

Doctoral candidate 9: 4D printed magnetic materials in fast-responsive, wireless and remote-control shape morphing devices

Host Institution	Delft University of Technology
PhD enrolment	Delft University of Technology
Primary Supervisor	Dr. Sepideh Ghodrat
Subject area	Shape morphing materials and smart systems

About this doctoral project and your tasks

You will design, manufacture, test and validate two smart material systems/demonstrators: (i) a catheter for invasive surgery with shape and property morphing and (ii) an assistive tool to navigate and guide visually impaired people. You will (i) select appropriate materials for the intended applications, (ii) by 3D printing fabricate smart material systems with magnetic shape memory materials as active components, (iii) study the effect of a number of parameters (related both to the magnetic material and the printing process) on the shape-morphing behaviour so as to obtain the optimum combination of material and manufacturing process. (iv) The results of these tests are employed to draw up a set of design guidelines that can be used by designers. The level of technological readiness of these smart materials is still low, which makes their integration in a smart material system with various segments a challenging design assignment. Therefore, it needs elaborative testing and characterisation (developing of testing procedures). The ultimate goal is to prototype demonstrators which are responsive in a magnetic field with fast response and remote control so as to demonstrate how the appropriate integration of smart components in the structure enhances the operational functionality, taking into account a complex series of boundary conditions (base functionality, reliability, processability and user experience).

Your tasks will include :

- Systematic selection of smart materials tailored to specific applications
- Designing, manufacturing, assembling, and architecting smart material systems, resulting in two functional demonstrators
- Rigorous performance evaluation under various conditions, including static and dynamic characterization

Foreseen secondments

For this project, we foresee secondments to:

- **Dr. Sandra Wilson** (6 months) at Sophion (Denmark)
- **Dr. Rajmund Mokso** (4 months) at Technical University Denmark (Denmark)
- **Dr. William Twengstrom** (3 months) at Excillum (Sweden)

About the host institution and research group

The Delft University of Technology (TU Delft: <https://www.tudelft.nl/>) is the oldest and largest Dutch public technical university, located in Delft, Netherlands. With eight faculties and numerous research institutes, TU Delft has identified multidisciplinary focus research themes seeking solutions to the present and future demands of society, including materials science, which is of direct relevance to this proposal. In this project, the Emerging Materials group from the Industrial Design engineering Faculty will contribute to design of smart material systems including design requirements, material selection, prototyping and testing them in a systematic approach.

About the offer

- The selected candidate will be employed by Delft University of Technology for **36 months** on the MSCA-DN project. In line with university regulations and following a positive evaluation by the doctoral committee, Delft University of Technology may provide additional funding for a maximum of 12 months to complete the doctoral degree.
- Doctoral candidates are offered a **competitive remuneration** based on the MSCA allowances and the regulations of the host institution. The gross monthly amount at TUD will be 3.059 €. Moreover, funding is available for technical and personal skills training and participation in international research events.
- **Expected start date:** between April and September 2026. We encourage last-year master students who will graduate by this time to already apply.

More information is available in the [general information document](#) for X-CELERATE positions.

Specific Profile requirements

- Your profile aligns with the [general requirements and eligibility criteria](#) of the X-CELERATE project.
- You have a master's degree in **industrial design engineering, material science, mechanical engineering** or related field (or will have by the time of your appointment).
- Background in **materials design, experimenting and 3D printing** is appreciated.
- You are proficient in at least one programming language

How to apply

All applications must be submitted via the [X-CELERATE job platform](#).

Deadline for applications: 16 November, 23:59. More information about the application procedure is available in the [general information document](#) for X-CELERATE positions.

Additional information

For additional information about the research project, contact:

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