Cooperative Motion Planning for Multiple UAVs via the Bézier Curve Guided Line of Sight Techniques

Warunyu Hematulin*, Patcharin Kamsing†*, Peerapong Torteeka**, Thanaporn Somjit*, Thaweerath Phisannupawong*, Tanatthep Jarawan*

*Air-Space Control, Optimization, and Management Laboratory, Department of Aeronautical Engineering, International Academy of Aviation Industry, King Mongkut’s Institute of Technology Ladkrabang, Bangkok 10520, Thailand
**National Astronomical Research Institute of Thailand, ChiangMai 50180, Thailand.

h.warunyu@gmail.com, patcharin.ka@kmitl.ac.th, peerapong@narit.or.th, newpail.12@gmail.com, thaweerath2009@gmail.com, Tanatthep001@gmail.com

Abstract—Multiple motion planning plays an essential role in several vehicle motions. This paper proposes a cooperative method between the Line of Sight techniques and the Bézier curve, applying this to motion planning for unmanned aerial vehicles. The experiment is implemented using the AirSim plugin on Unreal Engine 4. The results of the proposed method are compared with those for the conventional Line of Sight techniques to control multiple unmanned aerial vehicles. The results illustrate that the proposed method takes more time to process than the conventional one. However, the proposed method can reach a higher performance by addressing the target unmanned aerial vehicles and the pre-defining path more than the conventional method does, which is shown in all three simulation cases.

Keyword—Multiple UAVs, motion planning, Guidance Law, LOS(Line-of-Sight), Bézier curve, AirSim

Warunyu Hematulin is currently a bachelor’s degree student, major in Aeronautical Engineering and Commercial Pilot (International Program), from the Department of Aeronautical Engineering, International Academy of Aviation Industry. His research interests are included the simulation, guidance and control system on aeronautical and aerospace engineering.

Patcharin Kamsing received doctoral degree from the University of Chinese Academy of Sciences, Beijing, China sponsor by CAS-TWAS president fellowship. She currently is lecturer and assistant dean of International Academy of Aviation Industry, King Mongkut’s Institute of Technology Ladkrabang, Bangkok, Thailand. Her research is image processing and remote sensing applications.

Peerapong Torteeka received doctoral degree in Celestial Mechanics and Applied Astrometry Engineering at National Astronomical Observatories of Chinese Academy of Sciences (NAOC), University of Chinese Academy of Sciences, Beijing, China. He currently works at National Astronomical Research Institute of Thailand, research interests include passive optical-based small and dim space debris recognition and tracking system, moving object extraction, autonomous detection, robotics telescope for the space observation.
Thanaporn Somjit is currently a bachelor’s degree student, major in Aeronautical Engineering and Commercial Pilot (International Program), from the Department of Aeronautical Engineering, International Academy of Aviation Industry.

Thaweerath Phisannupawong is currently a bachelor’s degree student, major in Aeronautical Engineering and Commercial Pilot (International Program), from the Department of Aeronautical Engineering, International Academy of Aviation Industry. His research interests are included the image processing and application of deep learning on aeronautical engineering.

Tanatthep Jarawan is currently a bachelor’s degree student, major in Aeronautical Engineering and Commercial Pilot (International Program), from the Department of Aeronautical Engineering, International Academy of Aviation Industry. His research interests are included Indoor Localization Method via WiFi Receive Signal Strength Indicator.