DigitAlign: Low-radiation Implant Planning without CBCT

AI-based 3D Reconstruction of Tooth, Crown, and Implant Axes from Surface Scans using SSM Models

Technology

The process generates statistically supported representations for tooth axis, tooth crown, and implantation axis from a digital 3D surface scan (intraoral scan or digitized plaster model), by registering and parametrically adapting suitable Statistical Shape Models (SSM) to the individual patient surface. The SSM-based reconstruction replaces volumetric information from CBCT by probabilistic, anatomically plausible 3D estimations of the relevant axes and crown geometries, directly from the surface model.

For plausibility control, the determined axes can be projected onto a 2D radiographic overview (e.g., panoramic x-ray) to enable rapid visual validation without additional 3D imaging.

Innovation

- CBCT-free planning: Derivation of the implantation axis from SSM-enriched surface data
- Parametric anatomy: Use of statistical shape models allows robust axis determination, even for partial or artifact-prone scans
- Multimodal plausibility: Optional overlay with panoramic x-rays for quick, practical control of axis location using 3D-2D-registration
- Software ecosystem: Implementable as a stand-alone tool, as a module for existing CAD/CAM workflows, or as a cloud service with an integrated surgical-guide export function

Application

- Preoperative planning of single- and multi-stage implant insertions in dental and maxillofacial surgery practices and centers, especially for partially dentate patients.
- Chairside planning in digital practice workflows, based on intraoral scans and digitized plaster models.
- Cost-sensitive settings and radiation-sensitive patient groups where 3D volumetric imaging should be avoided or minimized.

Development Status

- Functional principle

Responsible Scientist

PD Dr. Brandenburg, et al

Medical Center Freiburg,
Dept. of Otorhinolaryngology -
Head and Neck Surgery

Branche

Digital dental medicine,
Implant planning

Patent Status

DE granted, EP, US pending

Earliest Priority Date

10.01.2022

Reference Number

ZEE2021052600

Status: Nov 25

Contact
Dr. Kathrin Lauckner
Campus Technologies Freiburg GmbH
Stefan-Meier-Str. 8 | D-79104 Freiburg
Email: kathrin.lauckner@campus-technologies.de
Tel: +49 (0)761 203-5017
Fax:+49 (0)761 203-5021