ABSTRACT

Automatic Identification System (AIS) is an important technology for tracking and managing vessel traffic and maritime safety. However, the limited communication range between ships and ground stations remains a major constraint in its effectiveness, especially in vast and remote maritime areas. To overcome these challenges, this research aims to develop a multi-channel AIS receiver system integrated into a nano-satellite. Integrating AIS receivers into low Earth orbit (LEO) nano-satellites at altitudes of 300-400 km allows for a significant expansion of monitoring coverage, ensuring that ships in remote locations can still be effectively monitored.

The research focuses on the development of a printed circuit board (PCB) AIS receiver capable of receiving and interpreting dual-channel AIS communications. This AIS receiver is designed to operate in the space environment and meets the power and size requirements suitable for nano-satellites. Testing and validation are conducted to ensure that the AIS receiver functions optimally under actual operational conditions.

The results of this research demonstrate that the developed AIS receiver has been successfully integrated into a nano-satellite using the PC/104 PCB format (89 x 92 mm) and consumes less than 2 watts of power. The device accurately receives and decodes AIS signals from ships, achieving a real-world range of up to 55 km and theoretically extending up to 400 km. The decoded information includes MMSI, speed, heading, and geographic position of the vessels. With this technology, the coverage of vessel monitoring can be expanded globally, making a significant contribution to maritime traffic management and safety. This system also opens opportunities for further developments in more efficient and effective maritime monitoring, providing more comprehensive data for maritime authorities.

Keywords: *Automatic Identification System* (AIS), *Nano Satellite*, *Multi-channe*l AIS *receiver*