myCopter
newsletter #6

This is the sixth and final newsletter from the myCopter project, funded by the European Union under the 7th Framework Programme.

THANK YOU!

After four years, the myCopter project has now officially come to an end and I would like to thank you for your interest and support for our project. In this final newsletter, we would like to show the main innovations from our project and hope to demonstrate that these could form the basis of a personal aerial transportation system.

Continued efforts will be required to make a PATS that can be used by the general public a reality. We have shown that specific socio-technological considerations, such as legal and certification issues surrounding PAV automation and operation, need to be addressed in any future endeavours in this direction. Hopefully, the next steps towards the implementation of a PATS will focus on the development of real-world implementations of the automation and augmentation technologies developed within myCopter, which would be required to bridge the skills gap between a highly-trained pilot and the average car driver.

Even though much more development is required before personal aviation becomes a reality, I believe that with myCopter we have taken the first steps towards the implementation of this vision!

Prof. Dr. Heinrich Bülthoff
myCopter project coordinator

myCopter Project Day

The myCopter Project Day was held on 20 November 2014 at German Aerospace Center DLR in Braunschweig, Germany. During the event, we presented the outcomes of our project to relevant stakeholders, the general public and members of the press. In the last 4 years, we have investigated breakthrough technologies in several research areas:

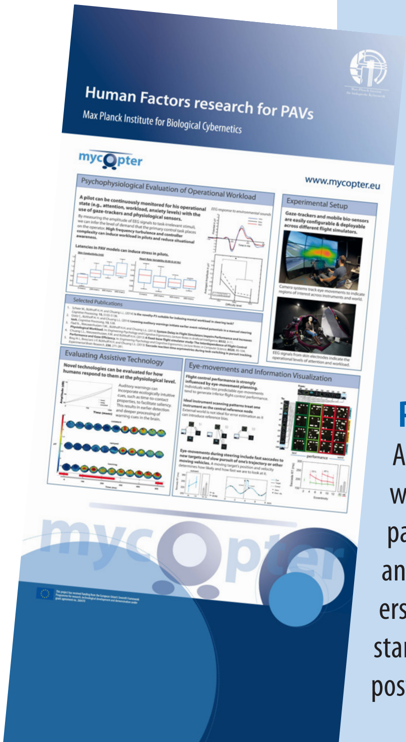
- New concepts for control of PAVs (University of Liverpool)
- Novel human-machine interfaces (Max Planck Institute for Biological Cybernetics, Tübingen)
- Computer vision-based PAV automation (Swiss Federal Institute of Technology Zürich)
- Collision avoidance strategies and automatic landing place assessment (École Polytechnique Fédérale de Lausanne)
- Implementation and tests of novel PAV technologies on the DLR experimental helicopter FHS (German Aerospace Center, Braunschweig)

Furthermore, we have explored the potential uses and risks of PAVs for society through technology assessment methodologies (Karlsruhe Institute of Technology).

With scientific presentations and demonstrations we hoped to stimulate lively discussions between attendees during hands-on demonstrations of our findings in various simulators and with unmanned aerial vehicles.

Project Day scientific presentations

The morning of the myCopter Project Day was devoted to presentations about the scientific results generated within the project. Project coordinator Prof. Dr. Heinrich Bülthoff gave an introduction into the project, after which each project partner gave an overview of their work. You can watch all presentations and download the presentation slides on our website.



Posters

After the presentations in the morning, the scientific results were elaborated in various posters prepared by the project partners. During the lunch break, attendees could walk around and discuss the outcomes with the project partners. In-depth posters were presented in the afternoon at each of the demonstrations stands in the exhibition hangar. You can view and download the posters from the website.

Project Day Demonstrations

The afternoon of the myCopter Project Day was devoted to demonstrations concerning the scientific work performed in the project. These demonstrations featured various simulators highlighting PAV Handling Qualities and human-machine interfaces, unmanned aerial vehicles demonstrating vision-based navigation and collision avoidance, videos regarding automatic landing place assessment, and a World Café where attendees could discuss their visions for personal aerial transportation systems with project partners. Detailed information is available on our website.

Flying Helicopter Simulator

DLR's Flying Helicopter Simulator (ACT/FHS) is a modified EC135 helicopter that can simulate other aircraft in real flight. Within myCopter it was used to investigate the flight dynamics and human-machine interface of a future PAV. The cockpit was equipped with a highway-in-the-sky display and a steering wheel for intuitive car-like control. This is the first helicopter to be flown with a steering wheel. Watch a video here.

Steering wheel control concept

The helicopter simulator of the AVES simulator center was used for ground-based simulation and preparation of FHS flight tests. As in the real helicopter the cockpit was equipped with steering wheel and highway-in-the-sky display. The flight dynamics of a future PAV were simulated and guests could take a flight. Watch a video here.

Haptic simulator

We combined a highway-in-the-sky displays with a haptic shared control framework to assist a non-expert pilot with force guidance cues during a flight through a tunnel trajectory. We have shown that this combination provides an easy-to-use control interface for flying a PAV. Participants could experience this for themselves in a fixed-base simulator. Watch a video here.

PAV desktop simulation

We demonstrated conventional rotorcraft response types and a practical flying route used for designing the training requirements. The demonstration aimed to show the response type requirements for likely PAV pilots with varying levels of flying skill in order to ensure safe and precise flight and also the evaluation methodology used for assessing the developed training syllabus. Watch a video here.

Vision-based navigation

Automation of take-off and landing relies on accurate knowledge of variables, such as the position, velocity and orientation of the vehicle. While GPS is a popular sensor choice in open spaces, it suffers from accuracy issues in urban environments. We therefore used cameras to estimate both the state of the vehicle and its surrounding obstacles. The demo showed a Micro Aerial Vehicle (MAV) that solely uses a camera system for stabilization and navigation. It can be steered by an untrained pilot with a joystick, while it avoids crashing into obstacles. Watch a video here.

Landing place assessment

We used high level image features to characterise appropriate landing places, by evaluating whether constellations of these features coherently depict viable landing places. Our features take advantage of constant image regions that for continuous and compact regions that are ideal landing locations. This demonstration showed our approach with videos and posters. Watch a video here.

Collision avoidance swarm

We performed a multi-MAV collision avoidance experiment. After take-off, all MAVs were placed on a collision course. We showed the effect of our strategy where every MAV computes a collision-free trajectory by itself based only on locally available information. Watch a video here.

World Café

Participants could join our World Café and see what others thought about PAV traffic in their backyard or on their daily commute route. Everyone was invited to imagine their personal use of PAVs and to discuss it with us and other guests while enjoying a cup of coffee. Watch a video here.

myCopter flyers

We have published a new flyer detailing the results and findings from our project. It is a companion to our first flyer, which focused on the objectives and goals of the project. Both flyers can be downloaded from our website.

Publications

We publish our work in international journals and conference proceedings. An up-to-date list of our publications can be found on our website. Furthermore, some of the findings from the myCopter project are available as public deliverables. These can be downloaded here.

http://www.mycopter.eu
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