

SparePartAssist

A **Research Project** supported by BMBF



Federal Ministry
of Education
and Research

„An Augmented Reality App supporting Service Technicians based on 3D Reconstruction and Object Recognition.“



Gesellschaft zur Förderung
angewandter Informatik e.V.



KEPLER
SOLUTIONS



htw

Hochschule für Technik
und Wirtschaft Berlin

University of Applied Sciences

Motivation

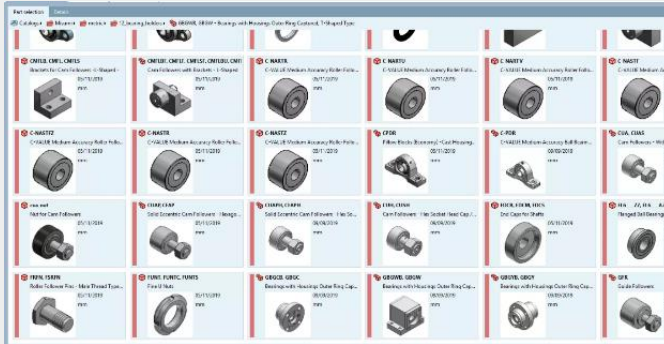
Service technicians cannot reliably determine the article number of an urgently needed spare part

- System documentation not available / up-to-date
- Component is installed or hard to access
- Part is heavily worn or partially destroyed

 **SparePartAssist recognizes components based on fragments of the geometry**



Constraints



Database

- Spare part catalog / system documentation including **CAD data**
- Dynamically changing
- > 1M parts
- Only approximated meshes without texture



Sensors

- Color and depth sensors of mobile devices
- **dToF** in iPhone / iPad Pro
- No access to raw data



Data acquisition

- **Occlusion** (part is installed)
- Harsh or bad lighting
- **Dirty** surfaces
- Reflecting surface
- **Low in texture**

Goal:

