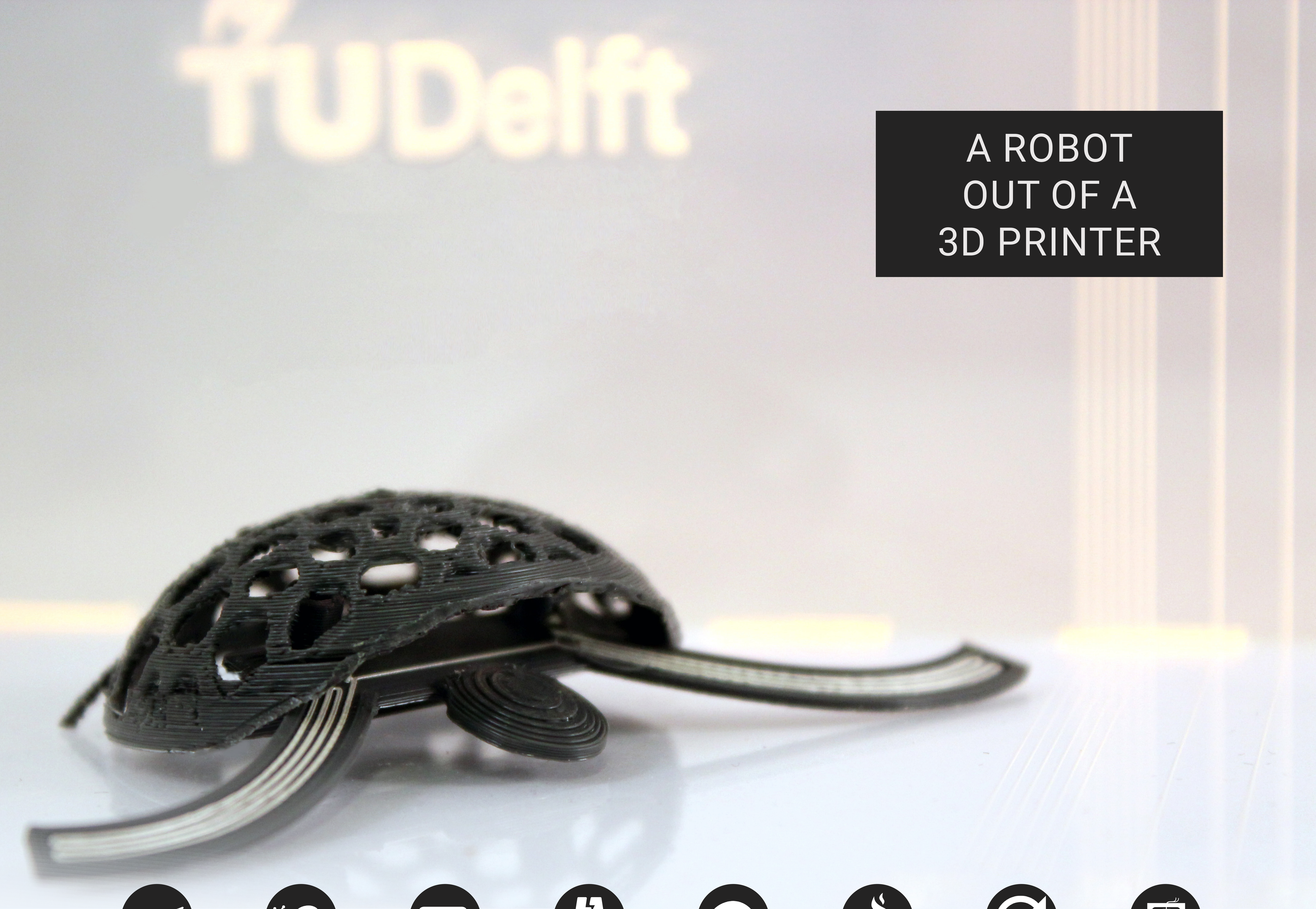


A ROBOT OUT OF A 3D PRINTER

LIGHTWEIGHT | MOVES SLOWLY | NEEDS LITTLE ENERGY | DELICATE | BENDS | HEATS UP | REPEATS ACTIONS | 3D PRINTED QUICKLY

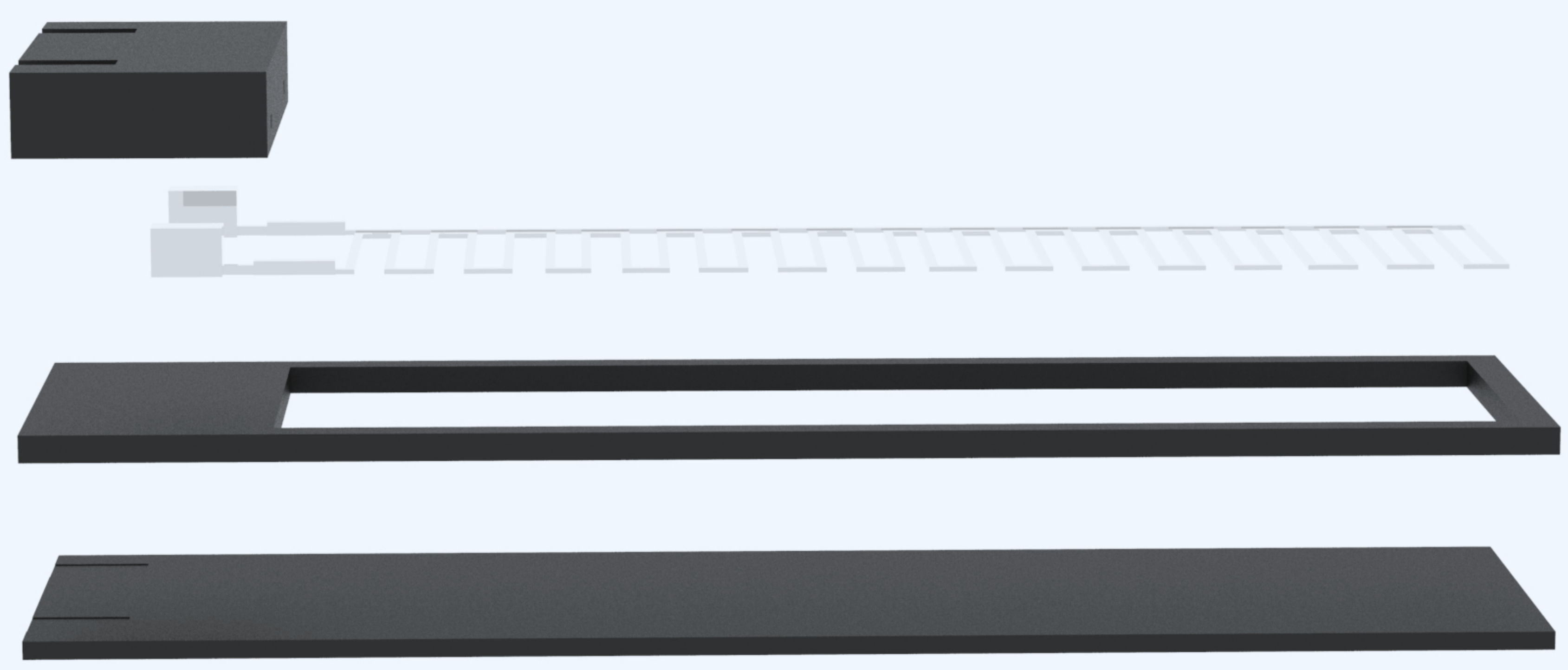
