

Abstract:

Radar is an electronic device which utilizes electromagnetic waves to determine the altitude, range, direction, or speed of both moving and immovable objects. In contrast, ultrasonic waves are used instead of electromagnetic waves in ultrasonic radar. The low power consumption, low cost and ease of implementation are considered the main features of the ultrasonic radar to be devoted in several applications such as security purposes, object detection and avoidance systems in robotics. This work presents a design and implementation of ultrasonic radar for distance measurements. The design consists of an ultrasonic sensor, an Arduino board as a controller, a servo motor and a java application. The detection range of the proposed system is tested up to 500 cm with the angle of rotation from (0 to +180) and (180 to 0) degrees for different types of obstacles or objects (sponge, wood and aluminum). The design is built using open source hardware (Arduino Uno 328) which is coded via Micro C environment as a software entity. The effectiveness of the proposed design is measured using a statistical analysis of the distance error between the radar and the obstacles. The results obtained for all types of obstacles are tabled and graphed to prove that a very small error can be achieved using the proposed design.