# **MEETING NOTES – WEEK 02**

| **Meeting/Project Name:** | Sound-source Localisation using a Microphone-array for NUbots | | | |
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| **Date of Meeting:** (MM/DD/YYYY) | 03/01/2023 | | **Time:** | 16:00 – 16:30 |
| **Minutes Prepared By:** | Clayton Carlon | | **Location:** | EAG29 |
| Attendance at Meeting | | | | |
| **Name** | | **School / Discipline** | | |
| Clayton Carlon | | School of Engineering | | |
| Andrew Fleming | | School of Engineering | | |
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| Progress since the last meeting |

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| Topics discussed |

* The basic description and scope was informed.
* Some context around NUbots was given.
* The need to simulate first before any hardware design was discussed.
  + Such simulation software as Simulink and MATLAB were given as potential software.
* Some aspects of the hardware were discussed:
  + the number of ADCs and channels needed,
  + the sampling frequency of the microphones,
  + the potential need for upsampling as a last resort to improve precision,

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| Things to do for the next meeting |

* A bird-eye's view of the literature was expressed as an importance.

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| **Supervisor’s Name** |  | **Signature** |  | **Date** |  |

# **MEETING NOTES – WEEK 05**

| **Meeting/Project Name:** | Sound-source Localisation using a Microphone-array for NUbots | | | |
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| **Date of Meeting:** (MM/DD/YYYY) | 03/20/2023 | | **Time:** | 13:00 – 13:30 |
| **Minutes Prepared By:** | Clayton Carlon | | **Location:** | EAG29 |
| Attendance at Meeting | | | | |
| **Name** | | **School / Discipline** | | |
| Clayton Carlon | | School of Engineering | | |
| Andrew Fleming | | School of Engineering | | |
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| Progress since the last meeting |

* Two literature-reviews were informed to Andrew, namely Argentieri et al. (2015) and Rascon & Meza (2017).
* A search of simulation-software was informed to Andrew, namely:
  + Audio Toolbox on MATLAB,
  + Acoustics Toolbox,
  + and Phased Array System Toolbox.

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| Topics discussed |

* COMSOL was suggested by Andrew as a potential candidate.
* Acoustics in gaming was also given as a potential place of inspiration.

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| Things to do for the next meeting |

* Literature-review was stressed as an important area to start.
* The method to benchmark methods was given by Andrew, namely plotting the variance and mean error over noise.

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| **Supervisor’s Name** |  | **Signature** |  | **Date** |  |

# **MEETING NOTES – WEEK 07**

| **Meeting/Project Name:** | Sound-source Localisation using a Microphone-array for NUbots | | | |
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| **Date of Meeting:** (MM/DD/YYYY) | 04/03/2023 | | **Time:** | 13:00 – 13:30 |
| **Minutes Prepared By:** | Clayton Carlon | | **Location:** | EAG29 |
| Attendance at Meeting | | | | |
| **Name** | | **School / Discipline** | | |
| Clayton Carlon | | School of Engineering | | |
| Andrew Fleming | | School of Engineering | | |
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| Progress since the last meeting |

* The progress of the literature-review was given.
  + The fact that it was taking longer than expected was expressed.

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| Topics discussed |

* Some of the methods in the literature were discussed such as MUSIC.

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| Things to do for the next meeting |

* The literature-review was to be complete soon, and a table comparing the best methods was to be drawn up.

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| **Supervisor’s Name** |  | **Signature** |  | **Date** |  |

# **MEETING NOTES – WEEK 09**

| **Meeting/Project Name:** | Sound-source Localisation using a Microphone-array for NUbots | | | |
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| **Date of Meeting:** (MM/DD/YYYY) | 05/04/2023 | | **Time:** | 13:30 – 14:00 |
| **Minutes Prepared By:** | Clayton Carlon | | **Location:** | EAG29 |
| Attendance at Meeting | | | | |
| **Name** | | **School / Discipline** | | |
| Clayton Carlon | | School of Engineering | | |
| Andrew Fleming | | School of Engineering | | |
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| Progress since the last meeting |

* Looked over the paper by Chen & Xu 2019.
* Briefly looked over the spreadsheet of literature examples.

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| Topics discussed |

* Discussed a way forward to simulate literature examples.
* Discussed simulation software:
  + Some possible examples on Python and MATLAB
  + Needs to simulate dimensions of a room, material, etc.
  + Ideally should give a time-domain signal that can be processed into MATLAB or Python, etc.
* Discussed the definition and context of R60 (reverberation time at 60dB) as a metric for reverberation.
* Discussed the effects of reverberation in rooms, e.g. hallways.

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| Things to do for the next meeting |

* Simulation was highlighted as the next step.

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| **Supervisor’s Name** |  | **Signature** |  | **Date** |  |

# **MEETING NOTES – WEEK 11**

| **Meeting/Project Name:** | Sound-source Localisation using a Microphone-array for NUbots | | | |
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| **Date of Meeting:** (MM/DD/YYYY) | 05/15/2023 | | **Time:** | 13:00 – 13:30 |
| **Minutes Prepared By:** | Clayton Carlon | | **Location:** | EAG29 |
| Attendance at Meeting | | | | |
| **Name** | | **School / Discipline** | | |
| Clayton Carlon | | School of Engineering | | |
| Andrew Fleming | | School of Engineering | | |
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| Progress since the last meeting |

* Informed the use of the Python module pyroomacoustics as a way to simulate reverberation.

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| Topics discussed |

* Discussed the methodology of testing:
  + A simulation loop is run for the same room-conditions
  + 10,000 results are needed for variances.
  + 100 levels of noise are tested.
  + The mean error and the variance are to be calculated for each level or noise and plotted against noise.
  + A random seed is needed.
  + The mean is expected to stay around zero if the estimator is unbiased.
  + If it is biased, then it may stray further with noise.
  + The variance is expected to increase linearly with the logarithmic scale of noise.
* The noise is the thermal noise on the microphones.

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| Things to do for the next meeting |

No meeting was to be after this one.

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| **Supervisor’s Name** |  | **Signature** |  | **Date** |  |