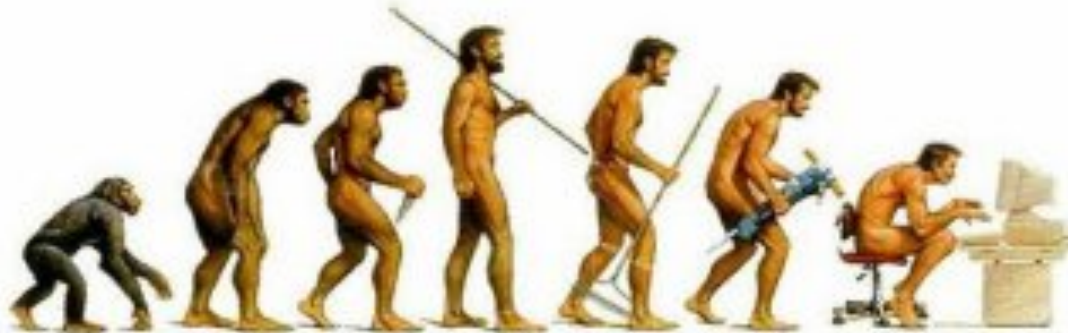


UiO : **Department of Informatics**
University of Oslo

Bio-inspired Computing for Robots and Music

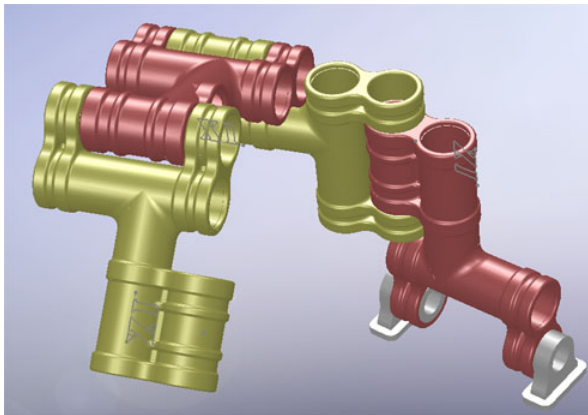
Jim Tørresen

Research group Robotics and Intelligent Systems

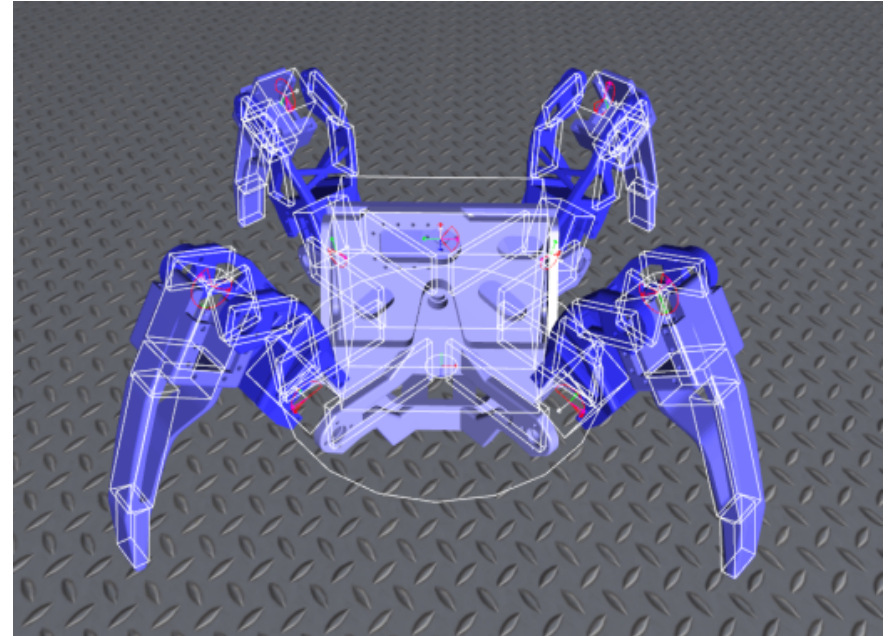
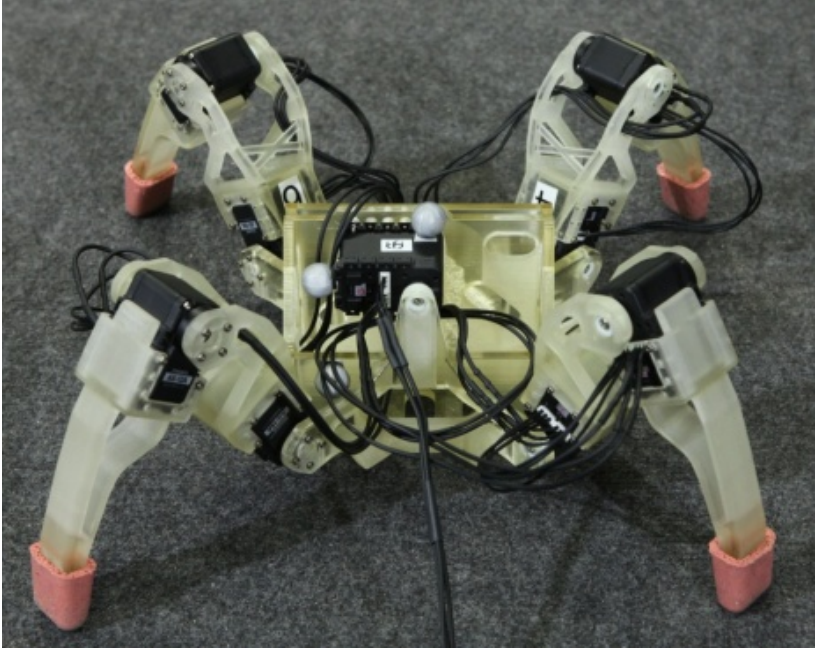


