Master’s Thesis

Chair of Imaging and Computer Vision | RWTH AACHEN UNIVERSITY

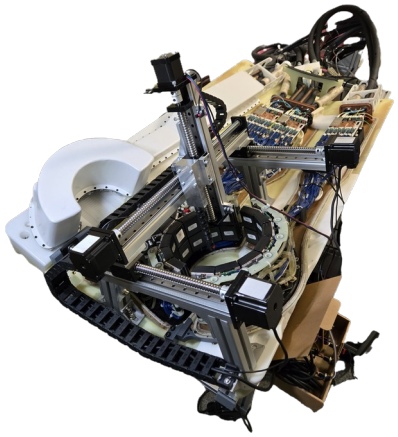
Low-Cost Precision Stage for PET Calibration

Design for desktop 3D printing and repair in a partner lab

The challenge

To calibrate a positron emission tomography (PET) scanner, we move a point source to known positions inside its bore. We want a partner lab to be able to build the stage on a modest budget and restore its accuracy after a repair.

You will design and build one portable XYZ stage. Decide where a locally printed mount or source holder can save money and where a part needs the stiffness or wear resistance of a standard rail, bearing or drive.



HYPMED scanner and motorized source stage at RWTH

Your tasks

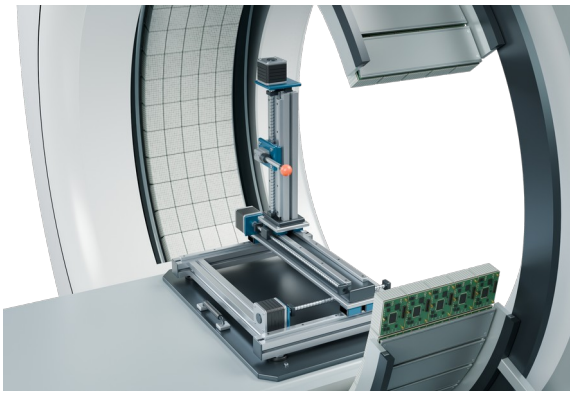
Design for local manufacture. Use a desktop filament printer for custom parts and common tools for assembly. Record hardware and filament costs, print hours and assembly time.

Build reliable motion. Protect moving cables and make wear parts accessible. Implement homing, travel limits, logged moves and fault recovery.

Verify positioning. Measure source-holder error and repeatability against an independent reference. The goals are ≤0.5 mm error and about 600 mm travel per axis.

Test wear and repair. Run repeated trajectories with a non-radioactive dummy. Check for play and drift. Reprint and replace one part, time the repair and remeasure positioning error.

Hand over the design. Provide editable CAD, print files and settings, a costed parts list, control code and instructions for assembly and repair.



Crystals line the 780 mm bore. The cutaway exposes five readout boards at lower right.



Alternative cube-frame stage with overhead gantry

Your profile

You are a master’s student in mechanical engineering, mechatronics, robotics, electrical engineering or a related field. You enjoy CAD, 3D printing and finding out how precisely a mechanism moves. Experience with Python, stepper drives or embedded control is welcome.

Our offer

Our lab has several 3D printers for prototyping mounts and making spare parts. You can build on existing CAD designs and compare your prototype with our reference stage. A separate paid student-assistant role may be possible for additional work, subject to funding.

Apply to Julian Thull, M.Sc. · Research Scientist, PET Calibration

Send a short CV, relevant experience and your preferred start date to julian.thull@lfb.rwth-aachen.de.

Start by arrangement. Chair of Imaging and Computer Vision · Univ.-Prof. Dr.-Ing. Volkmar Schulz, Head of Institute