Geometry based Instance Level Recognition



Query Shape



Top 1 Result



2nd Best Match



3rd Best Match



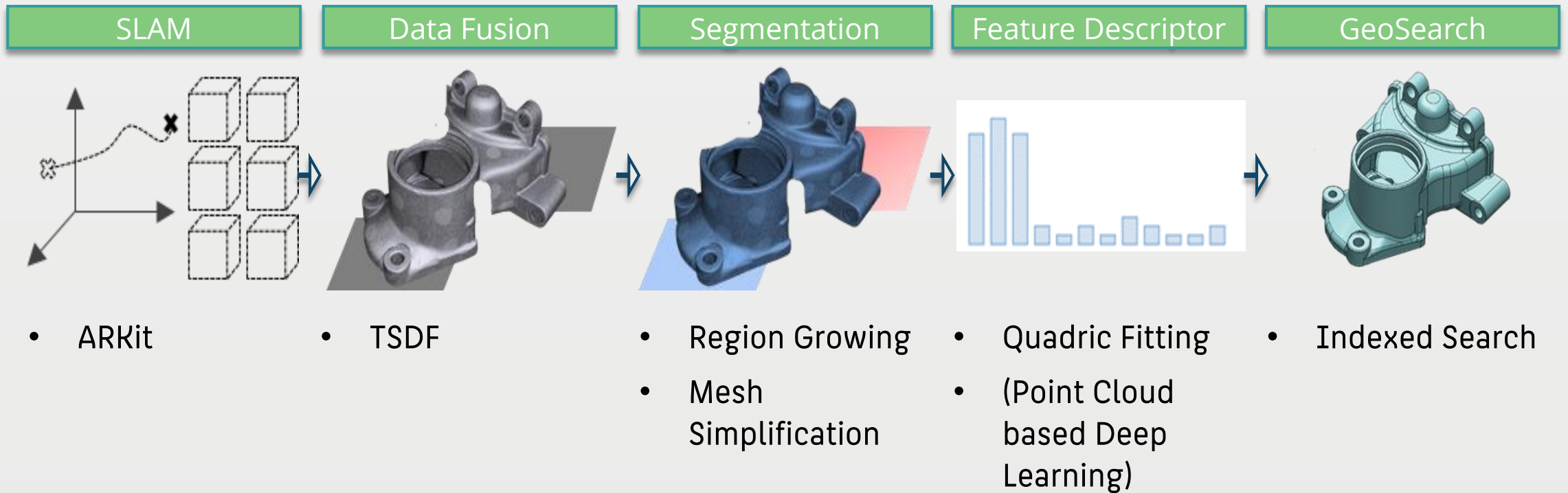
Input Data

- Fused and segmented 3D Data from depth images
- Incomplete due to e.g. occlusion
- Inaccurate, noisy data

Search Result

- Most similar shape in collection of CAD meshes
- Inaccurate due to approximation (polygons)

