

Genetic Algorithms Based ACPS Safety

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Abstract : Cyber-Physical Systems as drones proved their efficiency for supporting emergency applications. For these particular applications, travel time and autonomous navigation algorithms are of paramount importance, especially when missions are performed in urban environments with high obstacle density. In this context, however, safety properties are not properly addressed. Our ambition is to optimize the system safety level under autonomous navigation systems, by preserving performance of the CPS. At this aim, we introduce genetic algorithms in the autonomous navigation process of the drone to better infer its trajectory considering the possible obstacles. We first model the wished safety requirements through a cost function and then seek to optimize it through genetics algorithms (GA). The main advantage in the use of GA is to consider different parameters together, for example, the level of battery for navigation system selection. Our tests show that the GA introduction in the autonomous navigation systems minimize the risk of safety lossless. Finally, although our simulation has been tested for autonomous drones, our approach and results could be extended for other autonomous navigation systems such as autonomous cars, robots, etc.

Keywords : safety, unmanned aerial vehicles , CPS, ACPS, drones, path planning, genetic algorithms

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