State-of-the-art Rapid Prototyping Facilities

- 3D printers and milling machines
- Large potential for developing innovative robot systems.



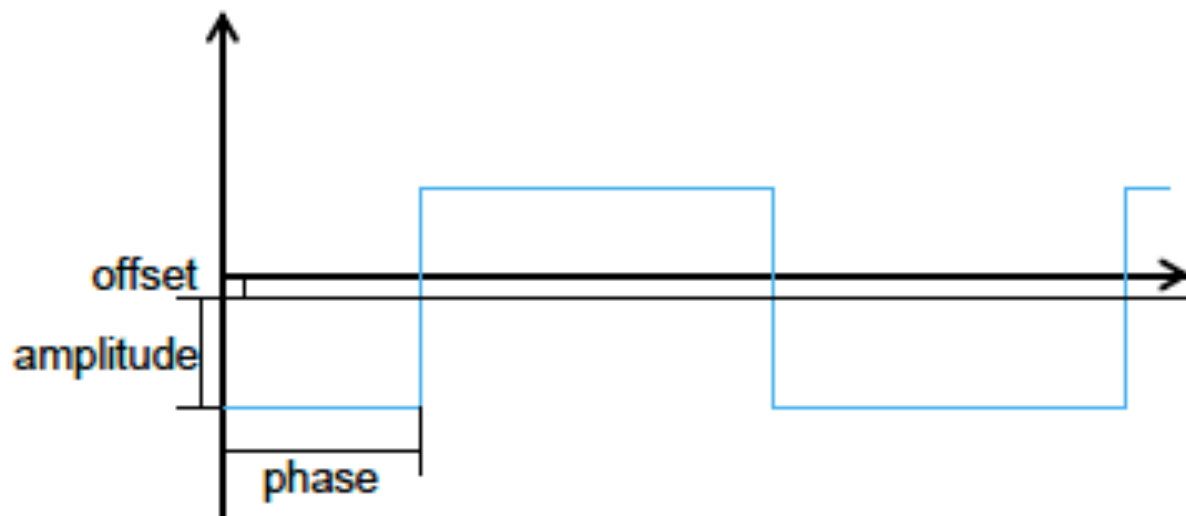
Robot Simulation in NVIDIA PhysX



- Work with real robot and simulator/models
- Co-evolve robot shape and walking pattern
- Study and try to reduce gap between reality and simulation

