



Project Management and Software Development  
for Medical Applications (PMSD)

Needle tracking for ultrasound-guided  
biopsies with inside-out vision

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## Thomas Sennebogen

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- ◆ Student at TUM
- ◆ Master in Computer Science
- ◆ Main focus: Robotics & AI, Software Engineering
- ◆ 7.6.1993 (22)
- ◆ Bachelor thesis: „Being Roboy – Immersive Embodiment of a Robot using Oculus Rift HMD“
- ◆ Lab Course:  
Project Management and Software Development  
for Medical Applications
- ◆ I like: Entrepreneurship, Startups, Silicon Valley,  
Science, Fitness Training, Bouldering, Superbowl,  
Financial Trading



# Needle tracking for ultrasound-guided biopsies with inside-out vision

Sentinel Lymph Node Biopsy

Tracer Injection

Lymph Node

Punch Biopsy with Ultrasound

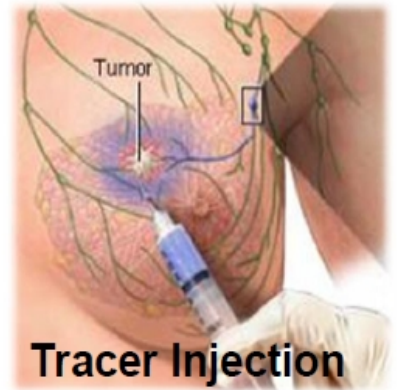
Problem: Needle location difficult in 2D US image

Solution: Needle tracking and real-time visualization

Less insertions

Analyse the right cells

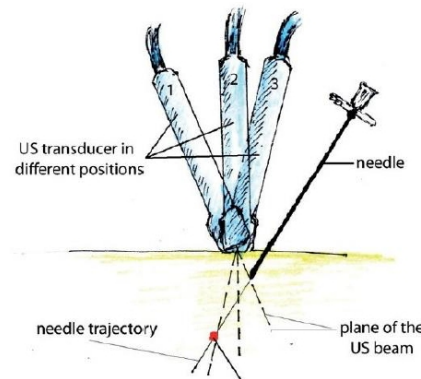
Better healing process



Tracer Injection



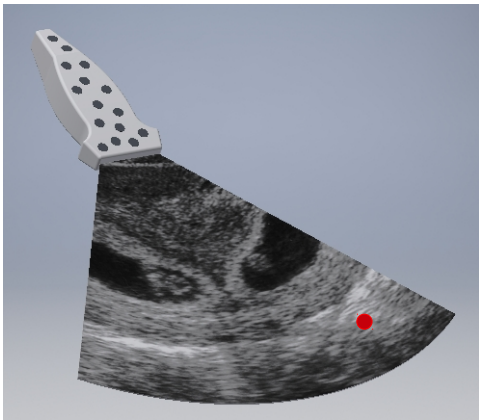
Biopsy needle



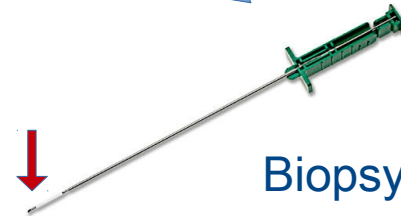
Ultrasound and gamma



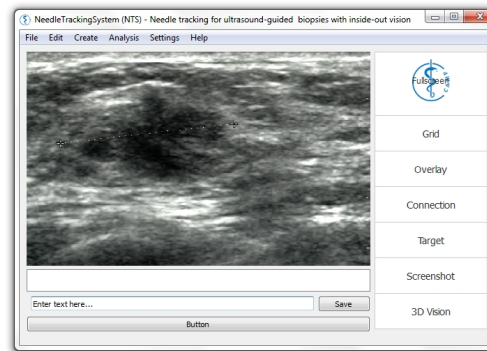
Ultrasound Transducer



Optical Tracking System (OTS)

