks 4.1 'Vehicle Movement Interpretation' and 4.2 'Basic Events Recognition').

During the test and the evaluation of the prototype model will certainly evolve during the project.