**AGENDA**

**EXPERT VISIT 12 – Newcastle University (UNEW)**

Acoustic-RF Gateway Technologies and Techniques

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Workshop: Designing and programming a Lora-based wireless gateway

(@UoM, 28th and 29th 2025)

**Meeting venue:** MONUSEN center, University of Montenegro, Faculty of Electrical Engineering (UoM)

**Address:** Cetinjska 2, Podgorica, Montenegro

**SCHEDULE**

Day 1: 28th May 2025 (Wednesday)

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| **Time** | **Description** |
| 08:30 – 09:00 | **Meet and greet coffee** |
| 09:00 – 09:45 | **Introduction** by Dr Ben Sherlock  Description of the objectives of the training, outcomes and tools. |
| 09:45 – 10:30 | **Acoustic-RF Gateways** by Dr Ben Sherlock  Overview of acoustic-RF gateway techniques and technologies with real-world case studies. Focus on low-power networks, sleep cycles, reduction of the data transferred. Followed by question and answer session. |
| 10:30 – 10:45 | BREAK |
| 10:45 – 11:30 | **LoRa Gateway Introduction** by Dr Ben Sherlock  Overview of the workshop aims, objectives, stages of development, and tools. |
| 11:30 – 12:15 | **Tool familiarisation and Setup** with Dr Ben Sherlock  Configuration of the IDE and starter project with programming tools. |
| 12:15 – 13:30 | LUNCH BREAK |  |
| 13:30 – 14:15 | **Implementing a Simple Transparent Serial Link** with Dr Ben Sherlock  Stage 1. Enable a simple transparent wireless bidirectional link between Laptop Serial Port and NMv3 modem. Exploration of Polling or Interrupt structures, packetisation of data, queuing of packets to send. |
| 14:15 – 15:00 | **Implementing a Simple Transparent Serial Link (continued)** |
| 15:00 – 15:15 | BREAK |
| 15:15 – 16:00 | **Adding MAC Headers and Configuration Control** with Dr Ben Sherlock  Stage 2. Previous stage uses simple broadcast approach, here we will add MAC headers and AT style interface for configuring a bidirectional point-to-point transparent serial interface. |
| 16:00 – 16:45 | **Adding MAC Headers and Configuration Control (continued)** |

Day 2: 29th May 2025 (Thursday)

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| **Time** | **Description** |
| 08:30 – 09:00 | **Meet and greet coffee** |
| 09:00 – 09:45 | **Reliability Challenges** by Dr Ben Sherlock  Overview of the weaknesses in the current implementation (many of which may have been observed the previous day). Techniques to address these weaknesses. |
| 09:45 – 10:30 | **Improving Reliability** with Dr Ben Sherlock  Stage 3. Adding a simple stop-and-wait ARQ protocol with Acks, Sequence Numbers, Timeouts, Retries, Random Backoff. |
| 10:30 – 10:45 | BREAK |
| 10:45 – 11:30 | **Improving Reliability (continued)** |
| 11:30 – 12:15 | **Improving Reliability (continued)** |
| 12:15 – 13:30 | LUNCH BREAK |  |
| 13:30 – 14:15 | **Shoreside Design with multiple RF-Acoustic Gateways** by Dr Ben Sherlock  Example scenario of multiple acoustic sensor units at sea each with a LoRa RF module communicating with a single shoreside receiver. Buidling on the existing MAC protocols a new Gateway will output packet information on the serial port for logging to files. |
| 14:15 – 15:00 | **Implementation of Shoreside LoRa Gateway** with Dr Ben Sherlock  Stage 4. Gateway outputs packet information in ASCII format to the serial port for logging to CSV files for offline processing. |
| 15:00 – 15:15 | BREAK |
| 15:15 – 16:00 | **Implementation of Shoreside LoRa Gateway (continued)** |
| 16:00 – 16:45 | **Wrap Up and Discussions** with Dr Ben Sherlock  Questions and answers, general discussion about the material covered. |