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2023

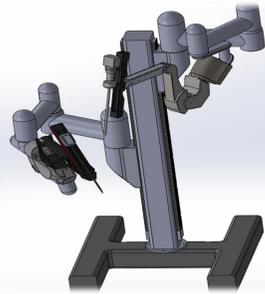
Tracking & estimation of surgical tool pose based on the vision system for surgical robot

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Aim & Objectives

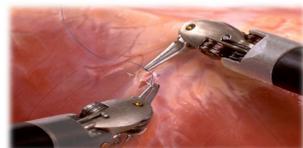
- This research presents a Virtual Dynamic Tri-crossbar and a Virtual Stable Graph (VDT-VSG) which simplifies the task of tracing the needle angle and location.
- Tool detection
- Tool tracking
- Tool pose & angle estimation



Customized Surgical Robot

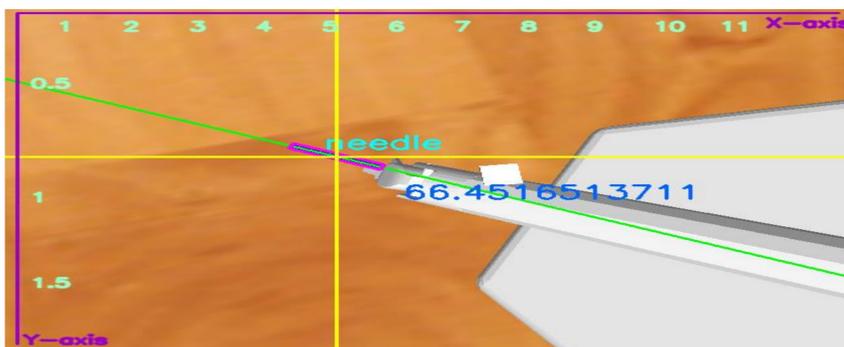
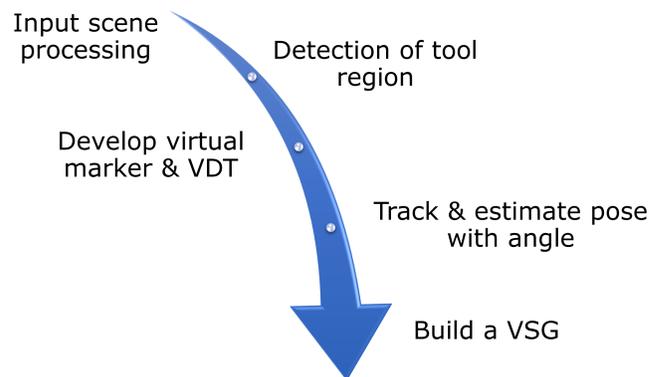
Problems

- Tedious to detect & track micro range tool
- Challenging to work in different illumination
- Limited field of perspective
- Complex eye-hand coordination



Stitching Operation [1]

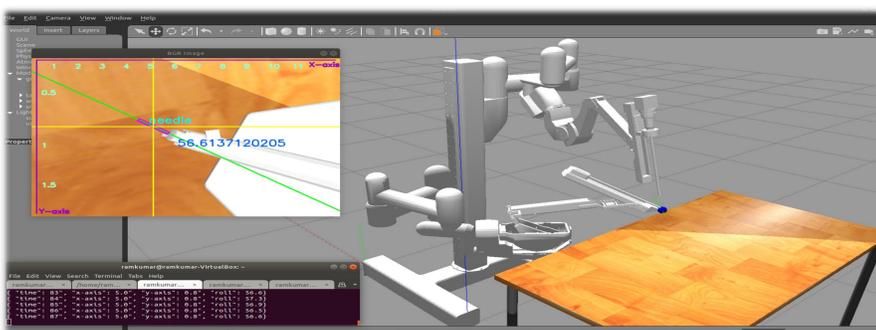
Algorithm



Processed Scene Output

Simulation

- Robot Operating System (ROS) was utilized as middleware to process & obtain data from Gazebo simulation platform.