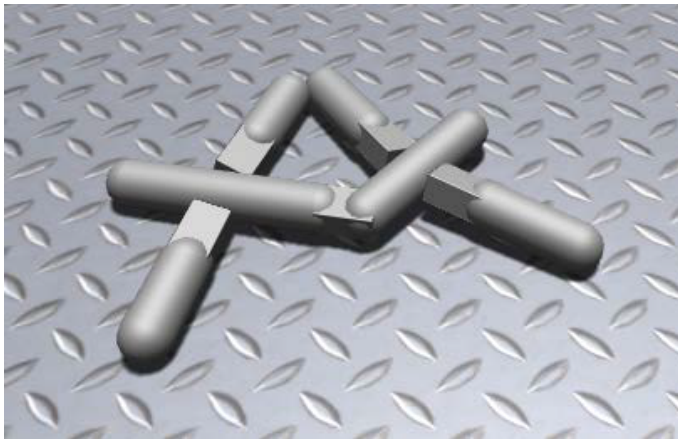
Evolved Control Systems

- We can evolve movement patterns!
 - Parameterize periodic functions for each joint
 - Evolve all those parameters



Evolved Robot Design

- Robot bodies could be difficult to design by hand.
- We use evolutionary algorithm to evolve both body and control system simultaneously.



Bio-inspired Computing for Music



State-of-the-art Motion Capture Facilities

- Allows precise tracking of human and robot motion
- Camera-based and on-body motion capture





Sound Saber



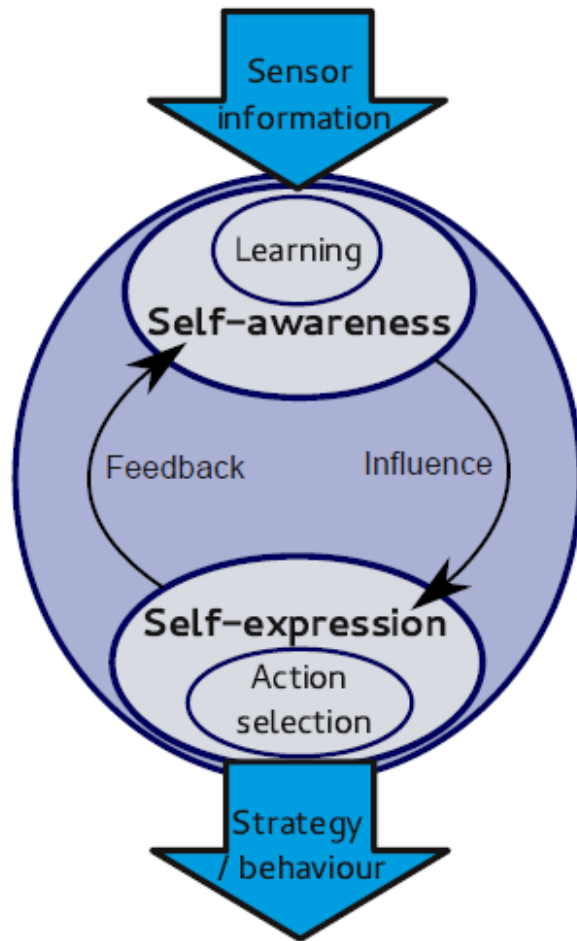
Sound Saber



Visit of Minister and University Administration 17 April, 2012



EPiCS – Self-aware systems (EU proj.)

