

Empowering an Inclusive Engineering Research Community through Creative Collaboration



UNIVERSITY OF LEEDS

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1. Introduction

Inclusive research cultures are critical to attracting and retaining diverse talent in engineering. Historically, initiatives have focused on recruitment rather than systemic cultural change. This project aimed to identify cultural barriers within the engineering research environment and support colleagues to have agency and ownership over the cultural change they wish to see. Our activities adopt an experimental approach that fuse traditional methods to capturing data and evidence together with experimental and creative processes.

2. Identifying Priorities

A Research Culture Survey was co-developed and iterated with researchers and research-enabling colleagues building on national surveys and their findings[1,2,3]. This provided benchmark data to inform targeted activity towards those who feel less visible, recognised or valued. Artist-facilitated workshops brought together colleagues from across the faculty, providing opportunities for networking, professional development, and collaboration. These enabled groups to explore local challenges and develop actions that challenge these. Each series of workshops culminated in a public-facing activity [4] that amplified participants' voices, raised the visibility of their work, and celebrated the diversity of our research community.

3. Community Collaboration

A highlight initiative in 2024 involved a fast-paced knowledge exchange partnership between an engineering technical team and community artists to address an 'impossible' costume design challenge for Leeds West Indian Carnival. The collaboration fused engineering expertise with the creative skills and cultural knowledge of community artists.

Computer Aided Design (CAD) was employed for both the head piece, structure and costume details. This enabled rapid refinement – ensuring the headpiece met both aesthetic and functional needs tailored to the wearer – while the structural mechanisms could be tested digitally prior to manufacture, meaning only a single prototype was required. CAD supported analysis of balance, fit, structural integrity, and component interaction, helping to avoid weak points.

The head piece design began with a scaled head model and foam prototypes, guiding the digital modelling for optimal balance and visual impact. Once finalised, materials and fabrication settings were chosen to maximise strength and appearance. The structure, featuring 6 arms that move at 90 degrees, was designed entirely digitally with the computer model used as the template for CNC machining, enabling precise manufacturing of the aluminium components.



Figure 1. Head piece development: from foam mock-up (left) to digital design rendering (right)

This approach delivered a durable, comfortable, and visually striking costume fit for extended wear.

