

# DOCTOR OF PHILOSOPHY

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## **RADAR TRANSMITTER IDENTIFICATION VIA SINGLE PULSE ANALYSIS**

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This dissertation proposes an entirely new method for the identification of radar transmitters based solely on a single received pulse. The method for building a mathematical model to describe a radar transmitter is discussed in full detail. Also detailed is the method for comparing these models to received radar pulses of unknown source, to determine the best match and therefore identify the source transmitter. The results of using this method on actual radar data are quite good; indeed, this method can even distinguish between different transmitters of the same make, model, and specifications.

The theoretical limits of radar transmitter identification are also explored. Specifically, a new lower bound on the optimum probability of error, applicable to any hypothesis-testing problem, is developed. This bound is applied to the radar case to give an indication of the theoretical limits of transmitter identification that cannot be exceeded.

**KEYWORDS:** Radar Transmitter Identification, Vector Quantization, Hidden Markov Models, Unintentional Modulation on Pulse, Specific Emmitter Identification

**DoD KEY TECHNOLOGY AREAS:** Sensors, Modeling and Simulation