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

activity agregators age at ambient application autonomous context-based environment framework input interactive modeling onobges parking texts radio-help recognition com-level sensor smart study support system thy traffic travel web-based web-based web-based web-based web-based sensor

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.

 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.

Goals



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.

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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

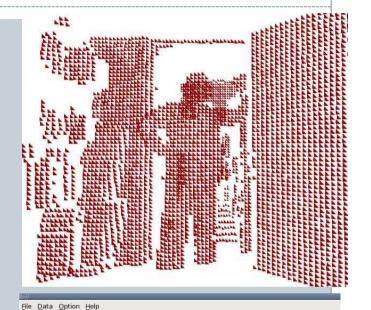
• Sensor performance versus Environment Complexity

• 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/practicalwindows-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 jeroen.doggen@artesis.be

September 26, 2012



Arduino Development Platform



- The Arduino development platform allow designers to develop electronic prototypes.
- The platform has been gaining in popularity over the last years.
- The open-source community has 70000 registered users and an abundance of user submitted libraries.



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Arduino Development Platform

- The Arduino development platform allow designers to develop electronic prototypes.
- The platform has been gaining in popularity over the last years.
- The open-source community has 70000 registered users and an abundance of user submitted libraries.
- ► Ease of use is the main selling point.
 - ► Connect the hardware
 - Install the software
 - ► It just worksTM



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Arduino meets Ambient Systems: Why?



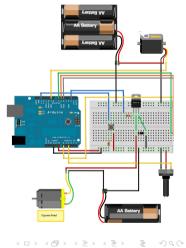
- ► Typical Ambient systems require:
 - Specialised software and knowledge:
 - e.g. TinyOS, Contiki
 - Specialised hardware: TelosB, Z-Wave, XBee, DASH7,...



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

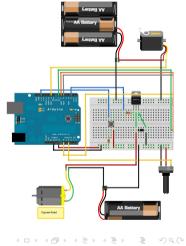


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Arduino meets Ambient Systems: Why?



- ► Typical Ambient systems require:
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 - 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
- Open Question: "Can and should we build competitive ambient systems using the Arduino platform?"



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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.



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Industrial Perspective

- Several companies are developing new technologies.
- Is the consumer waiting for these product or do we need to create a demand?
- ► Are the business models valid?

Industrial Perspective



- Engineers in industry are using Arduino in product development and testing
- ▶ New product to be released by Barco (winter 2012)



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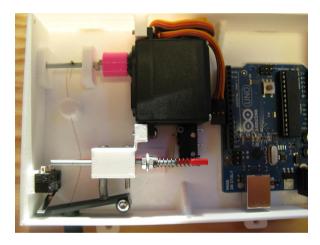
DIY Perspective





DIY Perspective





Conclusion & Future Possibilities



- ► The technologies have been developed.
- ► Who will develop the killer applications?
 - ► Scientists?
 - ► Engineers?
 - Regular people solving everyday problems?
- The Arduino community might be an enabler for this new trend.

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...

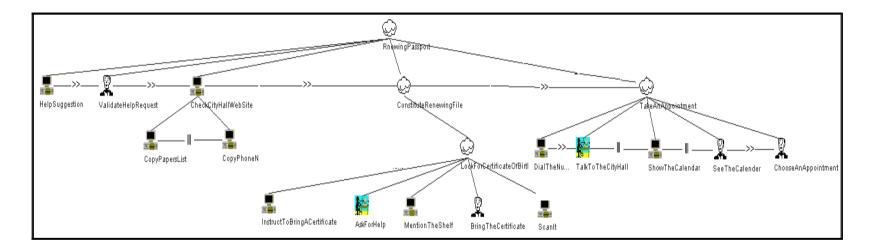
- The application ?
- The environment ?
- The underlying technical platform ?
- The user ?
- ...?

A few examples...

Example: Model user behavior

• Specific modeling paradigms for task modeling

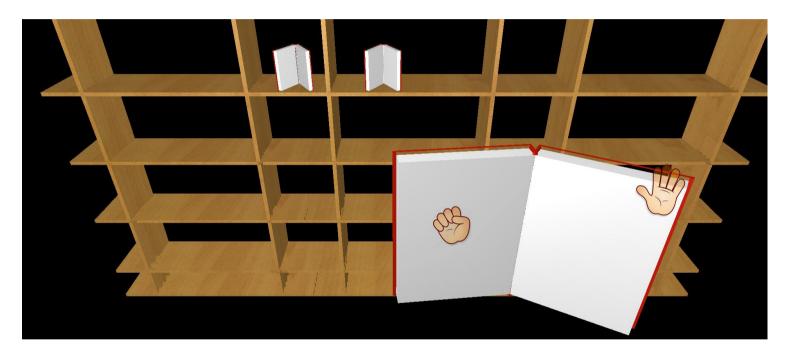
Example of such a paradigm: ConcurTaskTree (CTT):



