**School of Engineering Summer Internship Application Cover Sheet**

**Name: Jasper Day**

**Degree Programme: Mechanical Engineering**

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| **Top 3 projects in order of preference** | |
| **1** | **MatLib: A Library with all things bright and beautiful of the Material world!** |
| **2** | **Miniaturized Sensing for Scale Model Offshore Renewables** |
| **3** | **Numerical Simulation of Hydrogen Flame** |

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| Are you eligible for the EPSRC Vacation internships? | No |
| If yes would you also like to be considered for the following projects: | |
| 4D analysis of 3D printed components | Yes/No |
| Developing a direct ink writer for polymer extrusion | Yes/No |
| Timber compartment fires | Yes/No |

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| **Reason for your interest in a summer internship within the School of Engineering (no more than 200 words)** |
| As the Structures lead for the University's rocketry team, I've had the opportunity to get hands-on experience creating designs, working with different CAD packages, updating information databases, and leading a team. I want to continue to grow those skills while working at the University over the summer.  Every aspect of the science, the mathematics, and the artwork that goes into a finished design is fascinating. I’ve taken every opportunity available to me to learn and apply the fundamentals of the subject. Last year, I took a full course in Linear Algebra from MIT, then tutored the subject to a 3rd year engineering student over the summer. This year I’ve worked through textbooks on aerodynamics, vibrations, applied mathematics, and machine design. I want to learn everything not only to make optimum designs, but to be able to converse fluently with other engineers about the choices they make in theirs.  This desire to learn is why I’m excited about the School of Engineering internships. Not only would I be able to stay in Edinburgh (and keep all my library books out over the summer), but I would get a chance to further grow and apply my design toolbox and analytical skillset. |
| **Reason for your interest in your first-ranked project (no more than 200 words)** |
| I have a passion for creating knowledge bases. Last semester I created a website (https://jasper-day.quarto.pub/notes/) for my class notes, which I wrote in Markdown and published with git CI. Additionally, I pushed Endeavour to create an online knowledge base, and I've written over 20 wiki articles for it since then--most of the articles on the site. I'm also competent in the computer requirements: I do all my coursework and most of the math for Endeavour in Python, and I've made websites with hand-written HTML and CSS.  Besides my experience with wikis, I also enjoy the materials aspect of the internship. Much of my design work for Endeavour has involved researching material properties to make good choices: choosing the right aluminium alloy; selecting weaves and matrices for our fibre-reinforced polymer airframes; making trade-offs between density, strength, machinability, and cost. I’ve done extensive research in pursuit of this goal, reading books about manufacture and material fundamentals, and performing hands-on experimentation with material samples and 3D-printed prototypes. Thus, an internship maintaining a database of material information would be a perfect fit for me. |
| **Reason for interest in your second-ranked project (no more than 200 words)** |
| This semester I enrolled in Sensor Networks and Data Analysis on the advice of a friend, and despite being one of just a handful of mechanical engineers in the course it’s immediately become one of my favourites. Combine this with my innate love of anything large and mechanical, and an internship to create a sensor acquisition net for the world’s largest circular wave and current generation facility is an immediate winner. I’ve worked in the past with development boards and networking: my job last summer allowed me to bring Arduinos home and build things with them, and I’ve networked Arduinos and Raspberry Pi boards to run websites and file storage on my local network and control my 3D printer remotely. I can code and combine everything necessary to bring the Mini DAQ project to life, and I’m excited to see it in action at FloWave! |
| **Reason for interest in your third-ranked project (no more than 200 words)** |
| Hydrogen is not just a potential green combustion reagent of the future, it’s a critical component of the modern race to space. Liquid hydrogen and oxygen sent a Japanese rover to the moon just a month back, and they’ll (hopefully) return there long into the future. As a space and rocketry enthusiast, I’m excited to get a chance to learn more about the dynamics of hydrogen flame propagation, and particularly the beautiful and fractal behavior displayed in Berger et al.’s paper. Plus, I’m experienced with both Python and MATLAB and enjoy writing clean, neat code, and I would absolutely love to get some experience working with the University’s massive distributed computation networks. I write and compile all my own LaTeX for my university assignments (and my personal website), and I’ve studied aerodynamics on my own time from Anderson’s introductory textbook to better design rockets for Endeavour. It would be a lot of fun to spend the summer learning about the combustion dynamics that will propel a green future and that have already sent us to the moon and back. |