



Morphology Optimization of a Tilt-Rotor MAV

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MT

Supervised by Karen Bodie, Zachary Taylor and Prof. Dr. Roland Siegwart



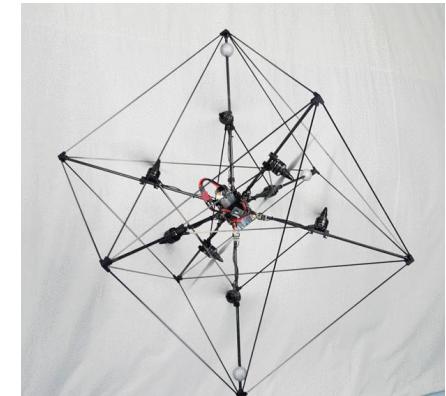
Autonomous Systems Lab

State of the art

D. Brescianini and R. D'Andrea, "Design, modeling and control of an omnidirectional aerial vehicle," in *2016 IEEE International Conference on Robotics and Automation (ICRA)*, May 2016, pp. 3261–3266.



S. Rajappa, M. Ryll, H. H. Bülfhoff, and A. Franchi, "Modeling, control and design optimization for a fully-actuated hexarotor aerial vehicle with tilted propellers," in *2015 IEEE International Conference on Robotics and Automation (ICRA)*, May 2015, pp. 4006–4013.

