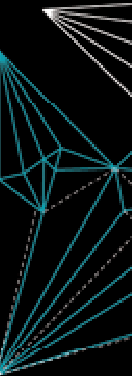
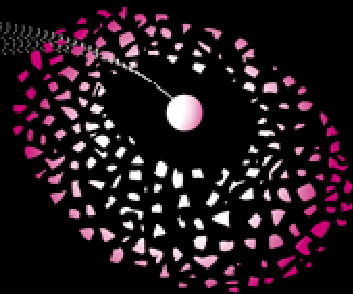
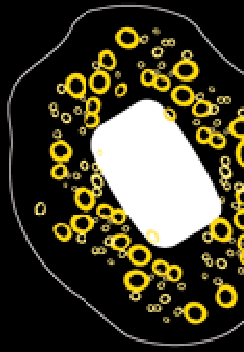


Use of formal models in model-driven design of embedded systems.

CPA 2009, Fringe Session

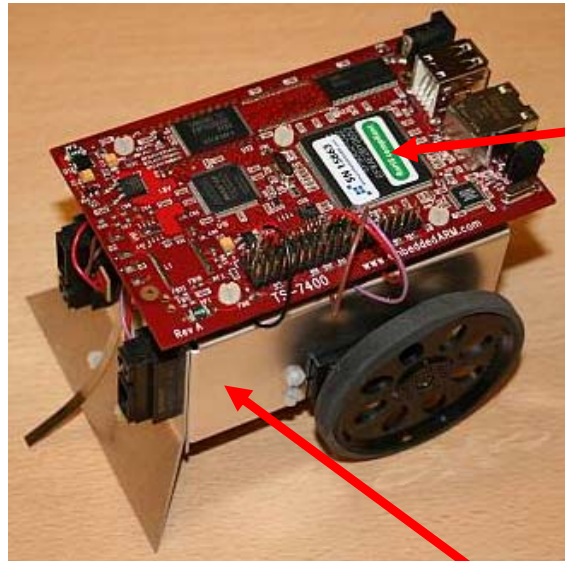
Oguzcan Oguz, Jan Broenink

Control Engineering, University of Twente, The Netherlands



- The project: **Model-driven design of dependable SW intensive embedded systems (ES)**
- ES gaining more use and importance.
- ES: specific purpose computers.
- Need for a adequate model-driven design process.
- Need for concurrency in ES: Interplay with the concurrent world and real-time constraints.

- Need to have model-driven design approach
 - Manage complexity, validation, early execution, abstraction.
- Specific purposes and needs of different ES
 - Cannot abstract from the hardware.
- Different views while designing ES
 - Control Theory, Software Engineering, Formal Methods
- Research questions
 - What are the essential models & methods to integrate?
 - Concurrency included in some of the methods.
 - Can there be a unifying approach, theory?
 - If not or if it is too complex, what other techniques are there for integration?
 - Co-simulation?



TS-ARM 7400
Controls the behavior, CSP coded here.
200 MHz ARM9 + MMU, 32 MB Ram,
32 MB Flash, Ethernet, USB, SD card

**Wireless
Wi-Fi - USB stick**

rs232

**Battery
4x AA**

MiniMegaBoard
Controls sensors & servos. I/O interface.
Atmel Atmega32 (16 MHz)
8bit μ Controller, timers, 4PWM

**Distance
IR sensor**

**Contact
Switch**

**Motors
DC / encoders**

**Line follower
IR sensor**

- Modeling the testbed robot behavior using different views
 - Control Eng., Software Eng., Formal Methods & Tools
 - CSP to handle concurrency.
- Integration of the models
 - Gathering more specific research questions.
- Inspecting the existent solutions/efforts that try to integrate the essential views.