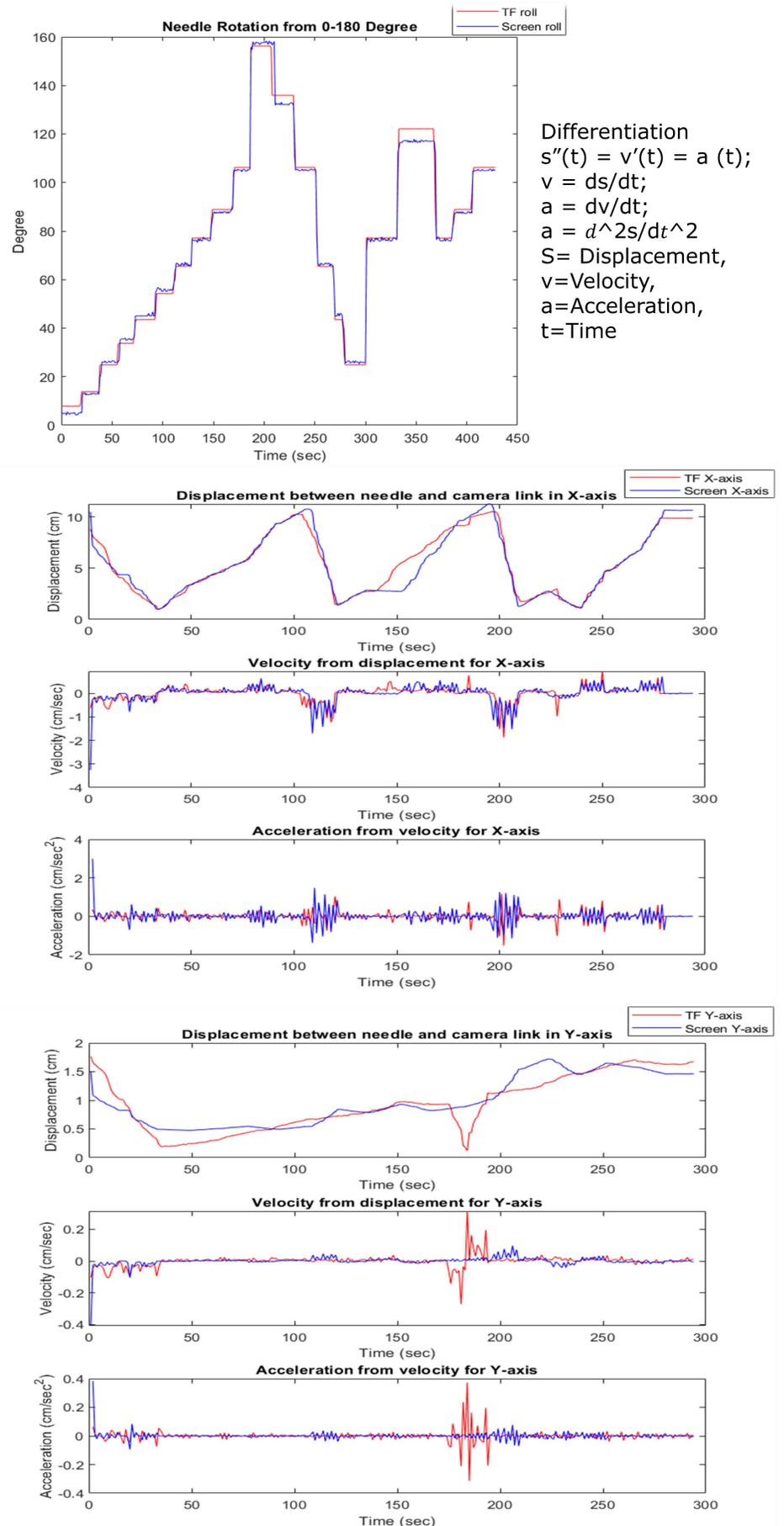
Simulation Output

Applications

- Tracking in cell and development biology
- Autonomous/semi-autonomous surgical robots
- Sensing in surgical operations using vision.

Results

- Using the following calculation scalar data like velocity and acceleration are obtained from vector data (displacement w.r.t time (seconds)).



Reference

[1] https://www.google.co.in/url?sa=i&url=https%3A%2F%2Frobots.ieee.org%2Frobot%2Fdavinci%2F&psig=AOvVaw0zu4WGXZtIEZCOva1yT3&ust=1670105968654000&source=images&cd=vfe&ved=0CBAQjhxqFwoTCIjbs8792_sCFQAAAAAdAAAAABAj