Potential field-based navigation task for autonomous flight control of unmanned aerial vehicles

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Abstract: This paper proposes to generate potential fields for navigation task of unmanned aerial vehicles (UAVs) which have fuzzy logic- (FL-) based autonomous flight controls. Three FL modules are developed under the navigation system for the control of the altitude, the speed and the heading, through which the global position of vehicle is controlled. A potential field block designed by using sigmoid and normal functions. Limiting functions are defined to provide the circling pattern and to limit the elliptical shape. The output of block produces a two-dimensional elliptical shape as the fight pattern with the target point being in the centre of the shape. The gradient of the potential vectors is used to generate tables (GPS-based). All modules are developed in the Matlab. Despite the simple design procedure, the simulated test flights indicate the capability of the approach in achieving the desired performance.

Keywords: potential fields; flight control; navigation task of UAV.

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Biographical notes: Omer Cetin was graduated from Turkish Air Force Academy in 2003 as a Computer Engineer. He received his MS from Aeronautics and Space Technologies Institute Computer Engineering Department in 2007. His current research interests are in the fields of intelligent control and mechatronics. He is working about Unmanned Vehicle System Technologies.