Ultrasonic radar

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Introduction

An ultrasonic radar (or actually a sonar) for distance measurements is presented here as a result of the project of the software development course. The principle of the measurement is emitting an ultrasonic pulse and detecting echoes reflected from the target. The distance can be calculated by knowing the speed of sound and the travel time of the sound pulse.
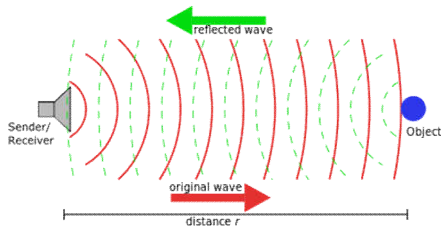

FIGURE 1. Principle of the distance measurement

Objectives

The main target is to design and implement the prototype of the radar with special features. Features are selected so that they would provide best possible opportunities to learn new skills and also match the topics covered in the courses of this term. Also the chance to gain Arduino coding experience and to explore the possibilities of the Bluetooth protocol is highly valuated.

Project

ECTS credits: 6 points

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Methods

The radar is intended to have a working range of maximum 400 cm due to specifications of the ultrasonic sensor used. The radar can be autonomously rotated back and forth horizontally 180 degrees by 1 degree steps. In every step the distance to the target is measured and the distance data is presented in visual form. Arduino board is used for controlling the movement of the radar, for measuring the travel time of sound pulse and calculating the distance, and finally for sending data to computer for visualization. User can also control the radar by Android mobile device via Bluetooth connection. The radar data visualization is implemented using Processing IDE and the mobile application for radar control is implemented with MIT App Inventor.

Results

The goals of the project have been achieved completely. The group managed to design and implement a full working radar and produce the requested documentation in addition learning plenty about coding and project management. The complete radar prototype will be presented live on the presentation day of the course in December 17th 2016 at the OUAS campus.
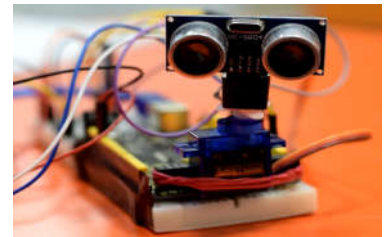

FIGURE 2. Radar

FIGURE 3. Radar screen

Conclusions

The Arduino board is a very versatile tool for prototyping and implementing several types of hobbyist-level electronic devices and applications. With suitable sensors and actuators the prototyping possibilities are almost endless. The ultrasonic radar presented here could be an useful piece of navigation equipment in a device like a robot vacuum cleaner or a nuclear military submarine.

References

https://www.arduino.cc/en/Reference

http://www.wikipedia.com