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Ad hoc Network of Multi-UAV System "FANET": Concepts and Challenges

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As a result of technological advances on robotic systems, electronic sensors, and communication techniques, the production of low cost UAVs systems has become possible. Easy installation and flexibility for these systems led to be used widely in both the military and civilian applications. However, the capabilities of one large UAV is limited. Nowadays, a multi-UAV system is of special interest due to the ability of its members to coordinate simultaneous coverage of large areas or cooperate to achieve common goals. This level of cooperation and coordination requires reliable communication network models that ensure a proper exchange for both control and data packets. Such networking models should provide all-time connectivity among UAVs in order to avoid the dangerous system failures or unintended consequences. Thus, we can say that the multi-UAV system relies on communication to operate.

In this survey paper, we try to submit a high informative about the multi-UAV system regarding its advantages and architectures. In addition, both the merits and drawbacks of the available networking models in this system are presented. Also, we define a FANET as a sophisticated type of wireless ad hoc network among UAVs which solved the communication problems into other network models. Along with the FANET unique features, open issues and challenges are also discussed.

Biography

- **Ferkan Yilmaz**

Ferkan Yilmaz *(h-index 15, i10-index 23)* received the B.Sc. degree in electronics and communications engineering from Yildiz Technical University, Turkey, in 1997. He was ranked first overall among all students graduated from the electronics and communications engineering (ECE) department and ranked second overall among all students graduated in 1997 from Yildiz Technical University. He received the M.Sc. degree in the field of electronics and communications from Istanbul Technical University, Turkey, in 2002, and the Ph.D. degree in performance analysis of communication systems from Gebze Institute of Technology (GYTE) in 2009. He was awarded for the best Ph.D. thesis.

From 1998 to 2003, he worked for National Research Institute of Electronics and Cryptology, TÜBİTAK, Turkey as a Researcher. Dr. Yilmaz is the recipient of "The 1999 Achievement Award" from TÜBİTAK.

From 2003 to 2008, he worked as a Telecommunications Engineer for Vodafone Technology, Turkey. In November 2008, he was invited by Prof. Dr. M.-S. Alouini to work as a visitor researcher at Texas A&M University (Qatar), and after August 2009, started to work as a post-doctoral fellow at King Abdullah University of Science and Technology (KAUST). Between November 2012 and April 2015, he worked as a Senior Software Developer expert in the Locations Solutions group, Vodafone Technology, and there he developed positioning algorithms, and achieved the implementation and assessment of outdoor / indoor location-aware applications.

Dr. Yılmaz is currently working as a Assistant Professor in Department of Computer Engineering at Yıldız Technical University, and with KAUST as a Consultant working on optical communications. He has also engaged in *"Alpharabius Solutions"* and *"Tachyonic Solutions"* startup companies.

His research interests focus on signal processing, machine learning and data mining (big data, data analytics), statistical learning theory, optimization methods, wireless communication theory (i.e, diversity techniques, cooperative communications, spatial modulation, fading channels).

- **Musaab Jasim**

Musaab Jasim received the B.Sc. degree in Computer Engineering and Programs from University of Diyala, Iraq, in 2007. He was ranked fifth overall among all students graduated from the Computer Engineering and Programs (CEP) department and ranked tenth overall among all students graduated in 2007 from University of Diyala.

From 2008 to 2013, he worked as a head of the scholarships branch, University of Diyala, Iraq. From 2013 to the present time, Musaab attended to the Yildiz Technical University as a regular student to get a master's degree in networking and communications .

His research interests focus on wireless communication, ad hoc network, MANET, VANET, FANET.