

# Integrated, Retractable Endoscopic Suction (iRES)



**Fraunhofer CMI is seeking commercial partners to license and market an integrated suction and irrigation add-on system for rigid endoscopes.**

## OVERVIEW

Endoscopic surgery has revolutionized how we surgically treat many diseases by reducing both surgical time for procedures and recovery time for patients. However, these operations are hampered by the perpetual need to clear the view of the endoscope. Debris produced from surgical manipulations (blood, smoke from cauterization, other fluids and tissue debris) persistently obscure the field of view. When space or the number of entry points is limited, working instruments must be repeatedly removed and suction instruments inserted to clear the area. It may also be necessary to remove and clean the scope itself, forcing the surgeon to relocate the proper view over and over again. We seek to alleviate these problems and increase the efficiency and effectiveness of endoscopic surgeries by combining key functions into one device, which can be operated with a single hand. By minimizing the number of tool changes, this device could reduce both procedure time and infection risk for hospitals and clinics.

## TECHNOLOGY

We have developed an integrated suction and irrigation add-on system for rigid endoscopes (named “iRES” for integrated retractable endoscopic suction). Unlike any device currently on the market, the suction tube extends into the field of view when suction is applied, leaving the view unchanged and allowing the surgeon to work and apply suction simultaneously. Suction then turns off when the tube is retracted. If needed, irrigation can be applied through the space between the endoscope and device sheath to flush debris from the lens and restore visibility. We believe that our universal iRES device could be applied to endoscopic sinus and skull base surgery, arthroscopic, laparoscopic surgeries, and other forms of endoscope-based surgery.

## FEATURES OF MERIT

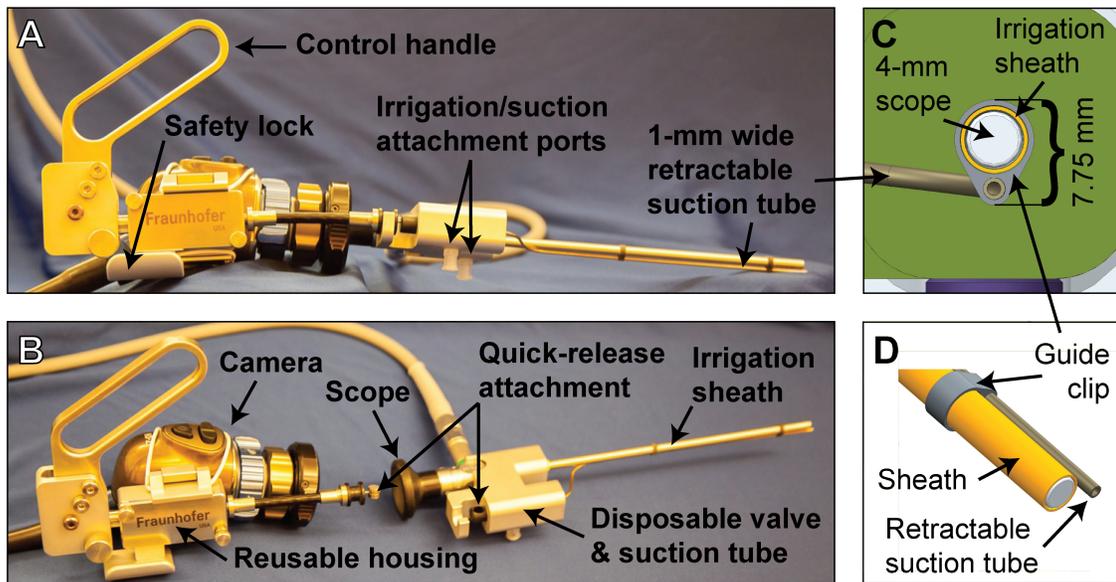
- Suction tube extends and retracts within scope view.
- Scope view is unchanged during matter removal.
- Intended to be universally attachable to existing endoscopic setups.
- Telescoping action is precise and adjustable.
- One-handed, ergonomic design allows all controls to be accessed from a single grip.
- Valves and tubes are disposable.

## MARKETS & APPLICATIONS

- Endoscopic skull base surgeries
- Sinus surgeries
- Minimally invasive neurological or cardiothoracic surgeries
- Laparoscopic surgeries
- Arthroscopic surgeries

## STAGE OF DEVELOPMENT

A collaborative effort between Dr Devaiah, Dr Sauer-Budge, and engineers at Fraunhofer CMI has produced a functioning iRES prototype (Figure 1A). The prototype was designed from the ground-up starting with design requirements set forth by Dr Devaiah, an expert in endoscopic ENT surgery. As shown in Figure 1C, the suction tube of the device runs along the length of the irrigation sheath, minimally increasing its diameter. This tube extends into the field of view when suction is activated, allowing the surgeon to watch the tip, and retracts when not in use to the edge of the field of view. Once the device was fully assembled, irrigation and suction of water were tested at CMI, and found to be satisfactory. The finished prototype was then taken to the clinic for initial testing. The device was connected to a camera and the extension/retraction view through the scope was tested on a skull model (Figure 2). We envision that our final device would be used for small-diameter applications, and would have a reusable, autoclavable unit (handle, housing, actuator) and a disposable unit (suction tube, irrigation sheath, ports and valve) (Figure 1B). A second-generation prototype is in development.



**Figure 1.** A functioning prototype has been designed, built, and tested. Photographs illustrating various features of the iRES prototype (A&B). Panels C&D show views of the device tip including the retractable suction tube, irrigation sheath, scope and guide clips.

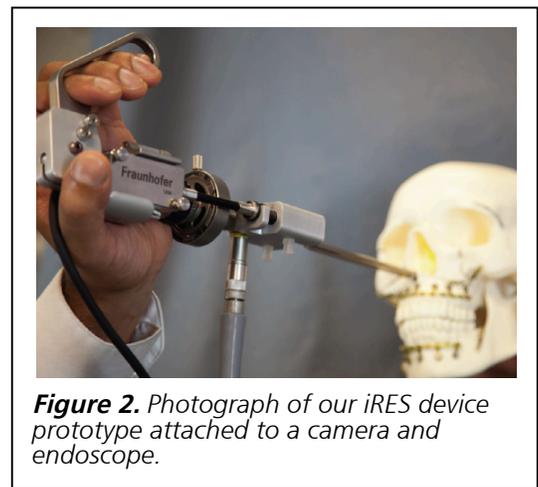
## INTELLECTUAL PROPERTY STATUS INFORMATION

Inventors: Alexis Sauer-Budge, Holger Wirz, Yuzhang Yang, Stephanus Johannes Marcellis van der Kemp, Anand Devaiah, and Andre Sharon  
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**Figure 2.** Photograph of our iRES device prototype attached to a camera and endoscope.

