

Future Work

Final Eye-bot **Hardware** will be capable of:

- Full autonomous operation
- Obstacle detection & scanning

Final Eye-bot **Software** will be capable of:

- Heterogenous swarming
- Formation flying

- Relative positioning
- On-board visual processing
- Swarm communication

- Collective search
- Navigation assistance
- Efficient coordination



The Eye-bot



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The Eye-bot: A Swarm of Indoor Flying Robots

Motivation

Eye-bots are part of the **Swarmanoid** - a heterogeneous swarm of: Eye-bots (visual sensing), Hand-bots (manipulation of objects) and Foot-bots (transportation). The goal is to carry out tasks normally assigned to humanoid robots.

Eye-bots are autonomous flying robots with powerful sensing and communication abilities for search, monitoring, and pathfinding in indoor environments. Eye-bots operate in swarm formation, like honeybees, to efficiently explore indoor environments, locate targets, and guide other robots or humans. Eye-bots can also be deployed on their own in indoor environments to locate: humans who may need help, suspicious objects, or traces of dangerous chemicals. Swarm intelligence provides adaptable, robust and efficient distributed control for both the Eye-bots and the rest of the **Swarmanoid**.

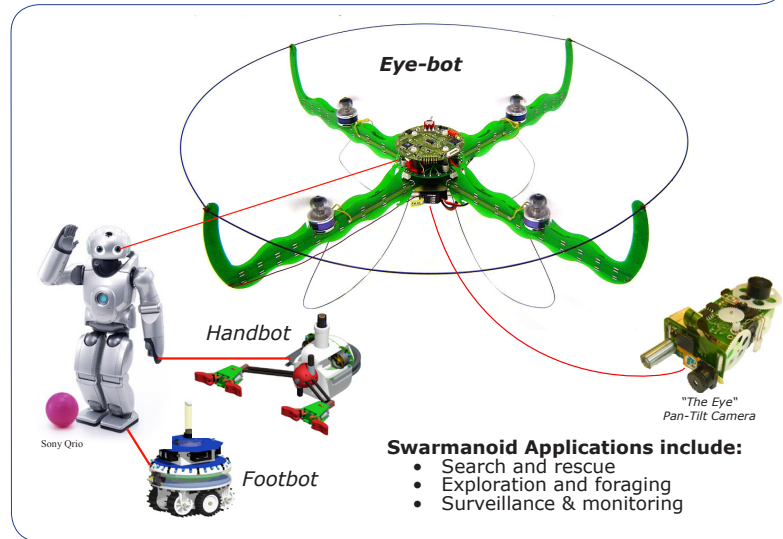
Prototype Features

- Robust, light weight, easy to manufacture body
- Jigsaw-like printed circuit board assembly
- Four powerful and efficient brushless motors
- High speed (1kHz) motor controllers
- Endurance of 30min (2100mAh LIPO)
- Simple collision protection system for indoors
- Ceiling attachment device

Sensing Abilities

- Custom 360° pan-tilt camera system
- Obstacle detection
- Relative positioning sensor for swarm coordination
- Custom 6-Degree of freedom inertial sensing
- Sonar and differential pressure sensors for altitude determination
- Magnetometer for heading determination

Swarmanoid



Swarmanoid Applications include:

- Search and rescue
- Exploration and foraging
- Surveillance & monitoring

Conclusion

The **Swarmanoid** is a proof of concept project. The Eye-bots together with the Foot-bots and Hand-bots will form a rapidly adaptable swarm of intelligent wheeled, climbing and flying robots.

The Eye-bot swarm will be able to self-deploy into a mobile distributed sensor and communication network. Such a sensor network can efficiently explore the environment locating targets and providing navigation assistance via an embedded topological map.