



Gioia FURIA

Ph.D thesis (2018-2021)
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Manufacturing of 3D molded cellulose objects with electronic circuits printed on surface with a six axis robot

Fabrication d'objets 3D comprenant des circuits électroniques imprimés en surface par procédé de moulage de cellulose et impression robotisée.

Context

Context:

The development of direct printing and robotics allow to consider a new way to manufacture functional 3D objects with advantages such as:

- Decrease waste of production
- Decrease number of assembling operation
- Decrease of weight
- More design possibilities

Objectiv:

To develop a robotic environment adapted for the manufacturing of prototypes and small series, which can be used without particular robotic skills.

It needs to be safe, flexible and easy to use.

To manufacture prototypes of 3D molded cellulose objects with electronics functionalities,

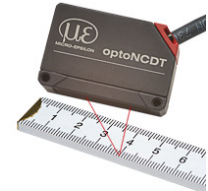
Methods

Global Plan

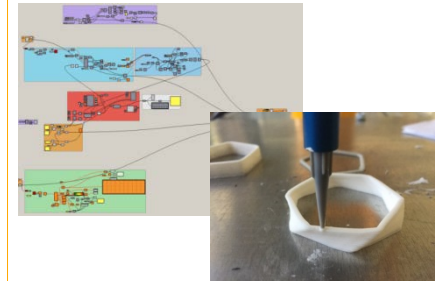
1. Research of direct printing technology and conductive inks which can be integrated on a six axis robot
2. Development of a protocol to code the robotic path planning programs from CAD datas
3. Implementation of printing tools, sensors and communication protocols on the robot
4. Definition of 3D design limitation
5. Manufacturing of molded cellulose 3D objects
6. Printing of electronic circuits on 3D surface
7. Multi-materials printing

Results

3D objects scanning and positioning



Path generation protocol



Implementation of printing tools



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