3D PRINTED THERMAL ACTUATORS

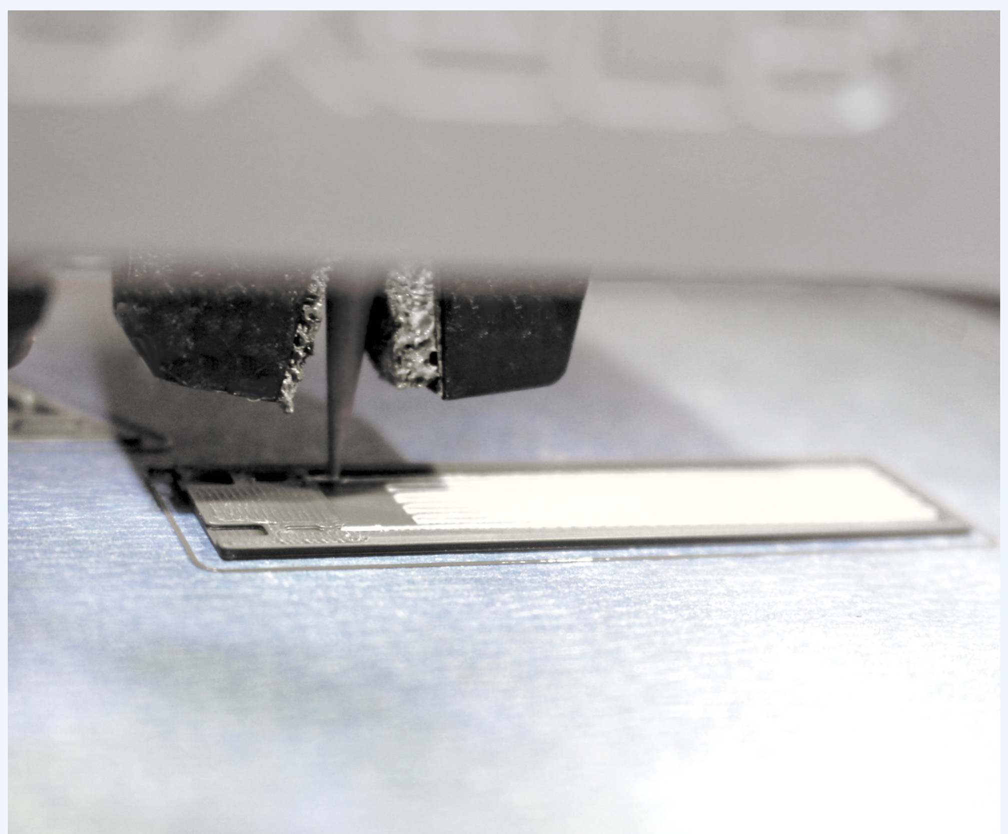
This project has been an exploration of 3D Printed Thermal Actuators (PTAs). The goal of the project was to create a 3D printed demonstrator that shows the qualities of PTAs.

