Summary of Proposal (1500 words) – for the public to see

**Development of Surgical Instruments for Endoscopic Ear Surgery**

Imagine a world where all surgeries are performed minimally invasively, imparting less trauma to the body and enabling faster recovery. Middle ear surgery is performed either via microscope, which requires an incision, or with an endoscope, which is minimally invasive and achieves similar results. In transcanal endoscopic ear surgery (TEES), an endoscope travels through the ear canal and provides visualization for the surgeon to perform middle ear surgeries. Instruments are required that enable grip and manoeuverability of objects and accessibility within the middle ear.

TEES requires one-handed surgery and extensive training. These shortcomings have hindered the use of TEES and will be addressed by this project which aims to develop specialized instruments for TEES.

Tools will be designed to improve grip and manoeuvrability of synthetic grafts and enable accessibility in hard to reach places within the middle ear. This will be done by manipulating angular geometry, adding pushing mechanisms and adding suction capabilities to increase control during TEES, thereby easing one-handed surgery and training.

Development of the tools will follow an iterative engineering design process. Initial prototypes will be 3D modeled on Solidworks and fabricated by 3D printing or machining and tested on 3D ear models.

Developing instruments specialized for use in TEES would ease one-handed surgery, reduce required training and thus enable more surgeons to adopt this minimally invasive technique. These instruments could also be applied to other minimally invasive surgeries such as spinal, nasal, spinal and gynecological.