ADDITIVE MANUFACTURING

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ABSTRACT

Additive manufacturing(AM)/3D printing is a new technology. Today, 3-D printers can print human cartilages, fully functional complex components, including batteries and LEDs. It is inclined in develop+ing expensive, complex parts, thus there is still a big room for exploration. We set out to combine two mundane, everyday gadgets into one transforming gadget, a Mouse that can be manually adjusted to become a Fan. Taking advantage of the ability to create one-pieced interlocking joints of AM, we succeeded in our design. We concluded on designing a transforming gadget by combining the fan and the mouse together, so that people who are using laptops can enjoy coolness at the same time.

INTRODUCTION

The first commercial 3D printer was based on a technique called stereolithography. Stereolithographic 3D printers position a platform just below the surface of a vat of liquid polymer. A UV laser beam then traces the first slice of an object on the surface of this liquid, causing a very thin layer of polymer to harden. The platform is then lowered slightly and the cycle repeats until completion, then it is drained of excess liquid, and cured. These printers is one of the most accurate types of printers, with a minimum build layer thickness of only 0.06mm. Another category of 3D printer hardware is based on material extrusion. Here a semi-liquid material, like the common hot thermoplastic is deposited from a computer controlled print head, e.g.'Fused Filament Fabrication' (FFF). With developments in synthetic biology, a range of biomass materials can be built into various items. The applications are already diverse, and range from printing in cheese or chocolate, to concrete printers.

METHODOLOGY AND DEVELOPMENT

We replace the upper cover of the mouse with the 4 blades of the fan. The base of the fan is connected with the lower cover of the mouse, and linked with the center of the four plates by a shaft containing 2 rotation locks. This shaft is specially designed for the mouse. It can be pulled to extend its length. It consists of 3 hollow cylinders of different sizes and two rotation locks between each two of the cylinders. By pulling the inner cylinders out one by one, the length can be extended. Rotation locks in the cylinders prevent them from collapsing. It consists of a tunnel of indentation and a protrusion. The tunnel is a hook shape. The protrusion goes up along the tunnel and when it reaches the end, it needs to be rotated to the right, so that the cylinder will not drop. After extending the shaft, the fan is facing upwards, we have to rotate it and make it face the user. The center of the fan blades is connected to a motor box, which is connected to a cylinder, which is put horizontally. The two ends of the cylinder are blocked with two stands connected to the shaft. There is a long slim cylinder stick in the horizontal cylinder and a stopper, 45 degrees away from the vertical. The rotation of the fan will stop when the stopper blocks the long slim cylinder. We used Unigraphic software to design and the fused filament fabrication (FFF) 3D printers to print our idea.

