OPTIMUM RECEIVER FOR DECODING AUTOMATIC DEPENDENT SURVEILLANCE BROADCAST (ADS-B) AND MODE-SELECT(S) SECONDARY RADAR SIGNALS.

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To my esteemed and cherished family, friends and all those who have contributed in this project for their continuous support, encouragement and motivation
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ABSTRACT

Air traffic control (ATC) radar has been the main sensor for the detection and monitoring of commercial aircrafts for air traffic management. Typical modern ATC radar consists of a primary radar and secondary radar. The primary radar locates aircrafts based on the time-delay between the transmit pulses and the returns off the aircrafts. Since only location is provided, the secondary radar receives identification and flight parameters based on mode A, C or S by interrogating the transponder on board incoming aircrafts. Extensive use of radar is limited by high acquisition, installation and maintenance cost. Also, the coverage is limited by blockage due to obstacles such as buildings and mountains. Automatic Dependent Surveillance-Broadcast (ADS-B) system is the next generation locating system to complement existing ATC radar system. The proposed project looks into the design of an optimum receiver to decode both ADS-B and mode S secondary radar signal. The project will consist of three parts namely; modulator, demodulator and performance verification. To ensure compatible to the industrial standards, the message format and its verification process will be based on the ICAO (International Civil Aviation Organizations) standards. A non-coherent detection structure (based on energy detection) will be adopted at the receiver to improve performance at low signal-to-noise ratio (SNR) condition.
ABSTRAK