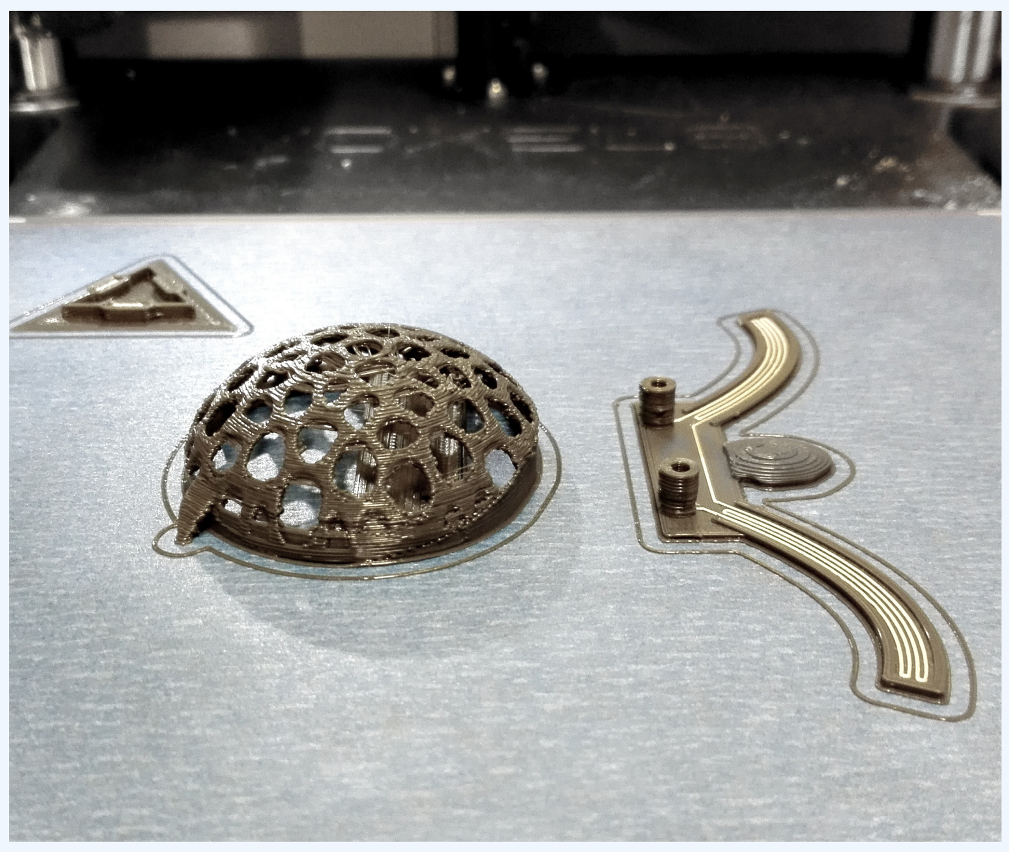
PTAs are created with a Voxel8 Multi-material printer which prints both PLA and a silver paste. When electrical power is applied to the silver trace, the plastic will heat up because of Joule heating in the silver trace the plastic will react to the heat by bending. This makes it an example of 4D printing. Compared to other 4D printed samples, PTAs have the advantage that they can repeat their motion. Additionally, PTAs are able to focus their energy locally, because of the placement of the silver traces. A PTA consists out of four different elements; a rim, a base, a silver trace and a connection to the power source. Designing a well working and predictable PTA takes some practice.

The movement of a PTA consists of three different stages; thermal expansion, transition and relaxing. When the PTA crosses the transition temperature because of the amount of electrical power that is applied, the PTA will transition into the relaxing stage and behave differently than before.

The result of this project is the Turtle Tinybot. Placing the active part, containing two PTAs under an angle proved to be the best method to create locomotion.







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Integrated Product Design (IPD)

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