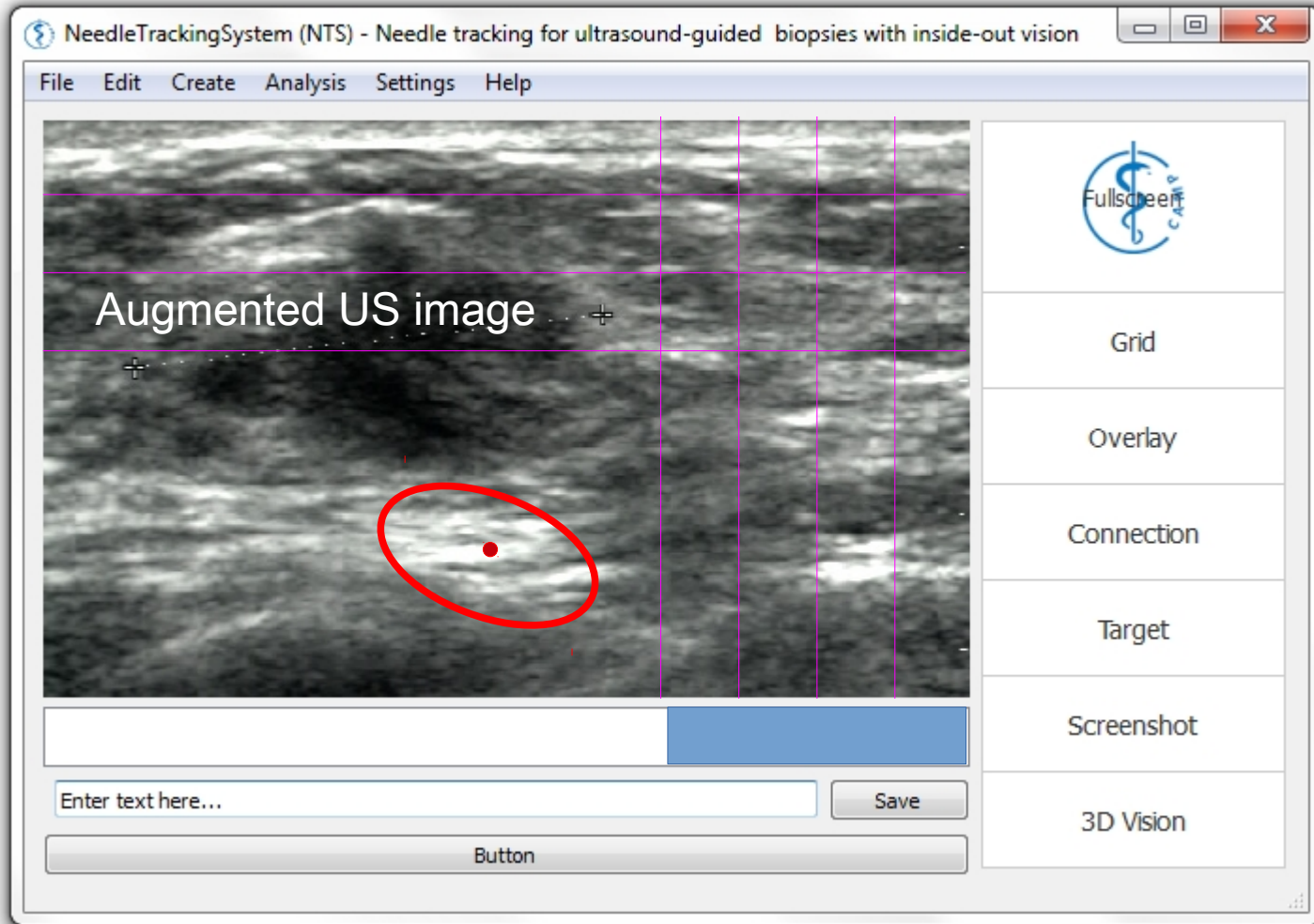


Biopsy Needle



Needle Tracking System





OpenIGTLink



