



AUTOMATED DEFECT ID & NOZZLE ALIGNMENT FOR AM REPAIR

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STUDENT PROFILE

We're looking for a self-motivated **automation, software focused mechanical/electronics, or practical computer** engineer. Who understands the challenges of soft/hardware integration. The interdisciplinary nature of the project will require you to research & learn outside of the group's expertise. The work is challenging, requires initiative, but will be valuable for careers in **robotics & vision-based systems**. You will need to stay organized & proactive. If you're up for a tough but rewarding project, we're excited to work alongside you.

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CORE SKILLS

Python



Computer Vision



Robotics



3D Scanning



Machine Learning



PROBLEM PRESENTATION

When we get a damaged part in for repair we need to do the following:

1. **Locate** the damage
2. Get its **dimensions** (length, width & depth)
3. Select a **machining strategy** to remove the damaged material
4. **Machine** a pocket in the part
5. **Align** the Cold Spray nozzle with the newly machined pocket
6. **Fill** the pocket with a predefined Cold Spray tool path

Currently this is **all done manually**, by an expert. It's expensive and time consuming which is holding Cold Spray back from being rolled out into all industries.

THESIS DESCRIPTION

Your work will start with aligning the part in the spray booth to the nominal CAD geometry, like [this](#). From there you will need to locate the defect on the part and pull its x, y & z dimensions. With this you will select a suitable machining strategy from a predefined list, which you'll work with a fellow master's student to create, similar to [this](#). Then the nominal geometry would need to be updated to include the new machined feature. Finally, the robot will need to be moved such that the Cold Spray nozzle is aligned with the start point of the predefined infill tool path. The cold spray tool path is defined and generated by your fellow master's student.

APPLICATIONS

At Giga Berlin, a recently fired Tesla engineer hurls a wrench across the factory in frustration. It lands with a sickening *clunk* against a multi-million-euro die, leaving a deep gouge in the precision-machined surface. Normally, this would mean weeks of downtime and a six-figure invoice for a new die.



But with Cold Spray, the damage is repaired within hours. No need for a full remanufacture, just a targeted metal buildup and machining pass. Tesla can keep production moving, no matter how many employees Elon upsets, thanks to Cold Spray.

BASIC INFORMATION

- Duration: 6-9 months
- Immediate start
- Experimental and numerical methods
- Practical & Hands On