RESULTS

Fig. 1.1 Prototype of Gadget

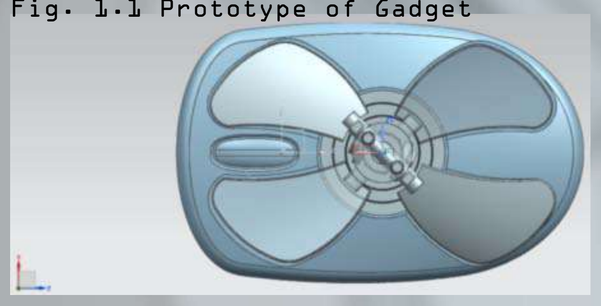


Fig. 1.2 Prototype of Gadget

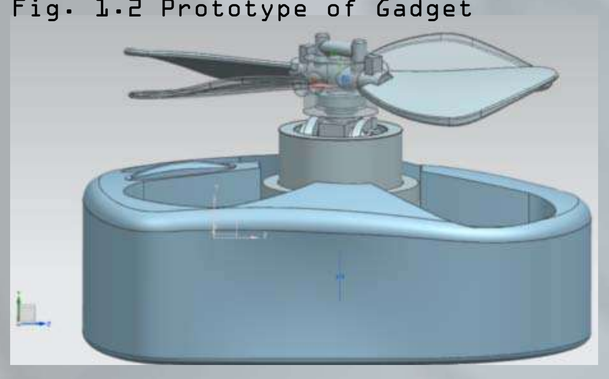


Fig. 2.1 Mechanism of steam of fan

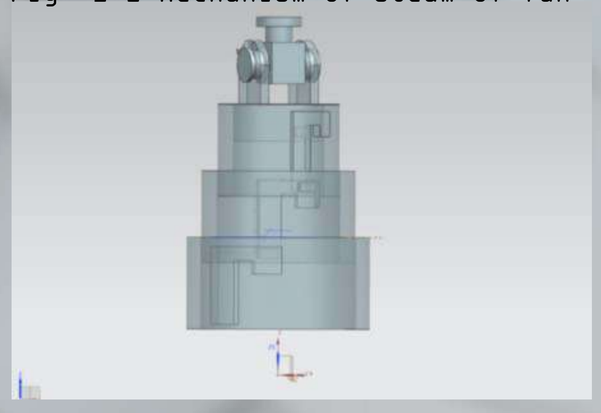


Fig. 2.2 Mechanism of Fan Joint

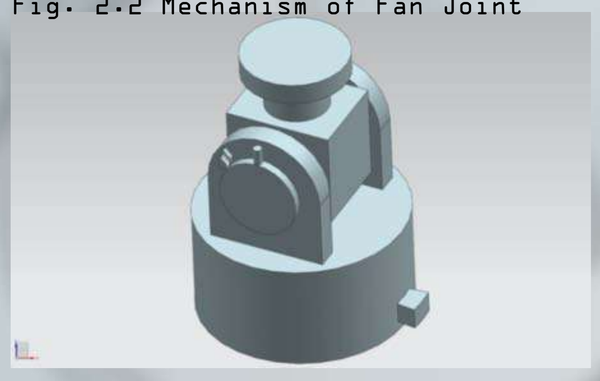


Fig. 2.3 Mechanism of Fan Blades

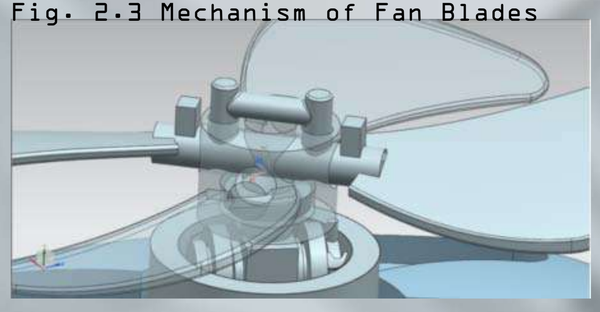
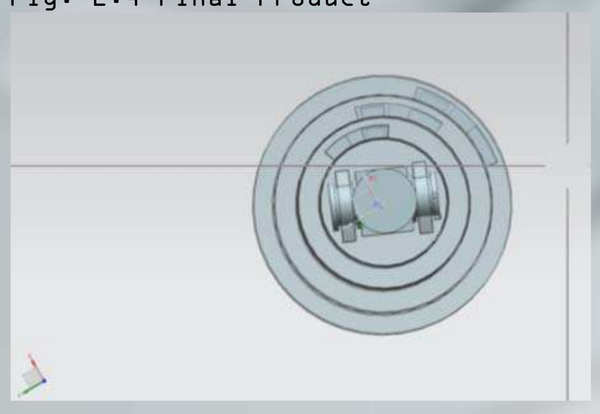


Fig. 2.4 Final Product



DISCUSSION

Prototype was successfully created using 3D printing, despite previously faced challenges of the thickness of parts too small (0.4mm) to be able to be separated after being printed (Fig. 2.4). We decided to increase the gap to 0.6mm but make the walls thinner to compensate the increase in gap. In addition, the four blades need to be rearranged during design, as all of them need to be rotated to the same direction and degrees. Thus, we installed the indentation 180 degrees away from the protrusion to turn it 180 degrees.

CONCLUSION

A transforming gadget of a fan to a mouse is completed. Implementations of electronics into 3D modeling could be made as an improvement.

ACKNOWLEDGEMENTS

We would like to sincerely thank the following people and organizations for their support and guidance throughout our Project: Our mentor and supervisor: Mr. Zaw Hlwan Moe for your guidance and pushing us to put our best efforts into this project. Our teacher mentor: Ms.Charmaine Chin for her kind advice and support throughout these past months. Our assistant/designer: Yeelaine for understanding our complicated ideas and making them into the Transforming mouse/fan. Nanyang Polytechnic and Zhonghua: For giving us the opportunity to learn more about Additive manufacturing and what it is like to take part in a Science and Technology project.