

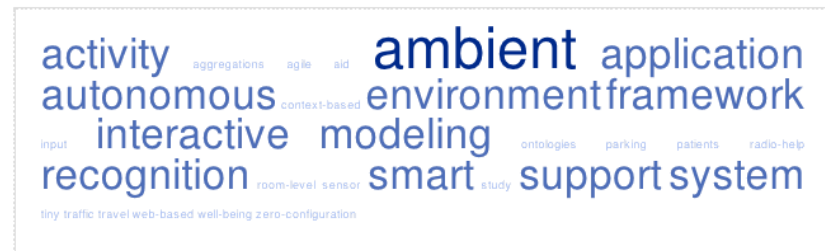
NexTech 2012
September 26th - Barcelona, Spain



Panel: Ambient Environments and Ambient Intelligence: Where is the Boundary Between Fiction and Future Reality

Panelists

- *Carlos Fernando Crispim-Junior*
INRIA - Sophia Antipolis, France
- *Jeroen Doggen*
Artesis University College Antwerp, Belgium
- *Christophe Jacquet*
Supelec, France
- *Kiyohide Ito - Makoto Okamoto*
Future University Hakodate, Japan



Moderator

- *Maarten Weyn*, Artesis University College of Antwerp, Belgium



Ambient Panel

Discussion movies:

http://www.youtube.com/watch?v=Fqi8NILq_dQ&list=PLdhqwc8Gg59kZpHXoPFWySXYZnIna6xxk&feature=mh_lolz

http://www.youtube.com/watch?v=gCuPx9shWT0&list=PLdhqwc8Gg59kZpHXoPFWySXYZnIna6xxk&index=3&feature=plpp_video

Conclusion of panel discussion:

Technology can make most Ambient vision reality in the future, the open questions is if there is going to be the need of society or if there are going to be business models which need some of these visions.

Ambient Environments and Ambient Intelligence:

From Lab-based to Home-based Surveillance System



Where is the Boundary Between *Fiction* and
Future *Reality*?

CARLOS FERNANDO CRISPIM-JUNIOR, DR.ENG.

Goals



- Detect patterns of emerging/early symptoms of Alzheimer's Disease and related dementia through short and long term surveillance of patients during activities of daily living.



Lab-based environment



Characteristics:

- Short term observation;
- Controlled environment;
- Experts help Patients to proper use the sensors;
- Frequent evaluation of sensors performance by technicians.

Sensors:

- Domotic sensors;
- Wearable sensors;
- Video cameras.

Frame Information

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Home-based environment

Characteristics:

- Uncontrolled environment,
- Long term observation,
- daily/frequent interaction of user with sensors,
- Data storage and access.

Sensors:

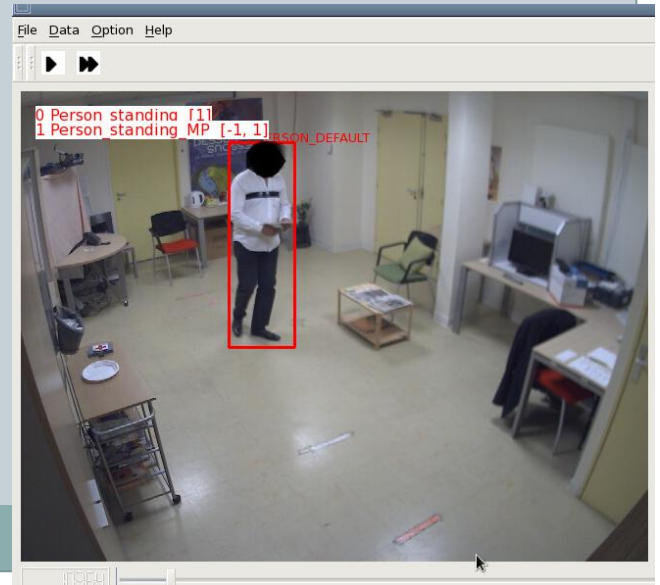
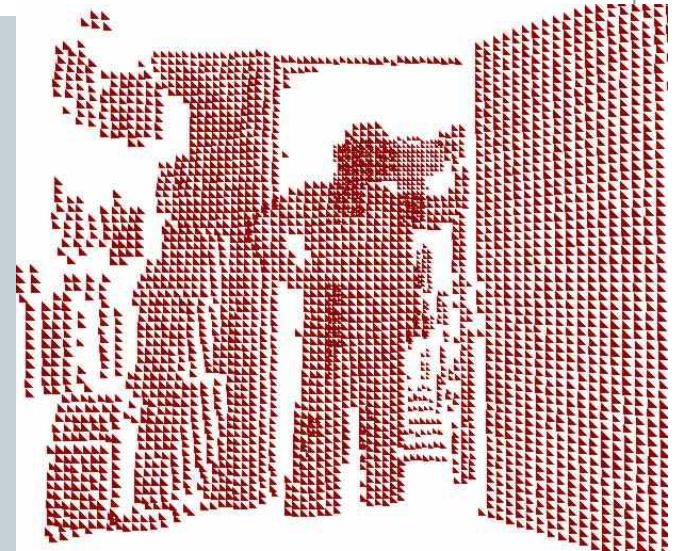
- Domotic sensors;
- Wearable sensors;
- Video cameras.



