

TOPIC OF A COMPETITION PROMOTING STUDENT ENGAGEMENT IN SCIENTIFIC ACTIVITIES

Topic: Ultrasound Beacon for Short-Distance Localization of Unmanned Vehicles
Goal: Produce an ultrasonic positioning beacon for unmanned vehicles
Currently ultrasound technology provides an easy and low-cost means for Accurate short-distance localization, mostly in in-door applications. The objective of this project is to expand the concept of ultrasound-based localization to moving autonomous vehicles, determining the distance, direction in a dynamically changing environment. The main aim of this research is to design, implement, and experimentally evaluate an ultrasound-based localization system for short-range applications. The specific objectives are: • To design and implement an ultrasonic beacon capable of transmitting distinguishable signals in air. • To develop a receiver capable of detecting and processing the transmitted ultrasonic signals. • To investigate distance estimation using time-of-flight phase information of the received ultrasonic signals. • To evaluate localization accuracy at different experimental conditions. • To determine the practical limitations and potential applications of the proposed system. The project is expected to demonstrate a working prototype capable of estimating the position of a receiver over short distances with useful accuracy. The research should produce strong indications about the viability of such systems on moving vehicles. Student level: third or fourth year. Required skills: Programming in Matlab and Python. Experience with electronics projects, Arduino etc..
Supervisor researcher/lecturer: Samer Hourì