RoboEarth for Flying Robots

Stage topic Description

In contrast to human beings or other animals, robots have the possibility to directly exchange knowledge and capabilities such as sensory-motor skills. Recently, the RoboEarth project has been proposed [1, 2], in which various robots are connected to a central database on the internet. The robots can upload their experiences and knowledge to the database, and download the experiences and knowledge of other robots. In the RoboEarth project, information is stored on: *object recognition (e.g., images, object models), navigation (e.g., maps, world models), tasks (e.g., action recipes, manipulation strategies) and hosts intelligent services (e.g., image annotation, offline learning).*

Of course, the success of RoboEarth-like systems depends on the number of robots that will participate in them. In the proposed stage at the Advanced Concepts Team, we would like to investigate the combination of crowd-sourcing and a RoboEarth-like system to acquire sensory-motor skills. A single robot is limited in its learning experiences, which may cause it not to learn the task. Together, many robots may acquire enough experience to successfully acquire a skill.

The skill we are aiming for is obstacle detection on flying robots. Such a skill is relevant also to space systems that would have to dock autonomously or move around in a space station. An application will be made that will gather visual information during flight and sends this to a central online database. Data mining will be used to transform the visual information into knowledge on detecting obstacles on time. Of course, people will only be stimulated to participate with their robots in this program if it also fun. Therefore, the application will be made in the form of a game.

Candidate's tasks

The ACT offers a three month stage with as main goal to develop the game for the flying robot and an online database that together will allow the drones to learn about their environment. The work will be done in close cooperation with the ACT research fellow on artificial intelligence. If the project is running, the stagiaire can participate in the analysis of the gathered visual data.

The ideal candidate

The candidate should have excellent programming skills. Experience with web applications is an advantage. Additional (but less necessary) qualities include experience with robotic (vision) projects and a background in artificial intelligence or computer science.

References

[1] Waibel, M.; Beetz, M.; Civera, J.; D'Andrea, R.; Elfring, J.; Galvez-Lopez, D.; Haussermann, K.; Janssen, R.; Montiel, J.M.M.; Perzylo, A.; Schiessle, B.; Tenorth, M.; Zweigle, O.; van de Molengraft, R.; RoboEarth – A World Wide Web for Robots, Robotics & Automation Magazine, IEEE, vol.18, no.2,pp.69-82, June 2011. doi: 10.1109/MRA.2011.941632

[2] Tenorth, M.; Klank, U.; Pangercic, D.; Beetz, M.; , Web-Enabled Robots, Robotics & Automation Magazine, IEEE , vol.18, no.2, pp.58-68, June 2011. doi: 10.1109/MRA.2011.940993.