Cognitive Radar for Autonomous System

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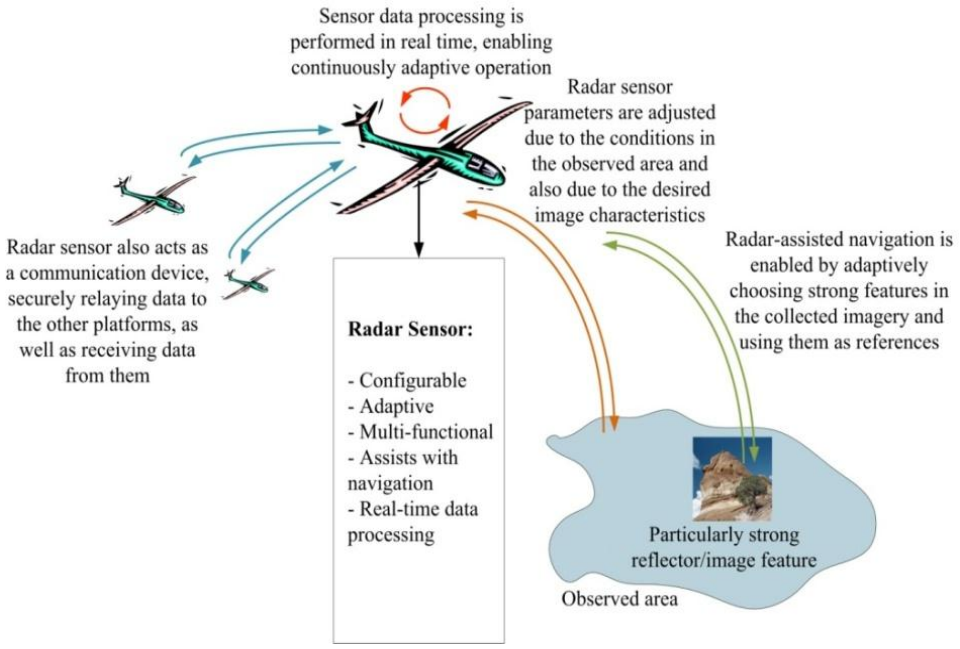

Autonomous vehicle operation is not possible without the use of a robust sensor system based upon a concept of adaptive, knowledge-based sensing. Such a system needs to adjust its parameters depending on the task at hand and the information obtained from interrogating the environment. Moreover, it needs to perform knowledge-aided analysis of the extracted information to maximize usefulness and facilitate further learning. In this project, a framework for a multi-functional radar sensor with a capability of autonomous operation is being developed. The proposed work will build upon our initial investigation into knowledge-based radar for target detection and radar-assisted navigation performed. A software-defined radar system (SDRS) based on an ultra-wideband (UWB) orthogonal frequency division multiplexing (OFDM) serves as a hardware implementation and a signal processing architecture for this purpose. This system is analyzed from the perspective of target detection, target scene imaging and platform navigation, all of which functions are to be performed concurrently without a human operator.

Further Readings:

[1] D. Garmatyuk, J. Schuerger, and K. Kauffman, "Multifunctional software-defined radar sensor and data communication system," IEEE Sensors Journ., vol. 11, no. 1, pp. 99-106, Jan. 2011.

[2] D. Garmatyuk and M. Brenneman, "Adaptive multicarrier OFDM SAR signal processing," in Proc. 2010 European SAR (EUSAR) Conf., 2010.

[3] B. Jameson, D. Garmatyuk, Y. T. Morton, A. Curtis, and R. Ewing, "Target scene reconstruction in indoor environment with cognitive OFDM radar," in Proc. 2012 Waveform Diversity and Design Conf., Kauai, HI, Jan. 2012.

[4] B. Jameson, D. Garmatyuk, and Y. Morton. "Cognitive radar for indoor positioning with a software-defined UWB OFDM system," in Proc. 2012 IEEE Radar Conf., Atlanta, GA, May 2012.