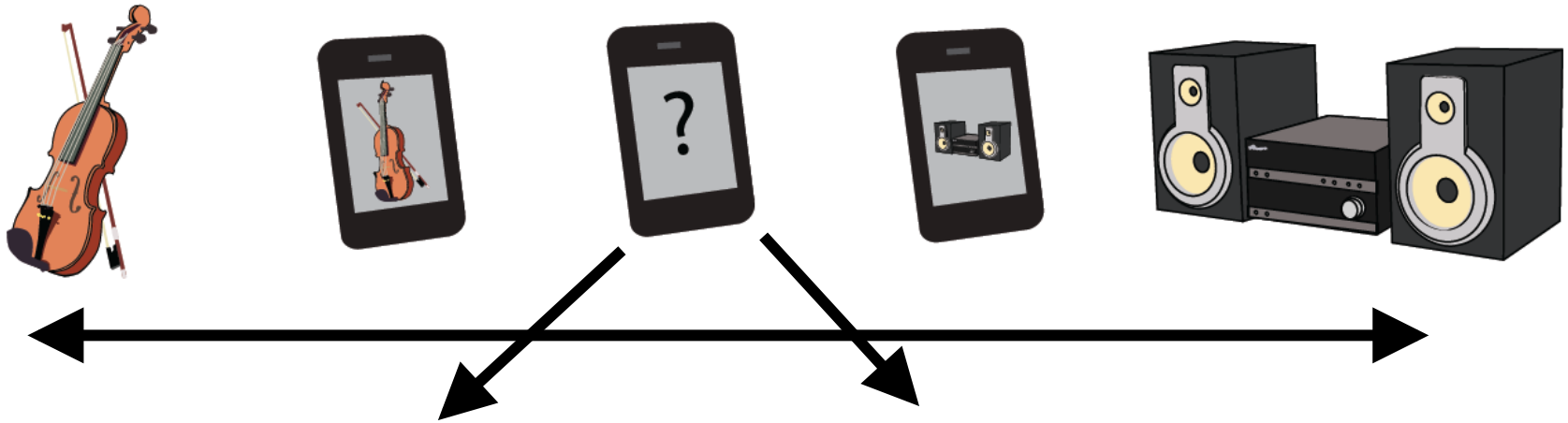


epiCS

Engineering Proprioception
in Computing Systems

- Human/nature-inspired algorithms for self-awareness and self-expression
- Application: active music
- Collab: 8 European partners

(Inter) Active Music



Direct Control

- Navigate within the song
- Control certain instruments (e.g. keep playing the chorus drumbeat in the verse)
- Change the tempo of the song

Indirect Control

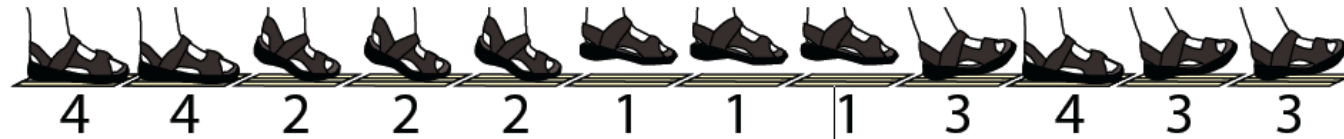
- Use on-body sensors to adapt the music to the mood of the user
- Listen to music that pushes you to work out harder
- Fuse the musical preferences of multiple users into one song

Ant Colony Optimization (ACO)

- Ants find shortest path to food source from nest.
- Ants deposit pheromone along traveled path which is used by other ants to follow the trail.
- This kind of indirect communication via the local environment is called stigmergy.