Challenges



- Sensor performance versus Environment Complexity
- Intrusiveness/Privacy
 - Which is the trade-off between a sensor performance and the impact in privacy we are willing to accept?
- Maintenance
 - Sensors long-term reliability,
 - Battery life,
 - Device life cycle.
- Data storage and analysis
 - Which parameters of daily living activities are relevant for a medical diagnosis?



References



- N. Zouba, F. Bremond and M. Thonnat. “An Activity Monitoring System for Real Elderly at Home: Validation Study”. Proc. 7th IEEE International Conference on Advanced Video and Signal-Based Surveillance, AVSS 2010, Boston, 29 August 2010, pp.
- Kinect Image: <http://www.i-programmer.info/ebooks/practical-windows-kinect-in-c/4126-kinect-sdk1-a-3d-point-cloud.html?start=2>

Ambient Systems: Panel Discussion

Ambient Systems and the Arduino Platform

Jeroen Doggen
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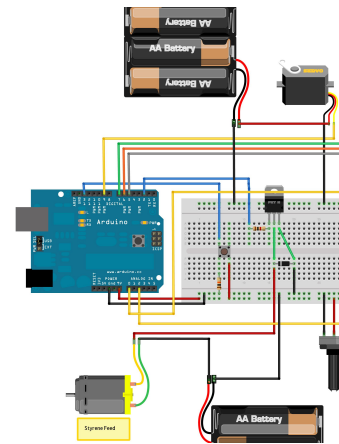
September 26, 2012



Arduino meets Ambient Systems: Why?



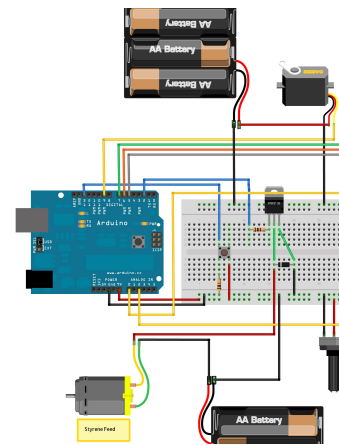
- ▶ Typical Ambient systems require:
 - ▶ Specialised software and knowledge:
e.g. TinyOS, Contiki
 - ▶ Specialised hardware: TelosB, Z-Wave, XBee, DASH7,...
- ▶ The Arduino platform provides:
 - ▶ Many well-documented software libraries for hardware interfacing
 - ▶ A big existing user community
 - ▶ Many options to share your own hardware and software designs



Arduino meets Ambient Systems: Why?



