Mitacs Globalink 2023 - Research Project Plan

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Project ID:	30145
Project Title:	Collaborative Robot Arm Software Development
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Intern Name:	ANDRES HOLGUIN RESTREPO

Project Goals:	The goals are to design, program (in c/c++) and experimentally test robot software for collaborative tasks performed by a robot and human. This will require learning and applying 3D vision, kinematics and control algorithms to collaborative robot arm(s).
Student activities and timeline:	Student activities and timeline: 1. Learning how to safely operate the lab's robot arms (onboarding) – 1 week 2. Study the existing c++ code (onboarding)– 2 weeks 3. Coding to improve the registration of the RGB-D camera and robot coordinate systems – 1 week 4. Coding for hand-pose and gesture recognition – 2 weeks 5. Coding for target object pose recognition – 1 week 6. Coding for object grasping by robot – 1 week 7. Coding for object handover to human – 1 week 8. Robot-to-human and human-to-robot handover experiments and code refinement – 2 weeks 9. Writing final report (offboarding) – 1 week 10. Meetings and sharing research results – weeks 1 to 12 (continuous activity).
Deliverables:	The main milestones are: 1. Demonstrating the hand-pose and gesture recognition. 2. Demonstrating the object pose recognition and grasping. 3. Demonstrating robot-to-human and human-to-robot handover tasks. The final deliverables are the simulation code (Matlab m code); c/c++ code for controlling the robot; and a final report documenting the research done, and how to use the codes.
Interaction:	The student and supervisor will communicate daily either in-person or online. The student will email the supervisor a written progress report every Friday. The supervisor will provide advice and feedback orally and in writing.

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