Overall Goal:

- Start from an application with given requirements (performance, capacity, hardware, architecture, ....)
- Design and model a set of design solutions, that vary on some chosen aspects (routing strategy, scheduling, ....)
- Analyze properties of the designed solutions, and compare them (is one solution better than the other?)
- To Deliver: A structured report plus models plus presentation and demonstration (say, 30 minutes)
Project Structure:

Forming Groups

- Groups of 2-4 people (not more)
- You can use similar groups as in Philipp’s course
- As Modeling tools, preferably use Matlab/Simulink, and Truetime if it will help you (not required).
- Choose and present a topic by April 12.
- (Note: I will be away after April 13 til Easter.)
Task: designing a Sensor-and Actuator system for some building, where sensors monitor temperature (say), and actuators can control heating.

Design: placing sensors and actuators, making them communicate wirelessly, and being able to control the temperature in rooms (maybe each room can “choose” its local temperature, ...), etc.

Some things that could come in: Routing, strategy for heating/cooling, saving energy (maybe not heating if people are absent ...)

Some possible readings:
http://chess.eecs.berkeley.edu/pubs/423.html
Task: Controlling a number of Mobile Robots that should follow one or several targets, and locate them with good precision. E.g., robots could have direction sensors, with measurement errors, and are supposed to collaborate on positioning themselves for good precision.

Design: strategy for moving robots, for collaboration, for computing position of tracked objects.

Some things that could come in: robustness to measurement errors, speed of robots/targets, ...

Some possible readings: TBD
Task: designing and evaluating different strategies for scheduling a control system on a chip multiprocessor. The control system could, e.g., control different parts of a robot, where some parts need a lot of computational power for calculating how to move, and some parts need short sample times to control movements, etc.

Design: Software architecture and mapping to processors, scheduling strategy, ..

Some possible readings: Description of simplified robot system. One possible such model can be found in the thesis by Anders Wall (starting pp. 211) http://www.mrtc.mdh.se/index.php?choice=publications&id=0621
Multicore implementation of Tracking System:

- Similar objective as the tracking system above, but using a parallel implementation on a single chip multiprocessor, which is supposed to track one or several targets in real time with unreliable data.

- Design: Algorithm, and how it is parallelized on the multiprocessor.
Task: Controlling traffic flow in a system of streets using sensors and traffic lights.

Design: Strategy for controlling traffic lights, e.g., to minimize latencies.

There is a lot of literature on the internet, of course.