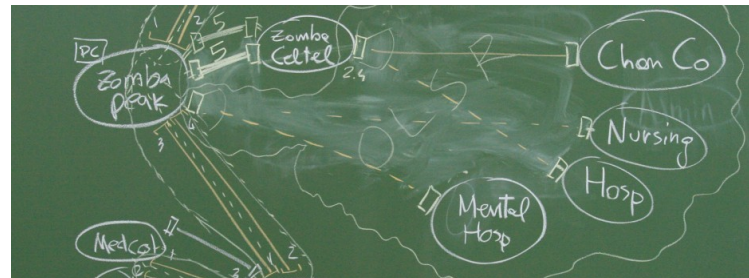
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- ▶ The Arduino platform provides:
 - ▶ Many well-documented software libraries for hardware interfacing
 - ▶ A big existing user community
 - ▶ Many options to share your own hardware and software designs
- ▶ Open Question: “Can and should we build competitive ambient systems using the Arduino platform?”



Academic Perspective



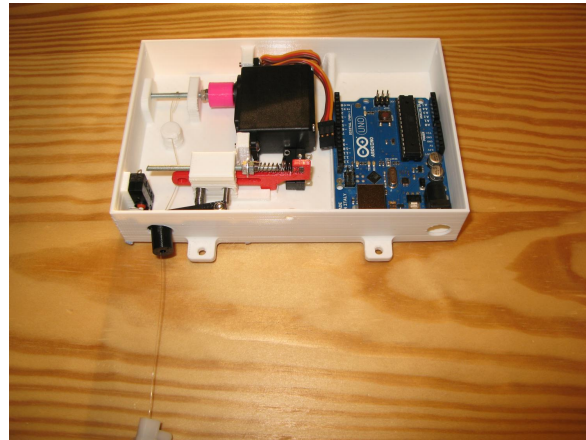
- ▶ Many protocols and architectures for WSNs
- ▶ An abundance of proof-of-concept implementations
- ▶ Popular real-world systems are scarce.
- ▶ Building new applications based on existing technologies is often difficult.



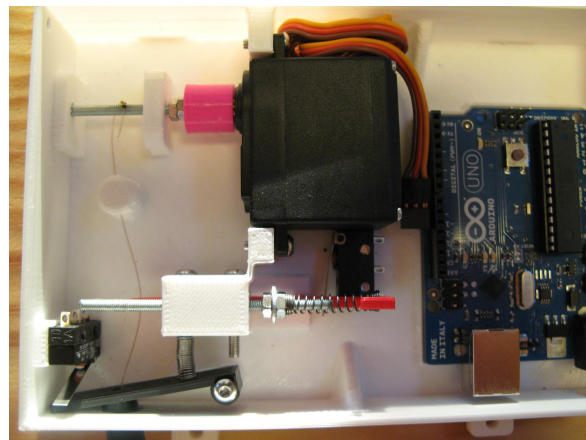
DIY Perspective



DIY Perspective



DIY Perspective



Christophe Jacquet

Associate Professor at Supélec

Graduate school, Paris Area, France



Interests:

- Heterogeneous modeling
- Ambient intelligence

**To achieve the vision of ambient intelligence,
What kind of models do we need?
What kind of modeling tools?**

Modeling...

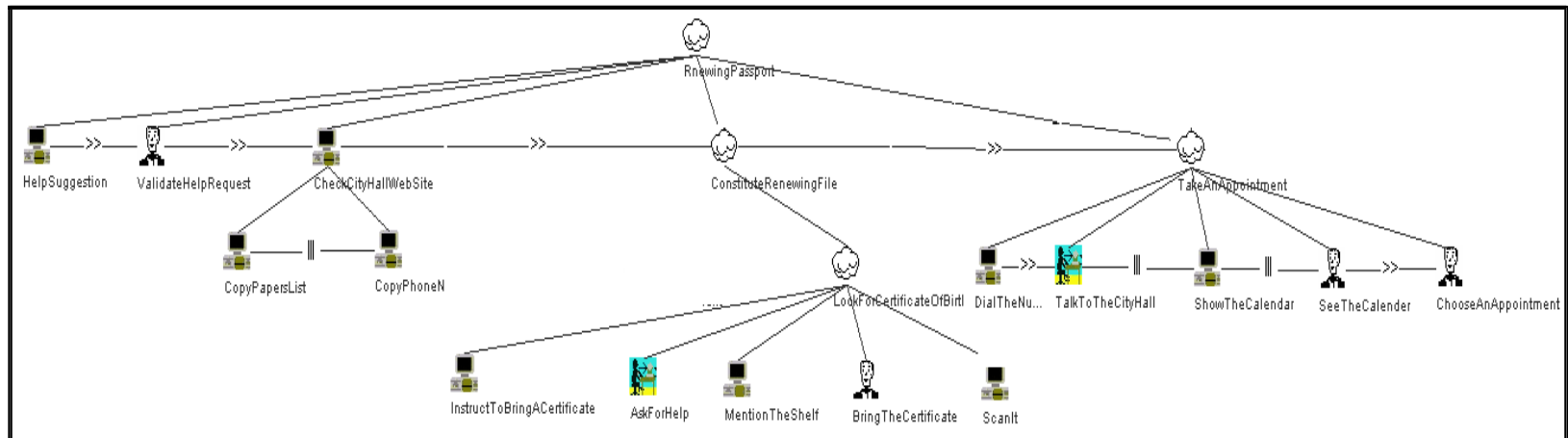
- The application ?
- The environment ?
- The underlying technical platform ?
- The user ?
- ...?

