Agent-based Control of a Flapping Wing Micro Aerial Vehicle

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Agent-Based control of Flapping Wing Micro Aerial Vehicle

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Flapping Wing Vehicle
- inspired by bees
- mimicking wing motion
- agile and versatile

Application
- measuring radiation levels in contaminated areas
- detecting toxic materials
- mapping of dangerous environment
- artificial plant pollination

Agent-based control
- challenging control task in varying environment
- traditional control methods might not be sufficient
- agents simulate complex, goal oriented behavior
- agents can deal with vehicle damage, change of the mission etc.

Controller Block Diagram
(Block diagram of the MAS-based vehicle outer control loop. The orange blocks have control functions while the green box has a diagnostic role (see text). The boxes with stick men are implemented with one or more agents. The supervisor agent coordinates the actions of all other agents. ζ(t) and η(t) represent noise sources to reflect uncertainty in the vehicle dynamics and sensor readings.)

Software Simulator
- C & java library implementation of FWMAV model
- Agent simulation toolkit MASON
- To develop and validate agent based control
- To simulate various operational conditions

Model Verification
- Develop real FWMAV to verify the results
- 3D printed parts
- Carbon fibre wings
- Miniature servo motors

- Left: 2D path of FWMAV with marked coordinate system and desired waypoint.
- Right: view of recorded data and simulation settings