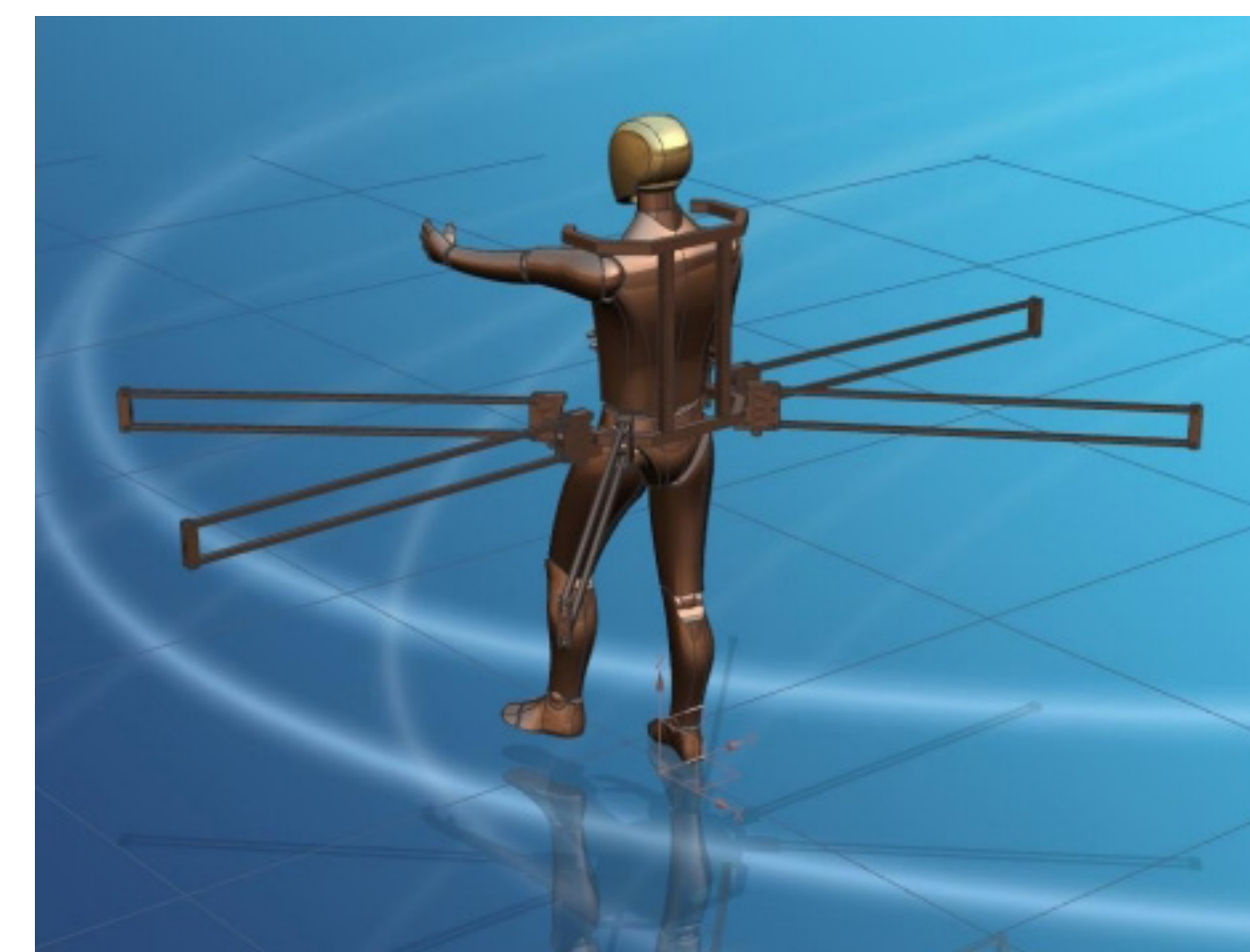


Figure 2. Digital model of the costume structure



Figure 3. Testing the prototype structure

4. Outreach and Public Engagement

The collaboration saw the co-design and co-creation of a 3m x 3m Carnival Queen costume, overcoming traditional manufacturing constraints. 'Ubuntu' was showcased to a public audience of over 115,000, leading the parade at the 2024 Leeds West Indian Carnival. Further development saw the costume feature in Light Night Leeds and in youth outreach activities. These nationally recognised events showcased engineering's creative potential and positioned technical professionals as ambassadors for inclusive research and innovation.



Figure 4. 'Ubuntu' at Light Night Leeds, October 2024

5. Evaluation and Learning

Blending disciplinary norms from engineering and arts, required significant time and engagement to overcome initial scepticism. A participatory approach was critical to building trust, both internally and with external collaborators, to ensure genuine co-design and co-delivery. This has led to sustained partnerships within the university and its local communities. Key outcomes include: (i) securing additional research impact funding with a technical Co-I and community partner, and (ii) transforming faculty engagement practices through art-engineering collaborations.

References and Acknowledgements

[1] Wellcome (2020) *What researchers think about the culture they work in*. <https://wellcome.org/reports/what-researchers-think-about-research-culture>. [2] ARMA (2020) *The ARMA Survey on Research Culture 2020*. <https://arma.ac.uk/wp-content/uploads/2021/03/ARMA-Research-Culture-Survey-2020.pdf>. [3] MI TALENT (2022) *Research Culture: A Technician Lens*. https://its.org.uk/wp-content/uploads/2024/02/Research_Culture_A_Technician_Lens.pdf. [4] Ibrahim et al. (2023) *Let It Be Named – Performing Change*. <https://www.youtube.com/watch?v=VfMlp1nYzq4>.

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View the project webpage:



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