Funky Sole Music



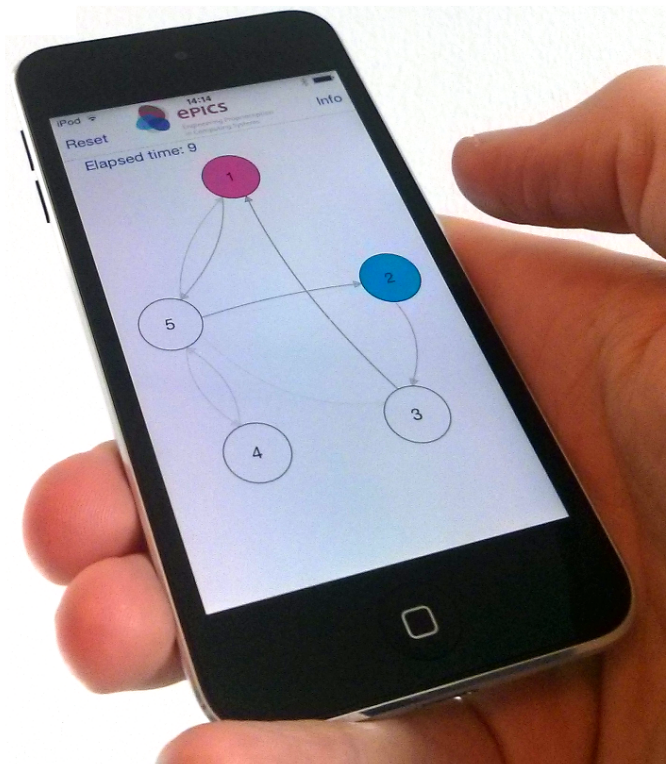
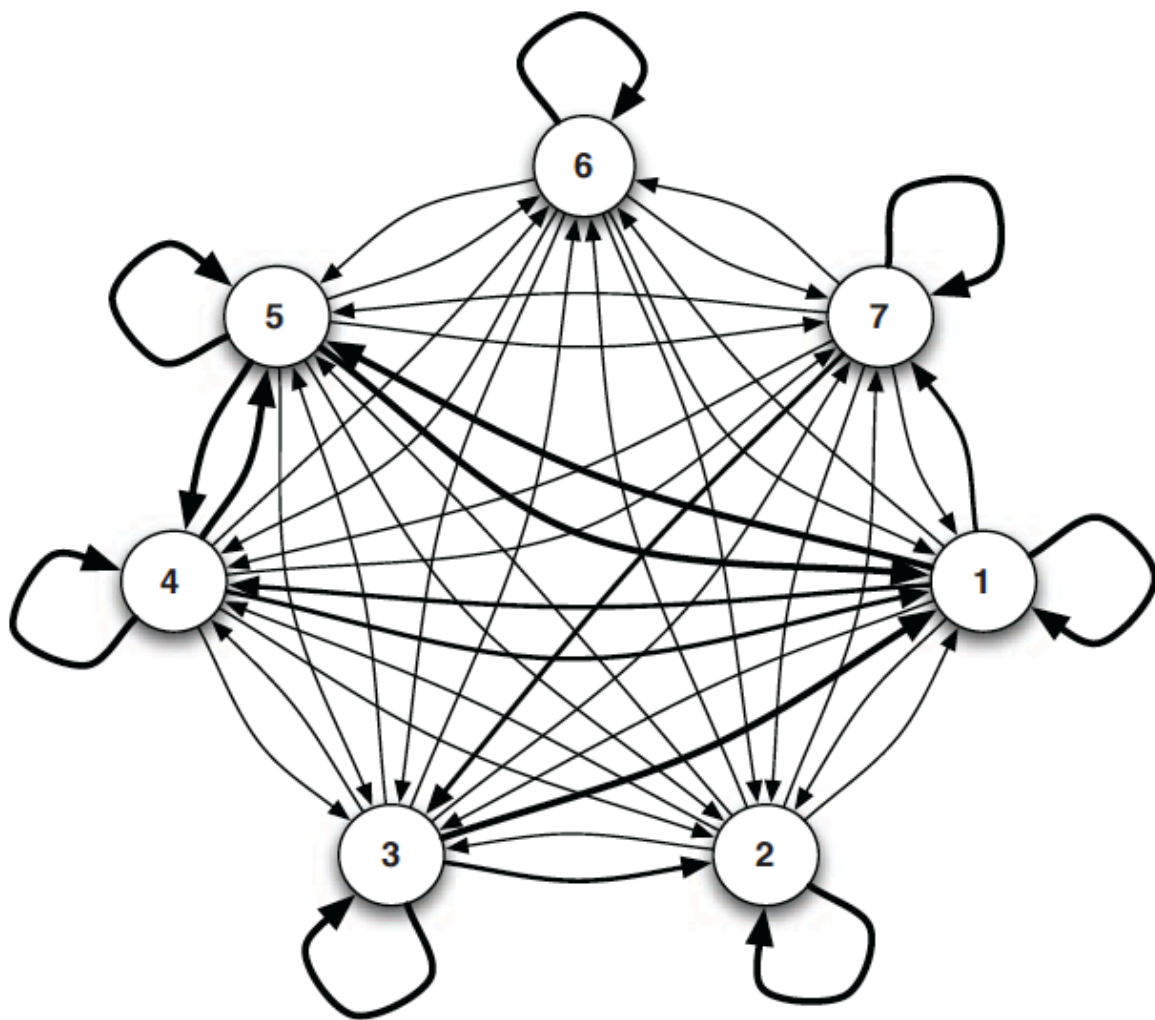
		current state			
		1-FullRelease	2-ToePress	3-HeelPress	4-FullPress
previous state	1-FullRelease	2	0	1	0
	2-ToePress	1	2	0	0
	3-HeelPress	0	0	1	1
	4-FullPress	0	1	1	1





- Combination of sound samples and synthesis
- Hierarchy of loops, controlled by the user
- Various sound effects are controllable when in different “states” (i.e., for different walking patterns)

PheroMusic: Navigating a Musical Space



Direct + Indirect Control Combined: PheroMusic



Last ned og prøv musikkappen
til ROBIN-gruppen:
PheroMusic