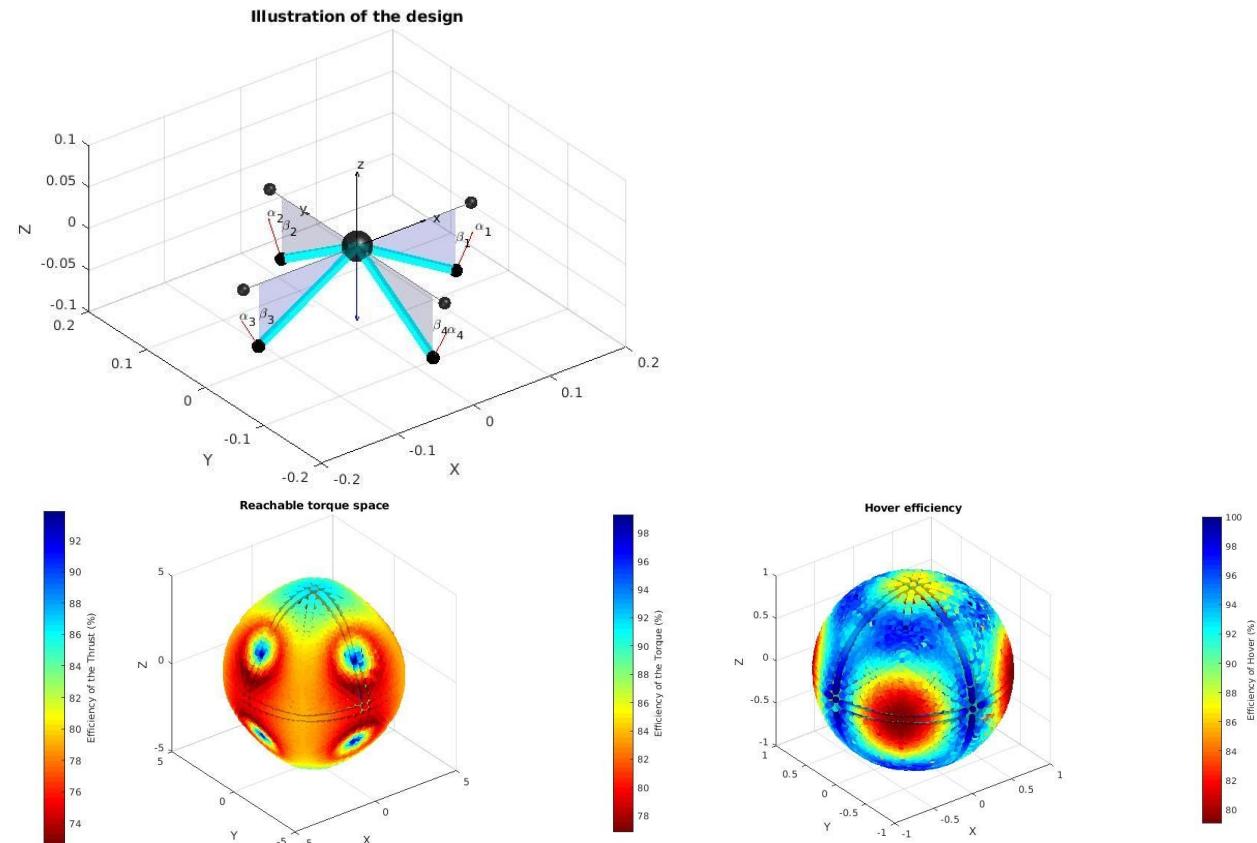


M. Kamel, S. Verling, O. Elkhatib, C. Sprecher, P. Wulkop, Z. Taylor, R. Siegwart, and I. Gilitschenski, "Voliro: An Omnidirectional Hexacopter With Tilttable Rotors," *arXiv:1801.04581 [cs]*, Jan. 2018, arXiv: 1801.04581.



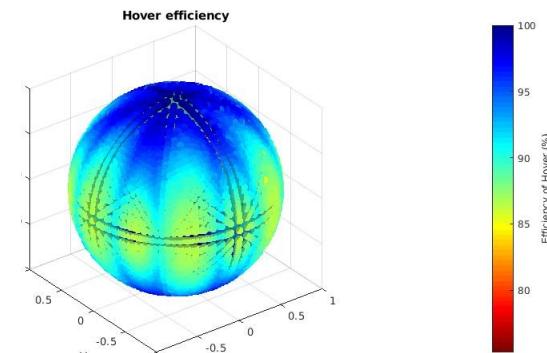
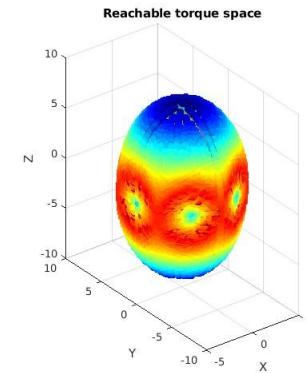
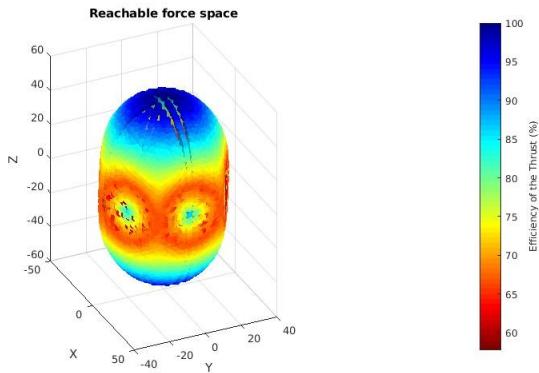
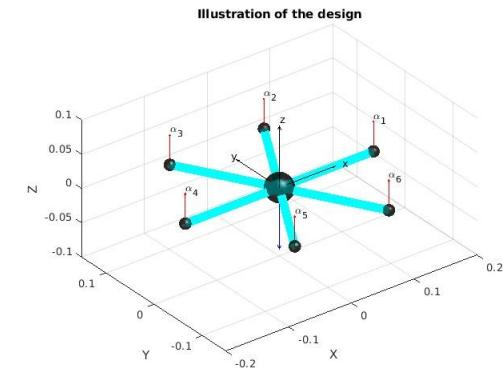
Realized

