Sensor Fusion, TSRT14

Localization Using a Microphone Network
Data Description

Anton Kullberg (anton.kullberg@liu.se)

March 25, 2020

1 Introduction

This document contains information about the reference data set in TSRT14. The data set consists of three `.mat` files, `calibration.mat`, `setup1.mat` and `setup2.mat`. The files are explained separately in the following section.

2 Data set

Each of the three files have five stored variables summarized in Table **??**.

2.1 Calibration

The calibration measurements were gathered according to Fig. **??**. The microphones are ordered 1 through 8, from left to right. The robot was placed according to the lab memo with the speaker facing the microphones. The calibration data file only contains `fs`, `tphat` and `y` as the robot does not move during the data collection and the microphones are arranged to be at equal distancer from the speaker at all times.

Load the file by running

```
load calibration.mat
```

Table 1: Variables in data set files.

Variable	Description
`fs`	Sampling frequency [Hz]
`mic_locations`	Microphone locations. The array is 8×2 where the first column corresponds to x and the second to y. Given in centimeters.
`tphat`	Estimated time of arrival of pulse per microphone. Given as $N\times8$ where N is the number of pulses and 8 the number of microphones.
`x0`	The initial position of the robot, if applicable.
`y`	Raw measurements from the microphones. Given as $M\times8$ where M is the number of raw measurement points and 8 the number of microphones. The data is sampled at the frequency `fs`.

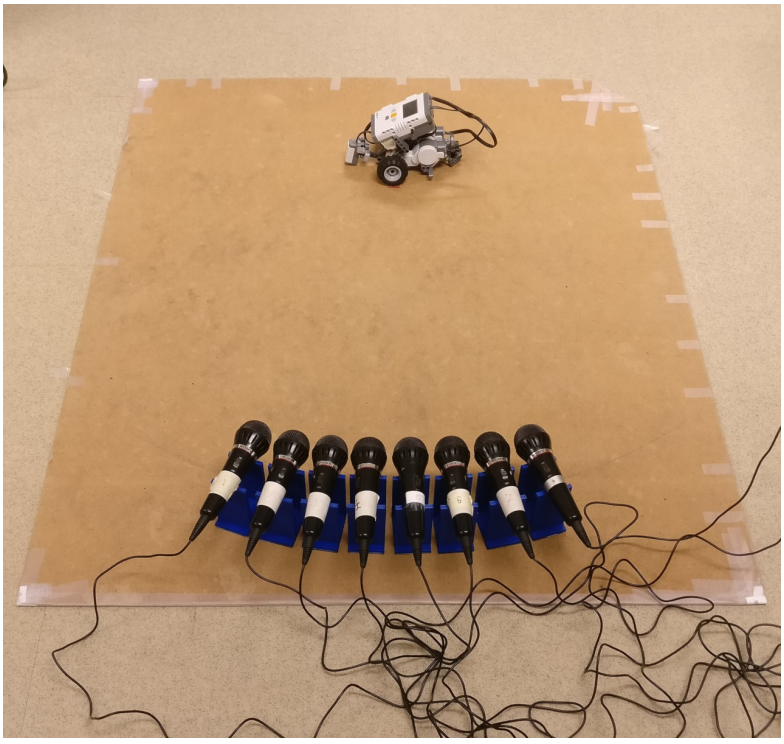

Figure 1: Calibration setup

2.2 Setup 1

For the first setup, the microphones were arranged according to Fig. **??**. The first microphone is in the bottom left, the second to its right and the rest of the microphones follow accordingly around the board. Data was gathered for one minute and the robot started at approximately $x_0 = \begin{bmatrix} 10 & 60 \end{bmatrix}$ cm.

To load the data, run

```
load setup1.mat
```

2.3 Setup 2

For the second setup, the microphones were arranged according to Fig **??**. The first microphone is the left most microphone in the figure and the rest follow accordingly to the right. Data was gathered for one minute and the robot started at approximately $x_0 = \begin{bmatrix} 10 & 60 \end{bmatrix}$ cm.

To load the data, run

```
load setup2.mat
```

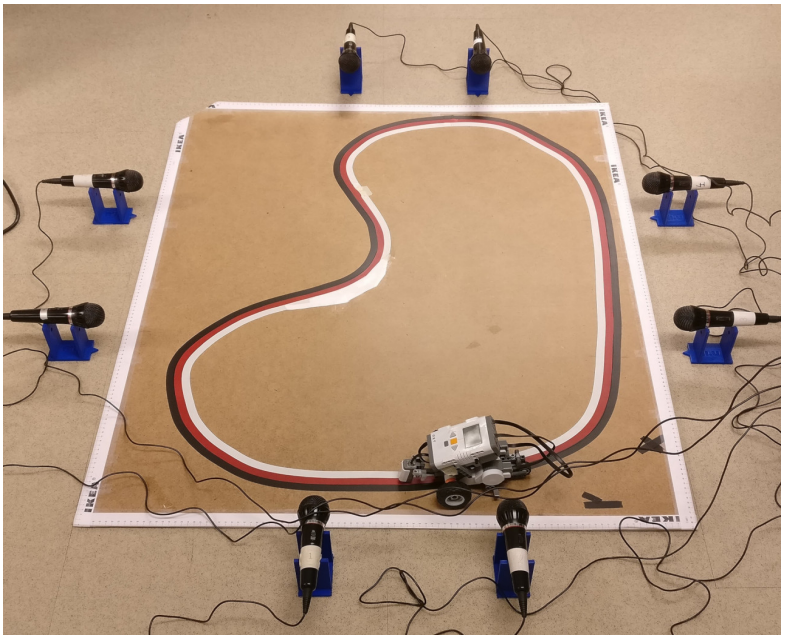

Figure 2: Setup #1. The first microphone is in the bottom left, the second to its right and then the rest follow accordingly around the board.

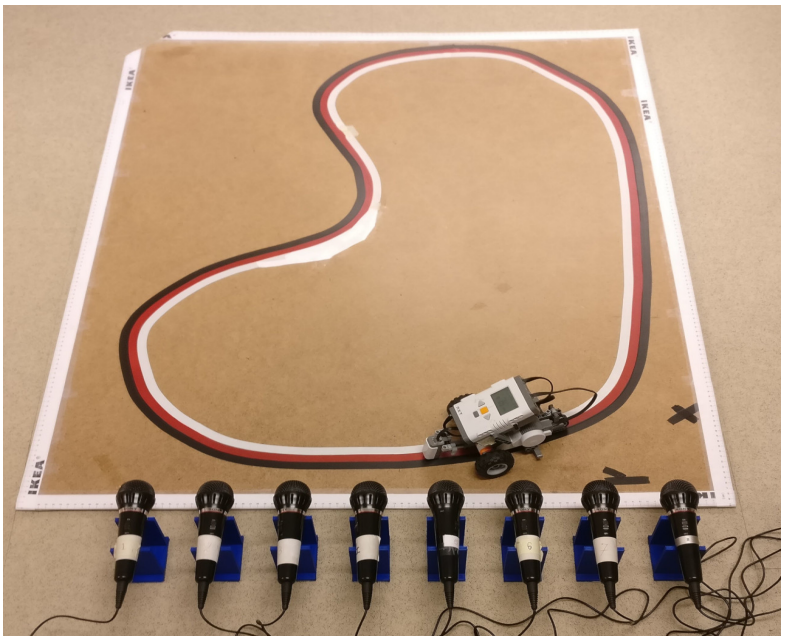

Figure 3: Setup #2. The left most microphone is the first and the rest follow accordingly to the right.