Process Strategy



The App



Search

Deep Learning enables more robust feature detection

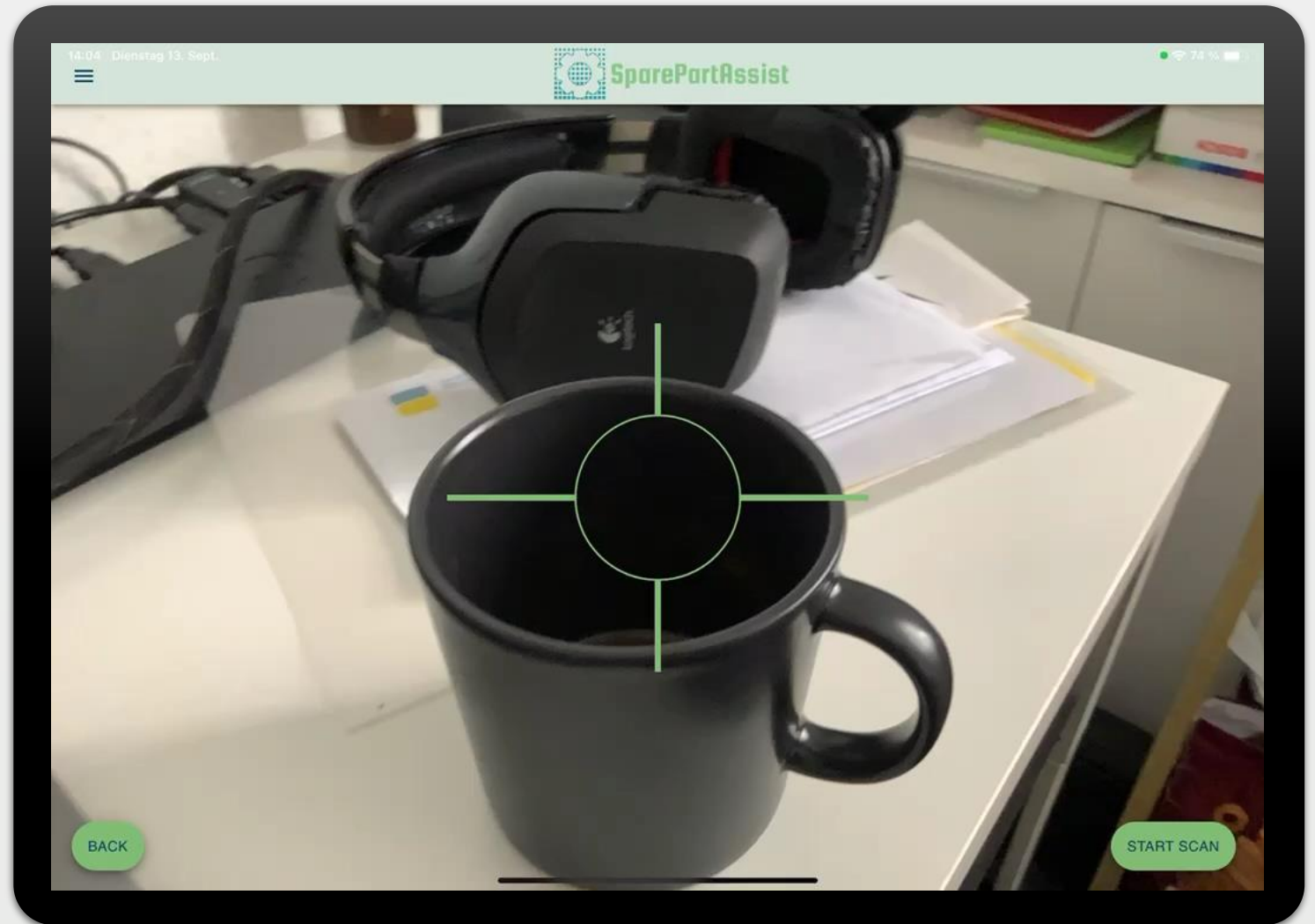
Approach is **PointNetVlad** based



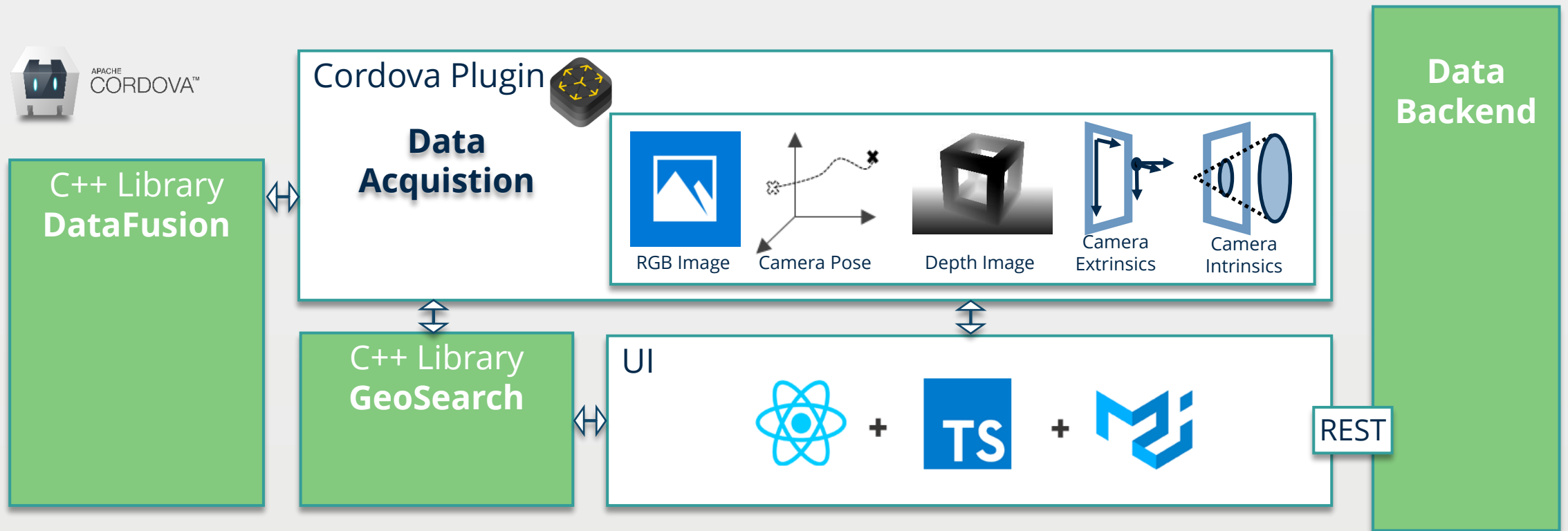
Search

Deep Learning enables more robust feature detection

Approach is **PointNetVlad** based



Software Architektur



Vielen Dank!

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