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3.5D printed soft actuator for novel robotic application

Recently, robotic technology can take place of humans in hazardous environments or manufacturing processes. However, conventional design is not suitable for home use because of rigidity, hardness, and electrical part. In comparison with such conventional robotics, soft robotics are non-rigid robots built from soft deformable materials. They can offer a new and safety approach for home use. To develop the soft robotics, soft actuator is an important part for the robotic movement. Generally, fabrication method of the soft actuator part is by plastic casting. However, the method is time consuming and complicated. 3D printing, in contrast, is another novel technique developed especially for building high complexity parts. Therefore, in this work, we designed an actuator and studied the formation of the actuator using the 3D printing technique (material jetting). Structure pattern, number of bulb, and active pressure in the actuator were varied to optimize the actuator performance. The printed materials were also characterized by optical microscope, scanning electron microscope, and dynamic mechanical analysis. Such active moving function of the 3D structure could be defined as the extra dimension of such actuator.

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