Assignment One
The Cricket Locator - Part 1

Set: *27th of November 2018*
Due: *7th of December 2018 @ 23:55 CEST*

Synopsis:
Design a 1-D cricket locator using CSP principles.

Introduction

This is the first of three assignments in the *Concurrent and Distributed Systems* course. The assignments are pratical in nature, and will give you hands-on experience with the topics of the course.

In this first assignment you will be designing a 1-D cricket locator using a CSP design approach. We want to locate a cricket by listening to the sound it makes. In these assignments we will assume that there is just a single cricket and that you have a number of listening devices (i.e. microphones).

Since we know that sound propagates in a predictable linear pattern, we can use multiple listening devices and measure the difference in detection time. If we place the listening devices on a line with equal spacing, we can compute where the cricket is located in a single dimension.

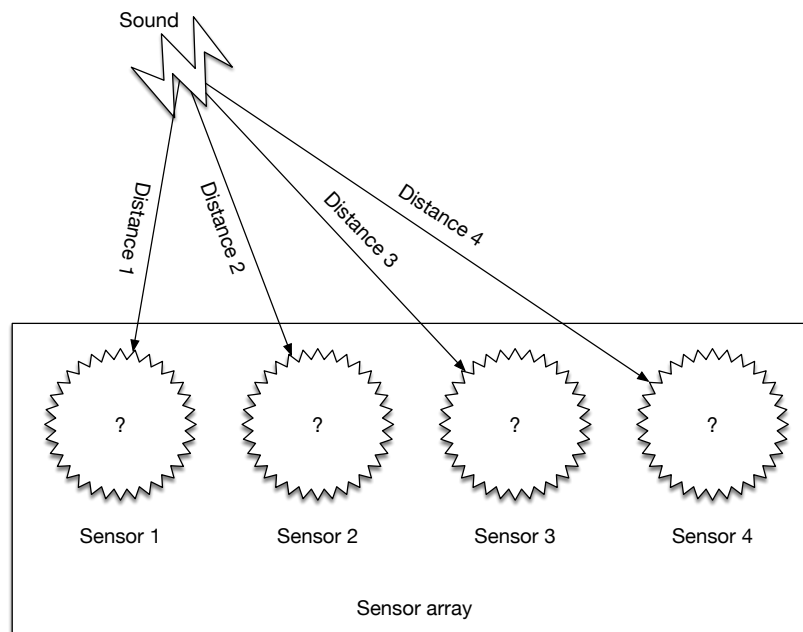A visualization of a setup with 4 dectectors is shown in figure 1.

Figure 1: A 1 dimensional sensor array comprising 4 sensors

Implementation

Your implementation *MUST* be done in a CSP-like design. We recommend using the PyCSP library.

Your design needs to solve these tasks:

- Capture the sound signal from the emitting process

- Detect when the sound signal has an edge

- Design an coordination process that orders the edges detected based on the delay

- Emit a value each time a signal has been detected, and the relative distance to each detector

- Optional: visualize the setup

Your Report

The implementation and report that you hand in must be **your own individual work**.

Your report *MUST* be written in ACM format. An ACM template for LaTeX and Microsoft Word is available for download via Absalon.

Your reports should contain:

- An abstract describing the contents of your report

- Description of your method for detecting an edge in the sound signal

- Considerations for how you order and group signals

- Ideas for system robustness against various errors

- A description of what tests you have performed and their outcomes

Deliverables for This Assignment

You should submit the following items:

- A single PDF file, A4 size, no more than 3 pages, in ACM format, describing each item from report section above

- A single ZIP/tbz2/tgz file with all code relevant to the implementation

Handing In Your Assignment

You will be handing this assignment in using Absalon. Try not to hand in your files at the very last-minute, in case the rest of the students stage a DDoS attack on Absalon at the exact moment you are trying to submit. **Do not email us your assignments**.

Assessment

Each assignment must be accepted in order to qualify for the exam. Should your assignment be rejected, you will be given a chance to resubmit, but please bear in mind that due to the tight schedule for assignments, you will need to complete the resubmission in the same period as another assignment.

Resources

- Locate the cricket: `https://m.imdb.com/title/tt1213275/`

- PyCSP: `https://pypi.org/project/pycsp/`

- Edge detection: `https://en.wikipedia.org/wiki/Edge_detection`

- Edge detection: `https://dsp.stackexchange.com/questions/19871/detect-impact-from-digital-audio`