Statechart modelling of interactive gesture-based applications

Romuald Deshayes Tom Mens

Software Engineering Lab

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Outline : Problem Statement

Problem Statement

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Challenge

Develop intuitive interactive applications that are easy to maintain

Why is it a challenge ?

- Complex behaviour
- Nondeterministic user actions
- Same events lead to different actions

Contributions

- Gestural user interface for 3D objects manipulation
- Modeling executable behaviour using a visual formalism
- Validation with an application framework

Outline : Proof-of-concept application

Proof-of-concept application

Proof-of-concept application

- 3D visual drawing tool
- Uses gestures to create and manipulate 3D objects
- OpenGL graphical library
- Microsoft Kinect + NITE

Small video

Outline : Modeling interactive behaviour

Modeling interactive behaviour

Modeling interactive behaviour

Context

- Gesture-based interaction
- Highly reactive event-driven systems

Proposed solutions

- Visual modeling language
  - Statecharts
  - Petri nets
- Amenable to formal analysis
- Easier to evolve
- Reduced complexity

Outline : The application framework

The application framework

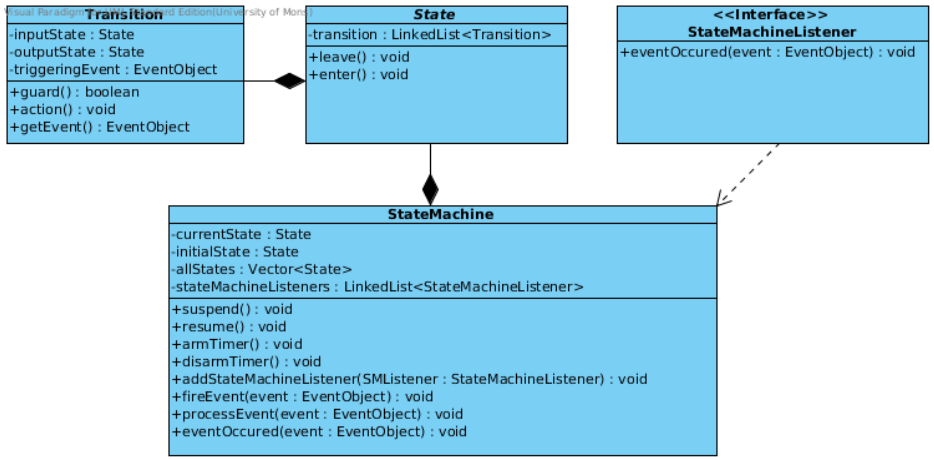
The application framework

- Framework for developing interactive applications
- Executable behaviour specified using statecharts
- Client-server architecture

The application framework II

Features

- Generic
  - Abstract classes
  - Observer design pattern
- Communication between statecharts
- Uses Java SwingStates library



The application framework III

Outline : Statechart models

Statechart models

Statechart models - Hand

Statechart models - Component

Statechart models - Scene

Outline : Conclusion and Future Work

Conclusion and Future Work

Conclusion and Future Work

Statecharts

- Appropriate and scalable formalism for modeling the interactive gesture-based behaviour ?

Improvements

- Externalise/decouple statechart represention from framework
- Compare statecharts with Petri nets

Future Work II

- Apply our approach to other HCI applications
- Other types of natural interfaces
- Compare/combine with other UIML
- Controlled experiments, carry out user studies, empirical studies