

Additive Layer Manufacturing in Assistive Technologies

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THE UNIVERSITY OF
WARWICK



- Students with disabilities have a variety of unmet needs where a standard 'off-the-shelf' solution is not sufficient.
- 3D printing is being used to create bespoke models as part of an assistive technologies project.
- This process will allow for the rapid manufacture of parts to provide immediate benefit from them.

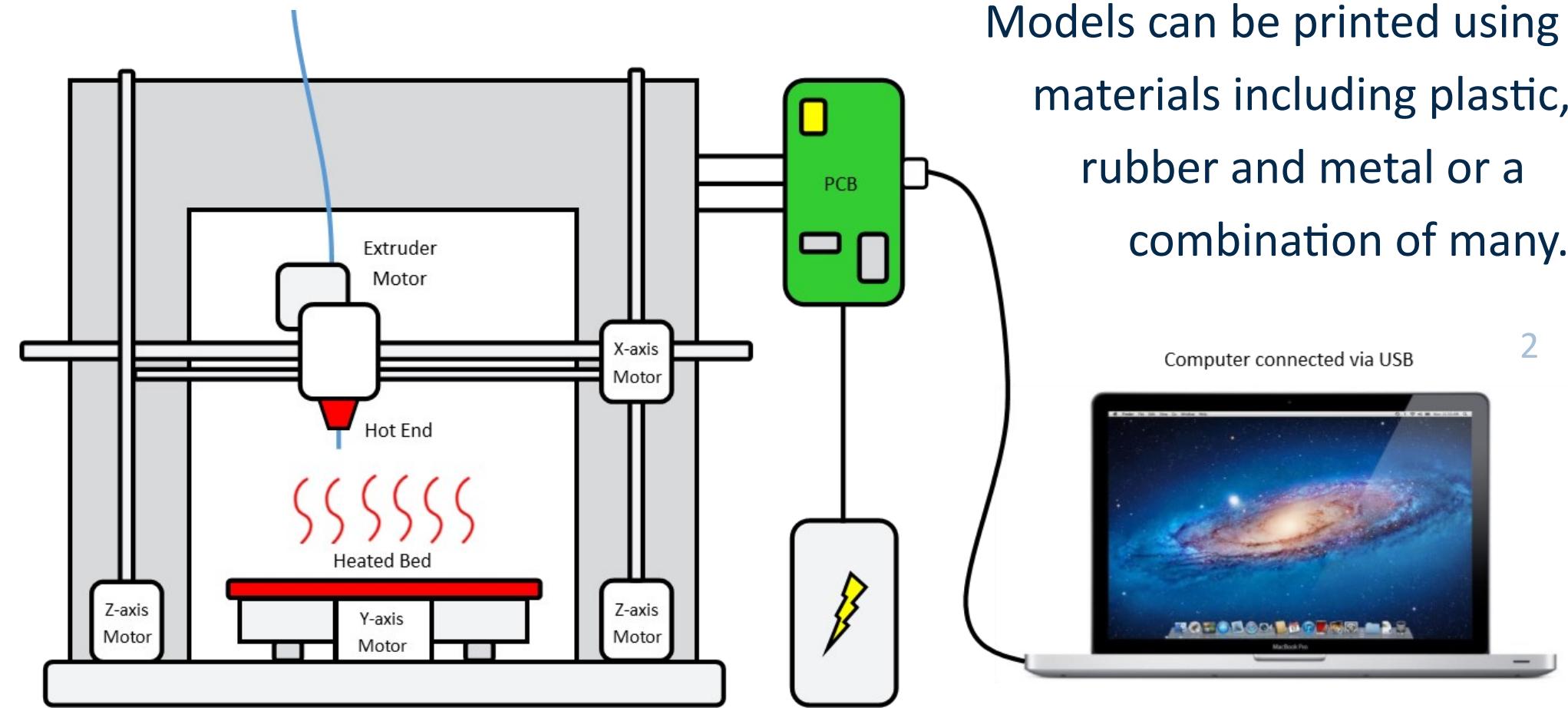
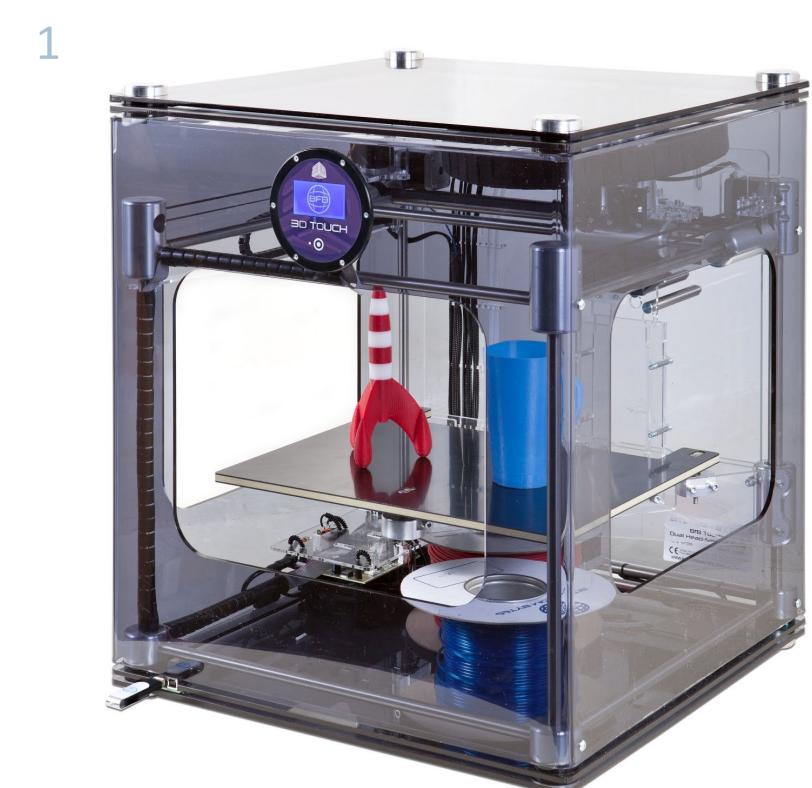
Background

