

# Thesis Topic and Supervisor Declaration Form (2022-23)

Please complete this form by September 23rd, 2022. This form outlines your proposed thesis topic and supervisor name for divisional approval. Students who submit this form late will receive a 1% deduction from their final thesis course grade.

## Your Information

### 1. Full name

### 2. Student Number

### 3. Option



### 4. What section of the course are you enrolled in?



ESC499H1F (Fall)

☒ ESC499H1Y (Year)☐ ESC499H1S (Winter)

## Information about your Supervisor(s)

Please note: At least one thesis supervisor must be a UofT professor. If you do not have a UofT professor for your project please contact one of the course coordinators, Professor Alan Chong ([alan.chong@utoronto.ca](mailto:alan.chong@utoronto.ca)) or Professor Lisa Romkey ([lisa.romkey@utoronto.ca](mailto:lisa.romkey@utoronto.ca)).

### 5. Supervisor Last Name

### 6. Supervisor Email Address ([utoronto.ca](mailto:utoronto.ca) or institutional email if possible)

### 7. Supervisor Department



### 8. Do you have a second supervisor?

☒ Yes☐ No

### 9. Co-supervisor Last Name

Gondokaryono

10. Co-Supervisor email address ([utoronto.ca](mailto:utoronto.ca) or institutional email if possible)

radian.gondokaryono@mail.utoronto.ca

11. Co-Supervisor Department (or Institution if outside UofT)

Other



Mathematical and Computational Sciences (UTM)

## Information about your Project

12. Please provide a working title (This can be changed, as needed, later in the term)

Robot Simulation and Control Framework Using 3D Slicer and a Collaborative Robot

13. Please provide a brief description of your proposed topic (150 words max.)

Joint use of image-guided surgery systems and medical robots is becoming increasingly common. Applications range from robot-assisted knee replacement (e.g. Stryker Mako) to microscope-guided brain surgery (Synaptive ModusV). For future advancements in research and education, the thesis project will combine a collaborative robot (Franka) with image-guidance software (3D Slicer) and Artificial Intelligence methods. Open-source codebases 3D Slicer and robot operating system (ROS, ROS2) will serve as foundation for the software development. ROS includes features for robot kinematics, simulation, and motion planning. 3D Slicer has been proven to work with ROS through the Image-guided Therapy Link (ROS-IGTL-Bridge). After the initial development of combining 3D Slicer with the Franka robot, an AI related research component will be implemented. Possible ideas include camera-based detection of anatomical or artificial landmarks for elastic registration, a reinforcement learning based method to control

14. Through consultation with my supervisor, I have reviewed the relevant safety training policy. Based on my project, department, or supervisor, I will require safety training.

☒ Yes

☐ No

15. Please briefly outline your plan to complete Safety Training (eg. Chemical Engineering safety modules, WHMIS course, Supervisor led safety training). We may be in touch later in the term to confirm that you have had safety training.

For the beginning there will be no need for safety training. However, robot use might be dangerous

16. My research will involve human and/or animal subjects.

☐ Yes

☒ No

17. Does your thesis work involve an industry partner or co-curricular student group?

☐ Yes

☒ No

18. I am prepared to complete my thesis work remotely, if necessary. \*We will be following up before approving any project without a remote plan.

☐ Yes

☒ No

## 19. Do you have any questions for the thesis course coordinators?

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