

DECEL training poster – Team Chenonceau

Underwater objects detection and form recognition through US system

Enrico Rizzi(UFE), Jaime Leal(UAH), Jiacheng CHEN(UT), Jorge Pais(UP)

Abstract

An FPGA (RedPitaya board) based US(UltraSonic) acquisition system has been developed with a HW-SW application in order to enhance the measurements. The US sensor is attached to the servomotor and moving in a radial way. A high-level Python based UI (User Interface) has also been implanted to simplify the control.

Project context and objectives

Create a US based system to detect underwater objects

Obtain dimension and position of the object

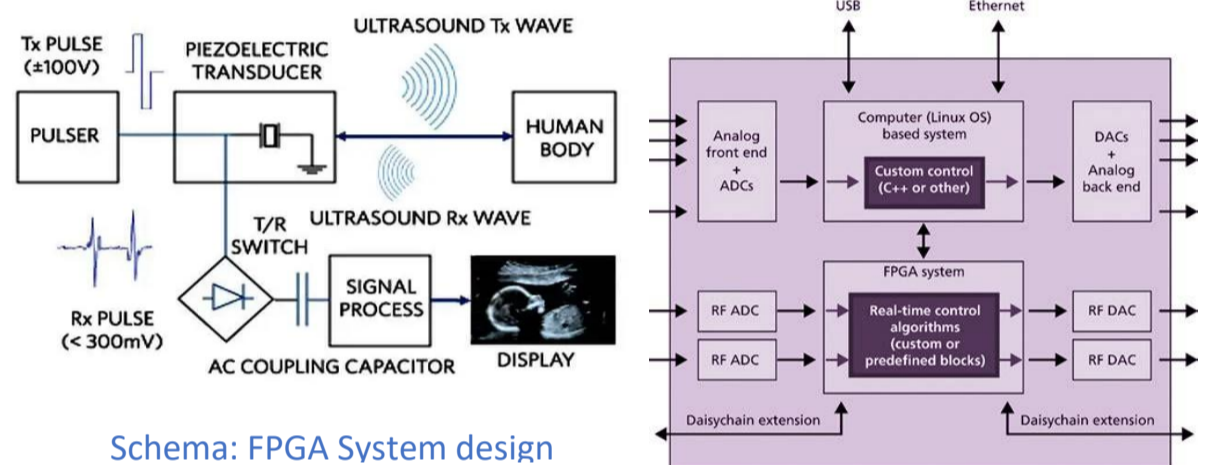
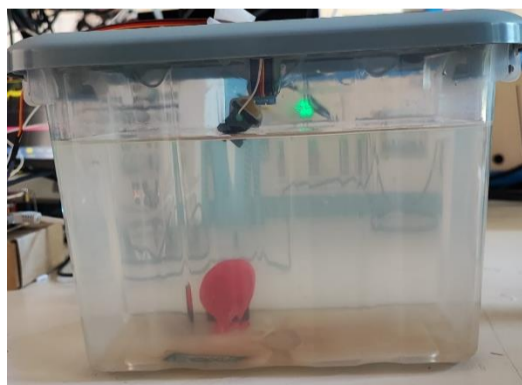
Distinguish materials with different acoustic impedance

Design a high-level Python User Interface

Measurement example :

An air bubble exists inside the water ballon, which creates an air-water interface with different acoustic impedance.

The results below show that we have well detected the air bubble. The correction algorithm also allows us to locate the position.



Schema: FPGA System design

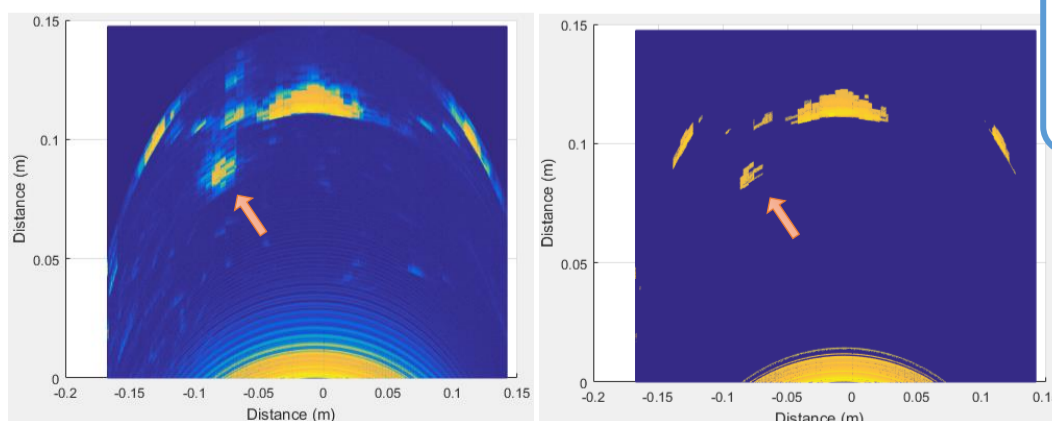
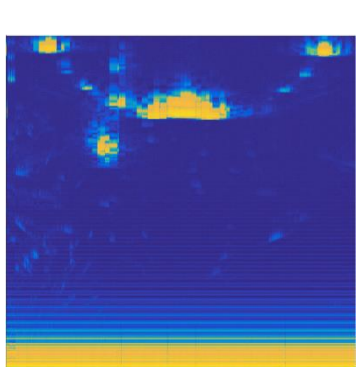


Electronic system

Challenges

Setting proper sampling frequency

Applying correction algorithm (angles, distance, threshold)



Original

Distance and amplitude correction