# Debugging Documentation

# for

# Reinforcement Learning Environment for Robotic Suturing

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## Debugging Issue

| **Issue** | **Resolution** |
|---|---|
| Import errors with forked surgical robotics challenge | Changed SRC imports to backtrack to forked version; Developed req.py for installing all necessary modules |
| Very slow rendering of AMBF simulation | Turn off visualization when running ambf simulator executable with '-g 0' flag; Created simple render function that prints locations of each component |
| Compatibility of ROS / AMBF with Mac (specifically with Silicon chip) | Manually fix import statements, add https://raw.githubusercontent.com/torvalds/linux/master/arch/x86/kvm/cpuid.c to directory |
| Frame transformations between different coordinate frames (needle to world) | PSM base already in world coordinates; Use Blender software to click parts of components and get relationship within needle; Use Needle Kinematics for computation of frame transformations of needle to world |
| Difficult to test step() function | Record ideal trajectories in lab and ensure that PSM performs same suturing movement as recorded |
| Jittery PSM movements | Multiply step defined by RL environment with dt linearly scaled to simulation time steps; run AMBF at slower simulation speed |