University of Glasgow | School of Engineering

# UESTC Final Year Projects

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| **Project Title** | **Micro-climate Weather Station** |
| **Summary** | **This project would suit a student interested sensing and monitoring of environmental conditions.**<br><br>**Environmental monitoring and air quality measurements are becoming a critical measure across the globe of a healthy natural environment. Traditionally this has been monitored by expensive, large, and highly accurate air monitoring stations. However with the introduction of low cost electronics, combined with easy access to wireless communications technology, it is possible to deploy environmental monitoring stations much more widely and increase the resolution of the data collected thus improving the overall picture at a local level.**<br><br>**This project is the development of a self-contained weather station capable of monitoring a number of environmental conditions such as wind speed and direction, rainfall, temperature, and air quality. The device pre-processes this information an uploads the data to a cloud based database.** |

| **General Classification** | | | |
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| **Analog/RF Electronics** | | **Sensing & Imaging** | **X** |
| **Communications** | | **Signal Processing** | |
| **Embedded / Digital Electronics** | **X** | **Power Electronics** | |

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| **Supervisor** | **Dr D Bremner** | **Email:** | duncan.bremner@glasgow.ac.uk |
| **Project Objectives** | • Research and understand the challenges of monitoring environmental conditions including air quality measurements.<br>• Prepare a design brief for a micro-weather station capable of sensing key environmental conditions, uploading the information to a cloud based database. The complete unit must not rely on external power sources but may use renewable sources (wind, solar) to re-charge local batteries. The device must store local data for up to 1 month.<br>• Design both software and hardware architecture for implementing a new micro-weather station including power management and data processing.<br>• Design a suitable enclosure capable of withstanding the outdoor environment and operating for at least 1 year without maintenance.<br>• The final prototype must be capable of being demonstrated to show the capabilities of the unit and accuracy against a commercial system.<br>• | | |
| **Project Description** | **Summary of project; background, application area, any special requirements, any special skills**<br><br>Background: The background to this project is a combination of sensor design, embedded processing, and cloud data storage.<br>Application area: The application area is environmental monitoring and the | | |

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| | ability to interface / interrogate the device remotely to both control and monitor operation.<br>Special Skills: The technology skills are a mix of system engineering, embedded control and software, and an understanding of sensor systems with a view to producing a stand-alone device which can be deployed around the UESTC campus.<br>Special Facilities / Equipment:<br>Access to workshop facilities / technician will be required to prepare the final prototype suitable for pole mounting around the UESTC campus. An appropriate software development environment will be required depending on the processor choice. Access to an on-campus environment would be useful for the final demonstration. |
| **Anticipated Project Deliverables** | 1. A report containing a summary of the challenges of environmental monitoring.<br>2. An analysis of the technology and techniques used for environmental monitoring including air quality. This must also include cloud based data storage solutions.<br>3. A system analysis of the preferred solution / architecture demonstrating how it will meet the design requirements identified in the above tasks.<br>4. A working prototype, self-powered, and capable of being deployed around the UESTC campus<br>5. A Bill-of-Materials (BoM) estimating the cost of producing 100 samples of the solution.<br>6. A full project report describing the architecture, design approach, feature set, and requirements specification for the final solution. |