**Purpose of Intent to Develop Endoscopic Ear Surgical Instruments for a Master’s Research Project**

**Objective**: To build upon the Capstone design project to develop modifications for surgical instruments intended for use in endoscopic ear surgery. In order to develop optimal instruments, the following technical aspects will be prototyped and tested:

* Utilize suction to pick up objects (like a graft) to orient and place them in the desired location within the middle ear with ease. This aims to eliminate the need for multiple instruments to maneuver and orient the graft.
* Spring-loaded or track-guided mechanisms that move along the instrument (such as the Rosen Needle) to push off objects that have been impaled on the tip. This would be a continuation of the prototype developed for the Capstone project.
* Optimizing bend angle geometry of instruments to gain access to hard to reach places. This is especially useful in cholesteatoma surgeries where it is difficult to reach certain areas in the middle ear to remove the cholesteatoma.
* Manipulating bend angle geometry of ‘mirror-tip’ instruments to allow the endoscope to show “hidden” areas in the middle ear.
* Explore different ‘gripping’ mechanisms such as the ‘alligator’ mechanism on the end of the angled tools to make it easier for the surgeon to pick up and hold onto the cholesteatomas as they are being removed.
* Incorporate suction with the endoscope and other instruments (such as the Rosen Needle) to manage bleeding while maintaining visibility and maneuverability of instruments within the ear canal.

The proposed designs are ideas that have been discussed during Capstone group meetings. I think that there are many designs that can be explored to develop robust, reliable and more effective instruments for endoscopic ear surgery. The capstone project timeline is not long enough to allow these ideas to develop into high-level prototypes that would be machinable. I would like to take the Capstone project further, and develop these tools with your feedback in an attempt to make endoscopic ear surgery a more feasible and effective way of performing ear surgery.

A long term goal would be to combine some of the functional technical aspects to develop multifunctional tools.

During my internship of 16 months at Baylis Medical Company, a medical device company, I was involved in testing and de-bugging components and manufacturing processes of a mechanical medical device. I worked with a team of engineers and production operators who would be the users of the manufacturing processes. I developed skills in 3D modeling software and basic machining for prototype development. These skills will enable me to design these instruments and identify the bugs in preliminary prototypes in order to design robust final prototypes that are functional and reliable for surgical use.

Should this research project work out, I intend to apply for NSERC and CIHR grants in order to try and fund some of the project.