



## **Application of GIS-based models for delineating the UAV flight region to support Search and Rescue activities**

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The objective of the approach presented in this paper is to demonstrate a potential of using the combination of two GIS-based models – mobility model and ring model – for delineating a region above which an Unmanned Aerial Vehicle (UAV) should fly to support the Search and Rescue (SAR) activities.

The procedure is based on two concepts, both describing a possible distance/path that lost person could travel from the initial planning point (being either the point last seen, or point last known). The first approach (the ring model) takes into account the crow's flight distance traveled by a lost person and its probability distribution. The second concept (the mobility model) is based on the estimated travel speed and the associated features of the geographical environment of the search area. In contrast to the ring model covering global (hence more general) SAR perspective, the mobility model represents regional viewpoint by taking into consideration local impedance. Both models working together can serve well as a starting point for the UAV flight planning to strengthen the SAR procedures. We present the method of combining the two above-mentioned models in order to delineate UAVs flight region and increase the Probability of Success for future SAR missions.

The procedure is a part of a larger Search and Rescue (SAR) system which is being developed at the University of Wrocław, Poland (research project no. IP2014 032773 financed by the Ministry of Science and Higher Education of Poland). The mobility and ring models have been applied to the Polish territory, and they act in concert to provide the UAV operator with the optimal search region. This is attained in real time so that the UAV-based SAR mission can be initiated quickly.