A few examples...

Example: Model user behavior

- Specific modeling paradigms for **task modeling**

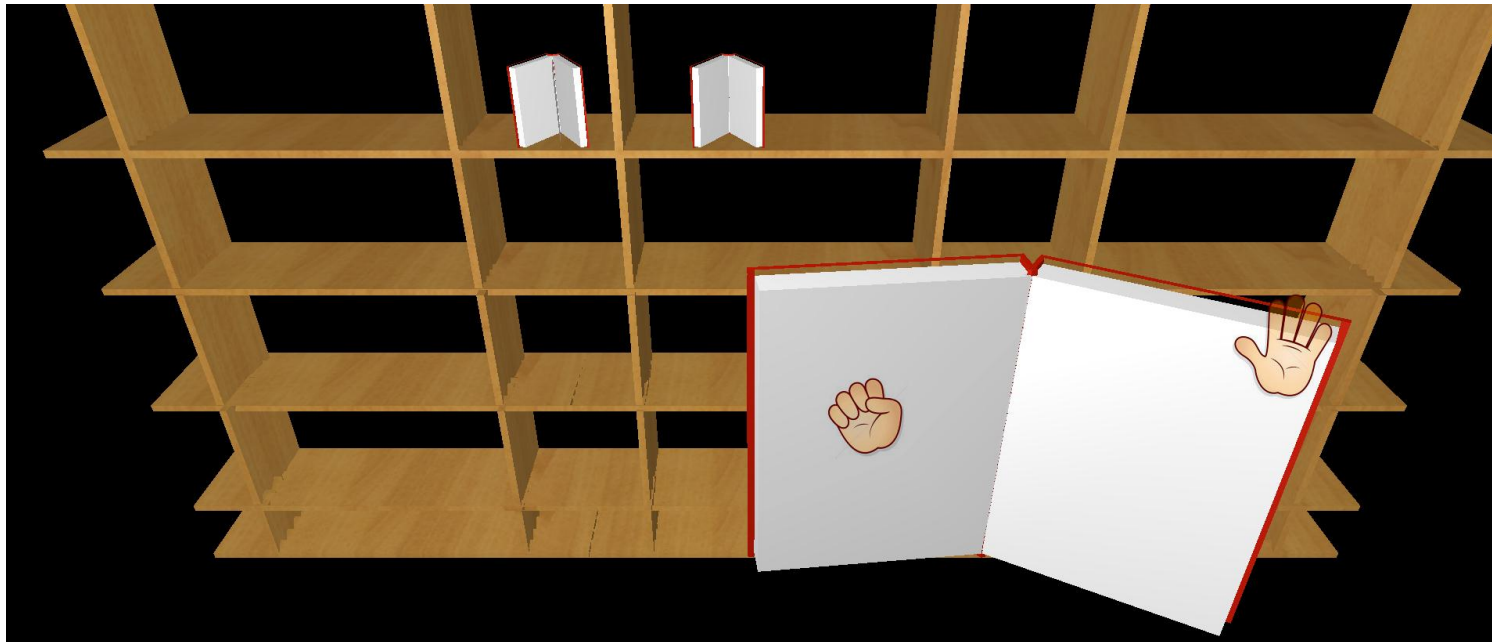
Example of such a paradigm: ConcurTaskTree (CTT):



