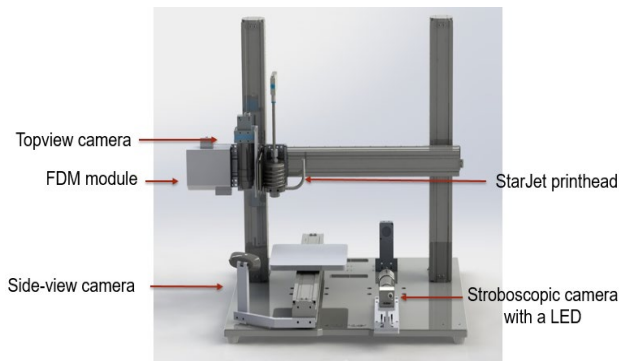


# Multi-material Printing Platform for Smart 3D Electronics Prototyping

**Additive manufacturing, or 3D printing, is a promising area of manufacturing technology. It could be the next generation of the industrial revolution. Now, the technology is restricted to produce mechanical 3D objects, while direct printing of 3D objects with electrical functionalities will enable the vast applications in the industry.**

We have developed an automatic and monolithic 3D multi-material printing platform by combining a FDM extruder and a molten metal printhead (StarJet) on a 3-axis robotic platform. With this novel hybrid 3D printing platform, freeform mechanical 3D models and conductive 3D features can be simultaneously printed and electrical smart functionalities can be directly embedded into 3D objects.

Compared to other conductive metal printing techniques, the StarJet technology has the advantages of customization, highly cost efficient metal materials, high electrical performance and easily printing 3D structures. Furthermore, the molten solder printed via StarJet is highly compatible with polymer substrates such as PET, PLA, PA6, PC, PC-PBT, and more. After deposition, the printed features show high flexibility, low electrical resistance as well as high mechanical stability. This multi-material printing platform could result in a high potential in printing 3D electronics and smart 3D objects.



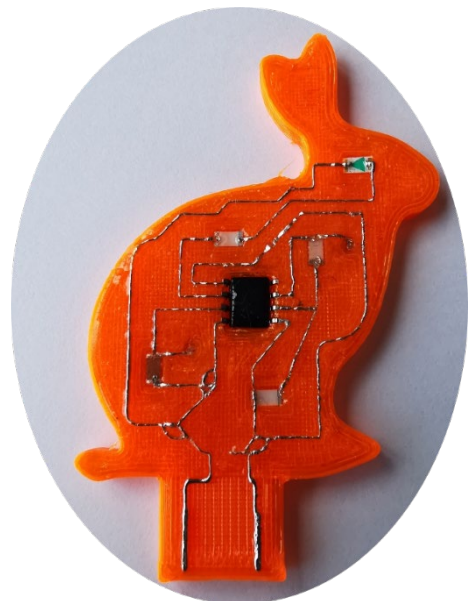
Schematic of the multi-material printing platform combining StarJet metal printer and a FFF-based 3D printer.

## Benefits:

- One-step solution from 3D CAD design to smart 3D electronics prototyping
- High potential in fast prototyping of smart 3D products for personalized and individualized applications
- Cost-efficient materials: bulk conductive metal and polymer filaments
- Direct embed and solder SMD electronics components via pick & place robot (under development)
- No post-processing required
- Highly automated and time-efficient for prototyping

## Fields of application:

- Fast prototyping of Printed Circuit Board (PCB)
- Fast prototyping of smart 3D sensing units and 3D electronics
- Fast prototyping of personalized medical devices



Hybrid printed freeform 3D circuit on PETG with embedded electronics