Product design specialists Renfrew group have partnered with the NHS to produce the future of wheelchairs for children and young adults with disabilities (aged 4 to 18 years). Renfrew have developed the 'Chair 4 Life' which aims not only to better meet the usability needs of the user, but also to revolutionise the manufacturing and prescription process for this type of product. The drive behind the project is from the users, carers and healthcare experts. 'Engaging Young People with Assistive Technologies' is a project involving the University of Warwick and Hereward college. The aim of the project is to introduce the students to 3D modelling; to allow them to design products that will enhance the way that they interact with their living and learning environment. These designs can be quickly produced by using 3D printing. The project will incorporate the 'Chair 4 Life' and build upon its modular design to enhance its functionality and usability.

3D Printing

3D printing is a form of additive manufacture. The process is based on the principle of building up a model in layers, commonly using PLA or ABS plastic.

Firstly, a model is created using 3D CAD software and is then loaded on to the printer. The printer takes a plastic filament and feeds it into an extruder head, where the plastic is heated to its melting temperature. This allows it to flow out of the extruder tip and onto a heated bed. The position of the extruder tip is controlled using a collection of motors. The head raises as the model is created (with some printers the bed lowers).



Models can be printed using materials including plastic, rubber and metal or a combination of many.



Hereward College

The students at Hereward college will be immersing themselves in 3D modelling and 3D printing. The students have a variety of unmet needs where a standard 'off-the-shelf' solution is not sufficient.



The aim of the project is to give these students the necessary skills to be able to design solutions to problems that affect how they interact with their learning environment. They will be able to suggest improvements, design, and manufacture using 3D printing. This will produce a bespoke solution and give them the satisfaction of being involved in the whole process.

By using 3D printing, the students will be able to quickly manufacture their designs and immediately benefit from them.



Future Research & Development

The project aims to progress by expanding upon the forms of technology being implemented. Existing assistive technologies can often require a large investment, so innovative uses of hardware and software from smaller companies can provide a cost-effective and specialised solution. There are plans to work with robotic hands, incorporating 3D printing to develop accessories to improve their usability. The 'Leap' motion device provides an interface that could replace the computer mouse as a way for students to interact with 3D software; allowing the manipulation of objects on screen by using gestures and movement, rather than requiring a precision input. Microsoft Kinect has been implemented in projects related to healthcare in a similar way.



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References

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2. **3D Printer Basics** - FDM 3D Printer Gronkbot 3D Printing
3. **Chair 4 Life** - Renfrew Group International/NHS
4. **Paul Doyle** - ACCESS, R&D Manager Hereward College
5. **Leap Motion Sensor** - Leap Motion, Inc