- Other instance: Maarten's **motion model** across rooms (finite state machines)

Example : model a gesture-based application

Manage a bookshelf using gestures captured by a Kinect

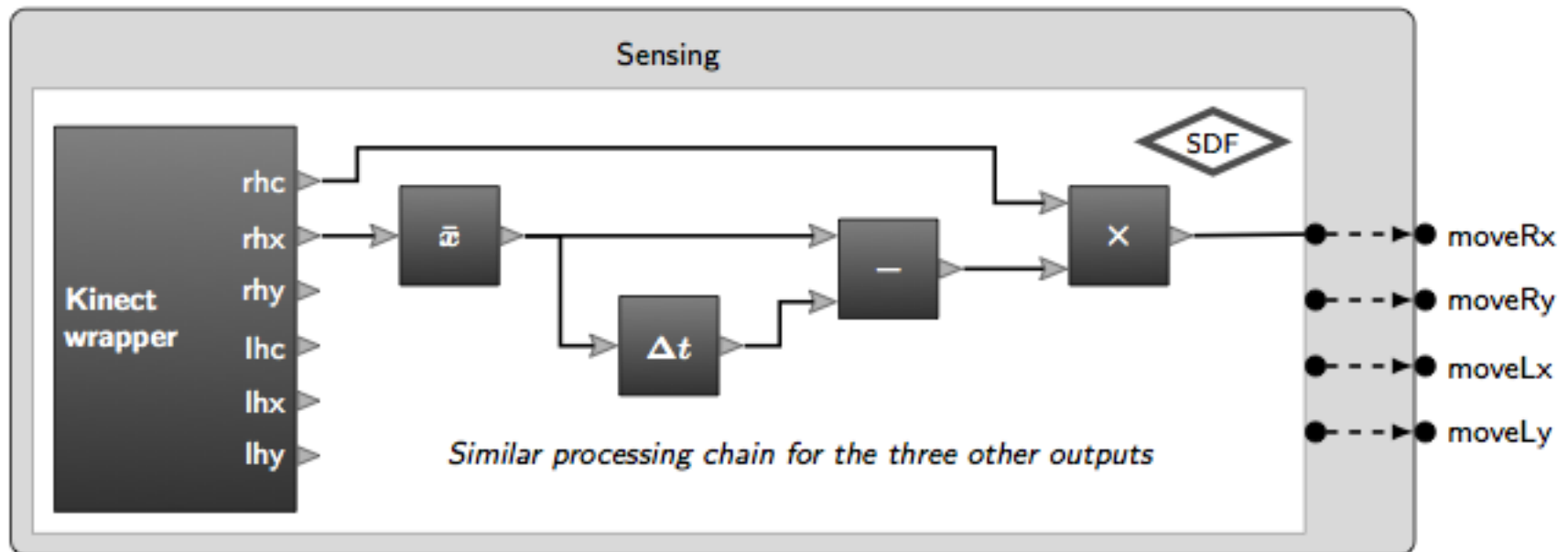


Joint Work, University of Mons / Supélec

R. Deshayes, C. Jacquet, C. Hardebolle, F. Boulanger, T. Mens, *Heterogeneous Modeling of Gesture-Based 3D Applications*. MPM 2012, Workshop at MODELS 2012.