- Matlab code for quadcopter based on fmincon



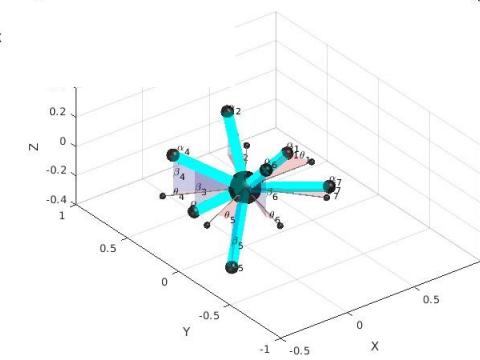
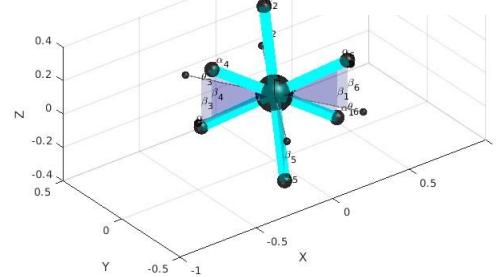
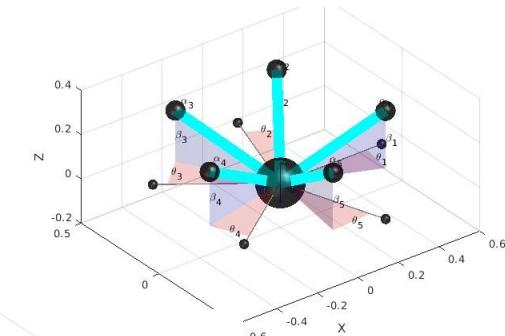
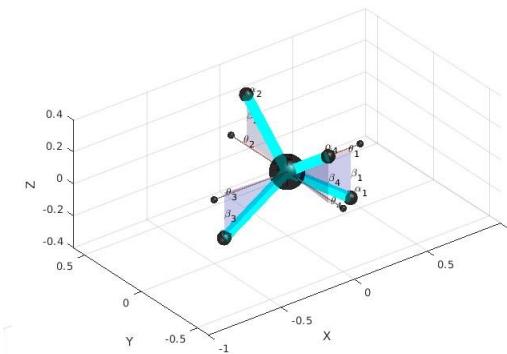
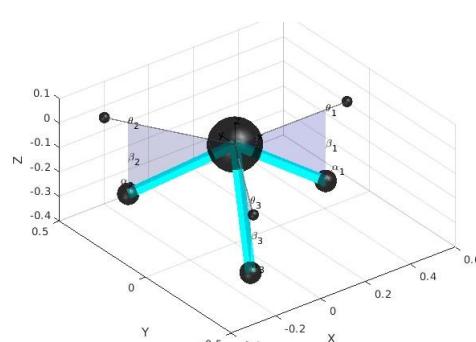
Realized

- Matlab code for quadcopter based on fmincon
- Generalized code for n-rotor MAV



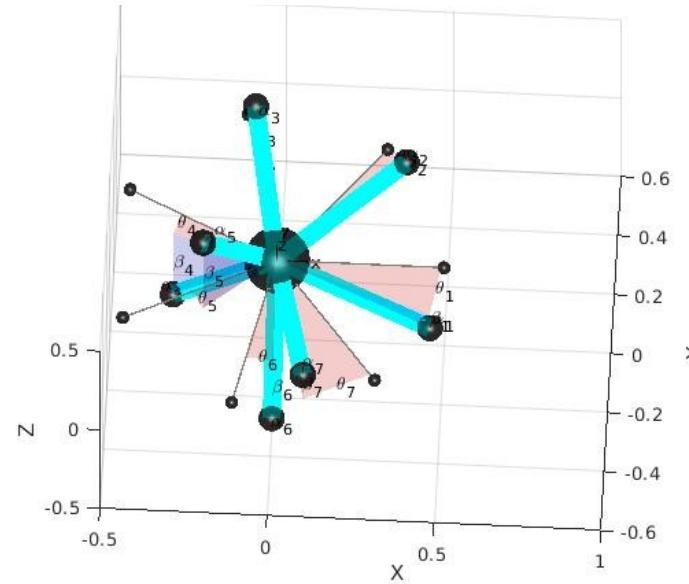
Realized

- Matlab code for quadcopter based on fmincon
- Generalized code for n-rotor MAV
- Design optimization to find arms angles and length



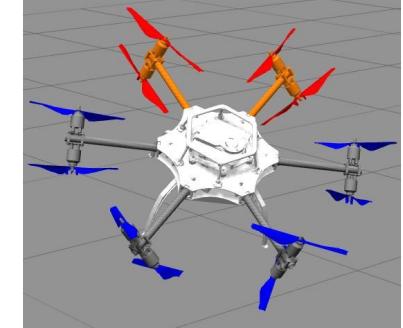
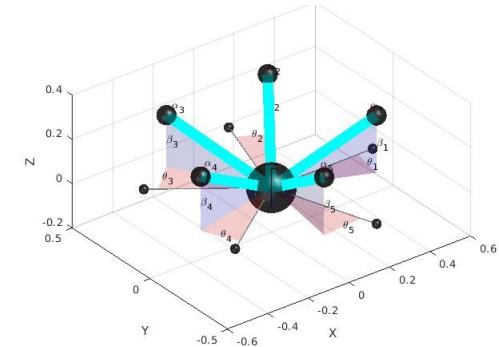
Realized

- Matlab code for quadcopter based on fmincon
- Generalized code for n-rotor MAV
- Design optimization to find arms angles and length
- Design optimization to find rotor numbers, arms angles and length



Further development

- Find more meaningful cost functions
- Obtain optimal design
- Simulate design in ROS environment
- Build a prototype



Thank you for your attention !

Questions ?