• 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



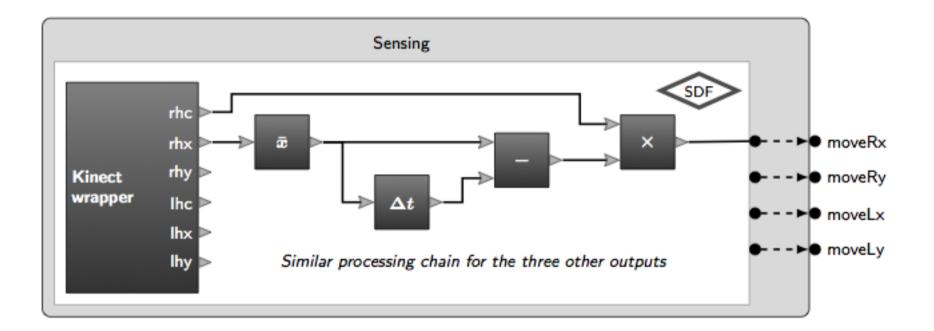
Joint Work, University of Mons / Supélec

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)

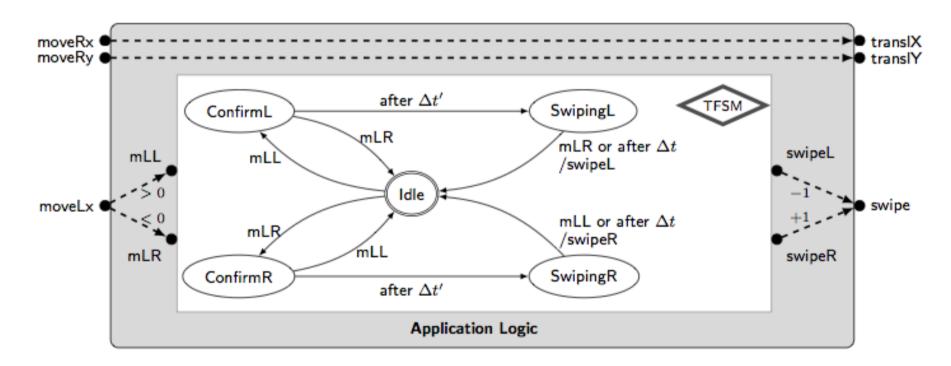


Model #2: application logic

Goal: associate application-related actions to combinations of gestures

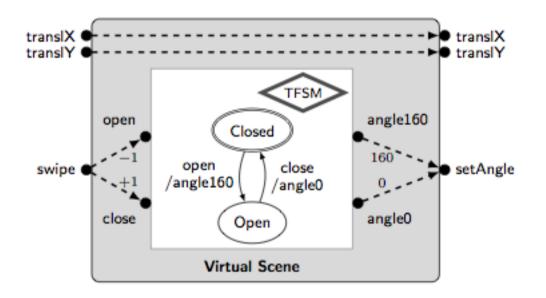
Example: swipes from elementary moves

• Nature of the model: timed finite-state machine



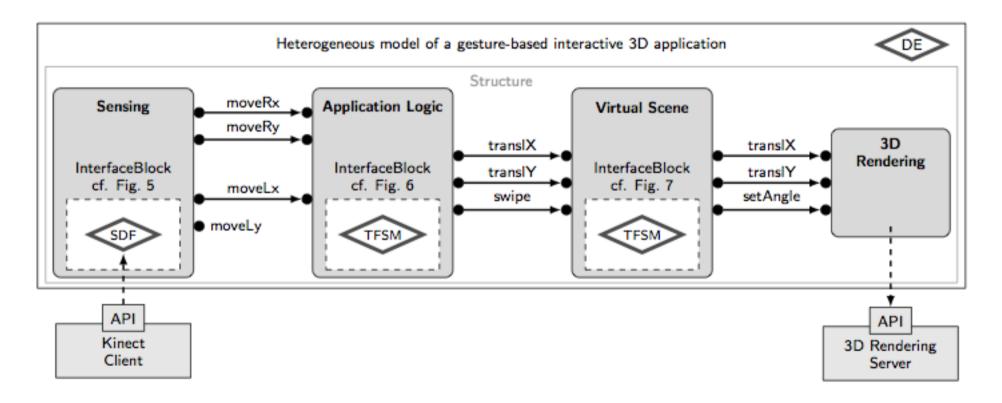
Model #3: state of an object

- 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 decribed 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?

Contact: Christophe.Jacquet@supelec.fr Homepage: http://wwwdi.supelec.fr/jacquet/ ModHel'X page: http://wwwdi.supelec.fr/software/ModHelX/