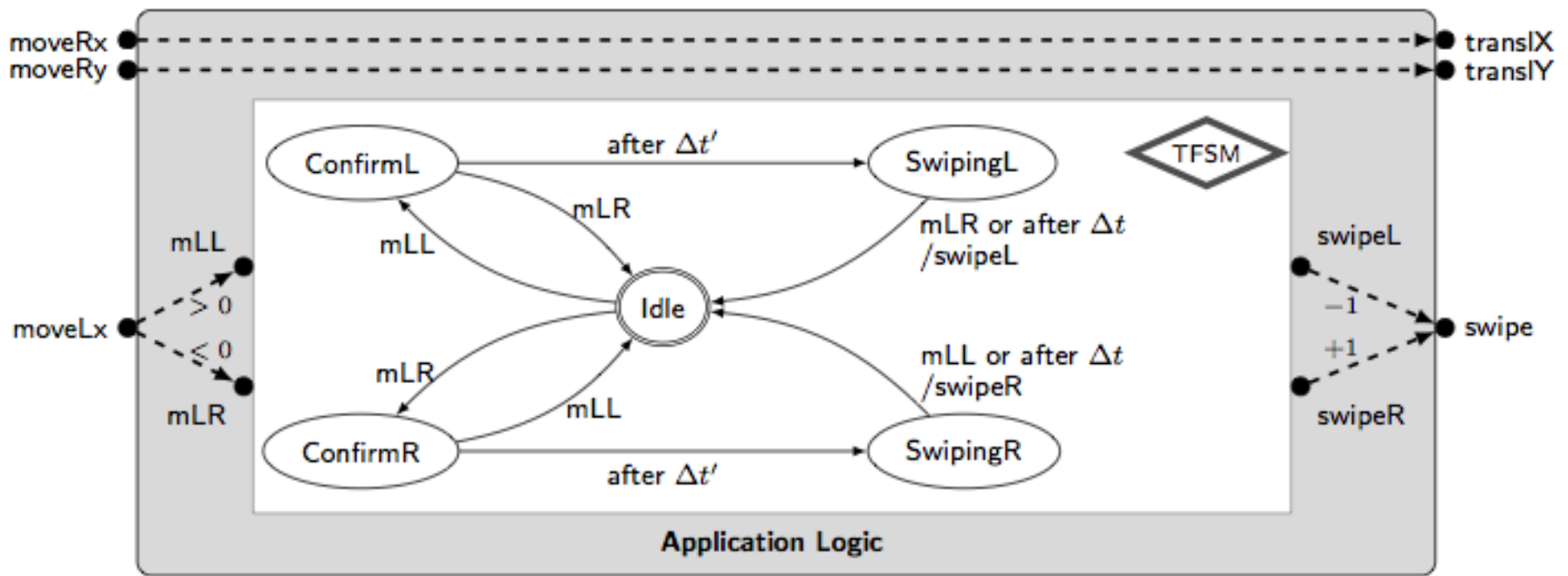
Model #1: sensing

- **Goal:** extract gestures from low-level hand tracking data
- **Nature of the model:**
Signal processing chain \rightarrow dataflow (cf. Simulink)



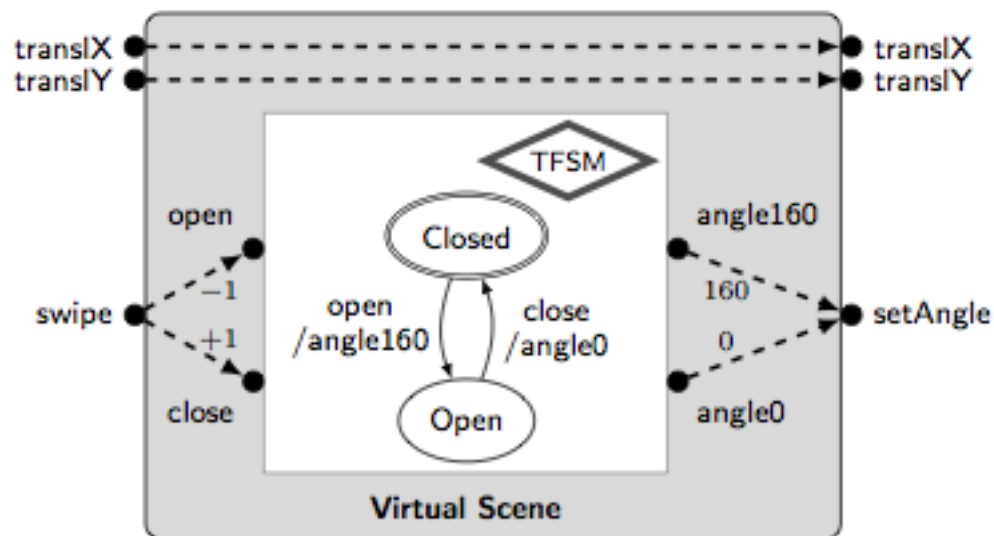
Model #2: application logic

- **Goal:** associate application-related actions to combinations of gestures
 - Example:** swipes from elementary moves
- **Nature of the model:** timed finite-state machine



