

Assignment Two

The Cricket Locator - Part 2

Set: 11th of December 2018
Due: 21st of December 2018 @ 23:55 CEST

Synopsis:

Design a 2-D distributed cricket locator.

Introduction

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

In this second assignment you will be designing a 2-D cricket locator using a network of sensors. We will use the 1-D sensor array from the first assignment, and use multiple sensor arrays to give an approximate 2-D position of the observed sound.

As each of the 1-D sensor arrays from assignment 1 are slightly different, you will need to make a design that allows multiple sensor arrays to work together. In groups of 3-4 persons, you need to agree on a protocol for communication between each sensor array. A suggested physical layout of the sensor arrays is shown in figure 1.

Implementation

Your implementation needs to be able to work in setup with up to 4 sensor arrays, and should emit a coordinate explaining where the sound is located. You need to decide on a physical layout of the sensor arrays, and you can then use each sensor as a component in the coordinate. In figure 1, the coordinate could be reported as (1, 1) because it is detected between sensor zero and sensor one (sensor zero covers $[0, 1]$, and sensor one covers $[1, 2]$ and the trigger is more or less in between). Depending on the time resolution and sensor distance, it would also be possible to report (1.2, 1.4) if we can determine that the sound is closer to the second sensor in the arrays.

We recommend using Python for the implementation, but accept any reasonably readable programming language (i.e. no brainfuck or emoji code).

- Agree on a protocol for communication between the sensor arrays
- Implement a strictly synchronous system that emits a position for each sound
- Implement a system with a gossip protocol that emits a position when it changes

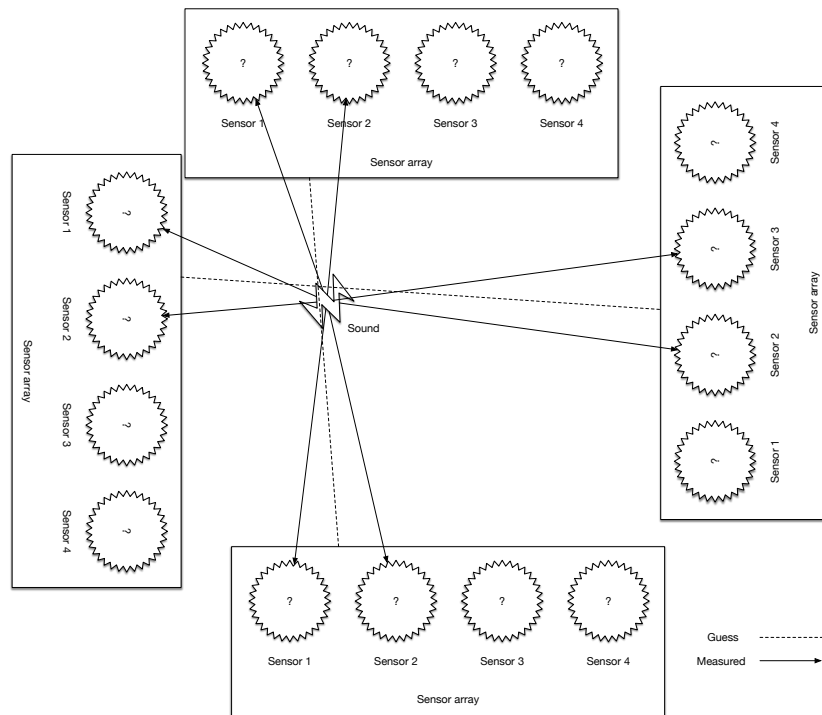


Figure 1: A 2 dimensional sensor using multiple sensor arrays

- Optional: Allow dynamic addition and removal of sensor arrays
- Optional: Visualize the detection for real-time human cricket hunting

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
- A description and discussion of the protocol and serialization format
- A description of your strictly synchronous system, including failure considerations
- A description of your gossip based system, including failure considerations
- 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/>
- Distributed systems book: <https://www.amazon.com/Distributed-Systems-Concepts-dp/0132143011>