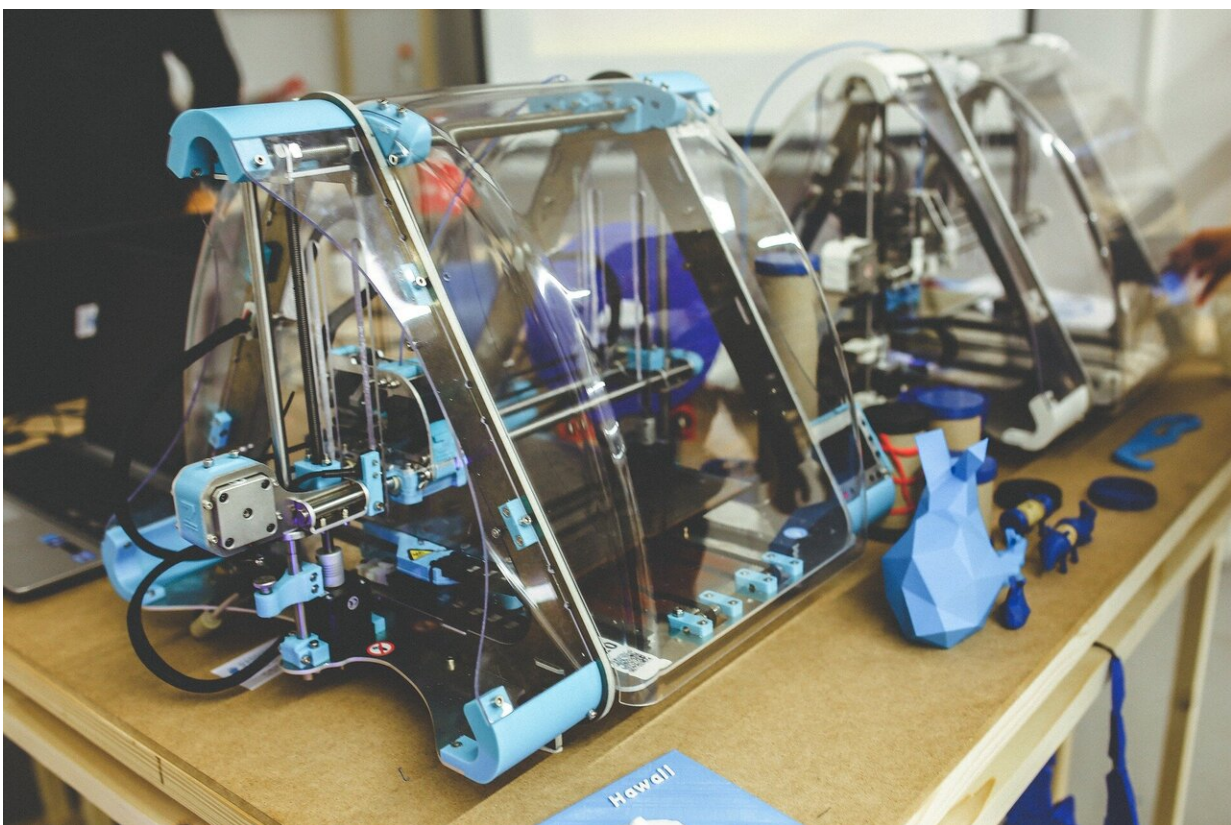


Transformative 3-D printing approach established from insight into developmental biology

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Engineers need to get more creative in their approach to design and additive manufacturing (AM) systems, by taking inspiration from the

way humans grow and develop, say researchers at the University of Birmingham.

In a new paper, published in *The International Journal of Advanced Manufacturing Technology*, teams from the University's School of Engineering and Centre for Reproductive Science have proposed a design approach for AM, otherwise known as 3-D printing, which opens a world of potential for the development of new materials and products.

Dr. Lauren Thomas-Seale, lecturer in Engineering Design and Principle Investigator of the project, explains: "Although we refer to it as [additive manufacturing](#), traditionally engineers learn to design parts based on a long history of subtractive manufacturing. This leads to well-acknowledged constraints in design creativity. Additive manufacturing has to break out of this inertia if it is to reach its full potential in both design and as a fundamental technique."

Dr. Jackson Kirkman-Brown, Reader in Human Reproductive Biology, and co-author on the paper, says: "Whilst using biological inspiration in [engineering design](#) is commonplace, studying the growth of humans and translating this to advanced [manufacturing](#) systems offers a whole new perspective. The way in which [biological systems](#) develop from incrementally adding cells to form tissues and organs, which both grow and modulate each other to function in synergy, is the epitome of sophisticated AM."

The study outlines how growth processes of the foetus change over time i.e. the duration of pregnancy. These processes are fundamental to the development of the human. Yet, the "growth" of an AM part during manufacture, is limited to where the material is deposited or fused. Therefore time can be considered an unutilised variable in design for AM. The authors propose Temporal Design for AM as a new approach that will unleash the potential of time through the [additive](#) build, to

create new materials and parts for AM.

Dr. Thomas-Seale elaborates "Looking towards radically different avenues for inspiration, is required not only to create real change in the way we approach design but also represents a more [holistic approach](#), which is important to avoid the fragmented development of the technique that ultimately mean new products face a much more difficult and costly route towards commercialisation."

More information: S. Saliba et al, Temporal design for additive manufacturing, *The International Journal of Advanced Manufacturing Technology* (2020). [DOI: 10.1007/s00170-019-04835-3](https://doi.org/10.1007/s00170-019-04835-3)

Provided by University of Birmingham

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