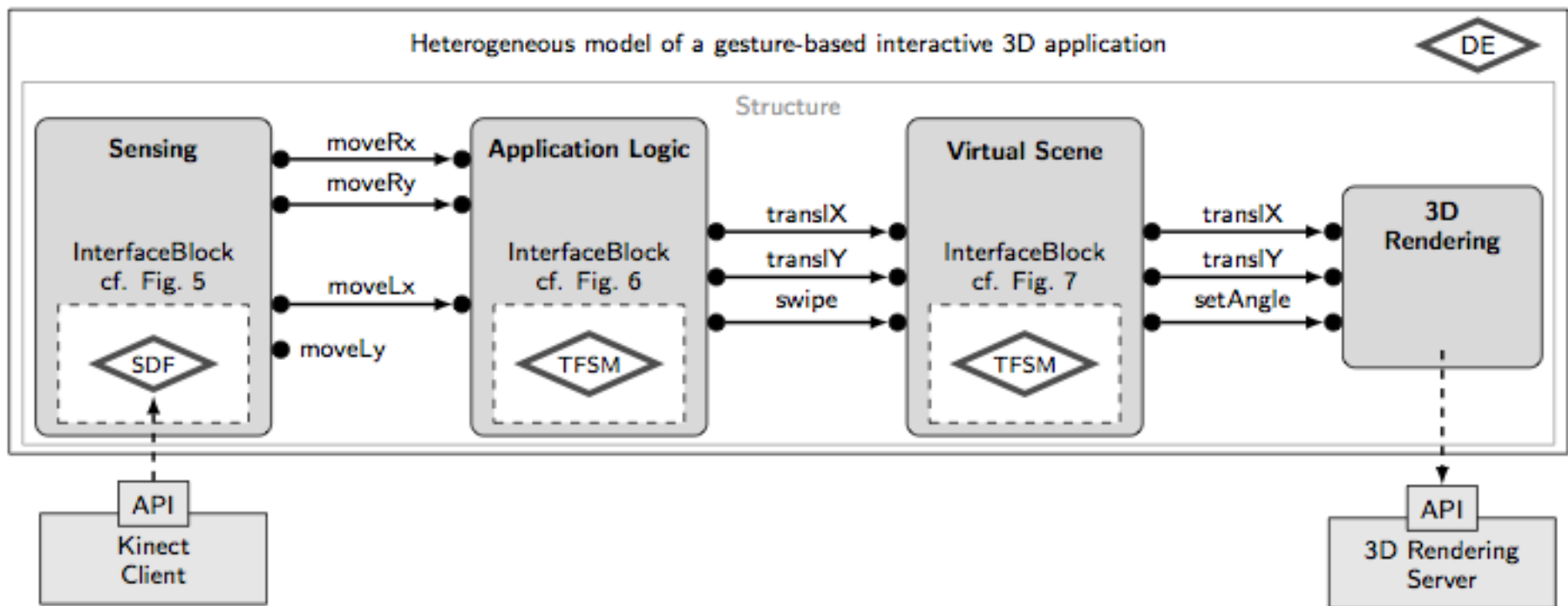
Model #3: state of an object

- **Goal:** model the state of an object
(Here a virtual book, but it could be a real object as well)
- **Nature of the model:** timed finite-state machine



Putting all models together

- The overall model of the system is heterogeneous
- **Adaptation** between models of different nature needs to be specified



Heterogeneous modeling

aka multi-paradigm modeling

Build models with subsystems described using different modeling paradigms

Examples of tools:

- Ptolemy (U. Berkeley)
 - Introduced the concept of Model of Computation (MoC)
- ModHel'X (Supélec)
 - Explicit adaptation between different MoCs

**To achieve the vision of ambient intelligence,
What kind of models do we need?
What kind of modeling tools?**

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Homepage: **<http://wwwdi.supelec.fr/jacquet/>**

ModHel'X page: **<http://wwwdi.supelec.fr/software/ModHelX/>**