

Bedside Disposable Endoscope

Summary

The Disposable Endoscope with Intrinsic Pneumatic Actuation (DEIPA) is a self-contained device intended for rapid diagnosis of the UGI tract. It consists of a user interface with a continuum manipulator architecture, steerable tip using parallel bellow actuators, and flexible multi channels catheter.

The DEIPA is low-cost (< 80 GBP), intuitive to manipulate, and successful at achieving large viewing angles ($\beta_{\text{max}} = -17^\circ$, α ranging from 0° to 360°) which are crucial for effective examination of the upper GI tract. DEIPA holds promise for non-traditional setting endoscopy with the potential to reduce cost and need for sedation.

Addressed Need

Bedside assessment of the upper gastro intestinal tract with no sedation needed. (e.g. esophageal varices screening, gastroesophageal reflux disease non-responsive to medical therapy, suspected upper gastrointestinal (GI) tract bleeding, and dysphagia, gastric cancer screening)

- Upper endoscopy diagnostic exams
- Lower endoscopy diagnostic exams
- Abdominal surgery (low cost laparo-endoscope)
- Decrease patient sedation-related adverse event.
- Triage management tool to assess patient status.
- Tool for gastric cancer screening program in low middle income countries

Technology Description

This self-contained device (no specialized unit necessary and no need for sedation) is intended for rapid diagnosis of the upper gastrointestinal (GI) tract and consists of a user interface mechanism, a stiff and flexible instrument body, and a steerable tip. Both the interface mechanism

and steerable tip have continuum robot architectures; however, there is no external actuation needed, instead the steerable tip is mechanically actuated to mimic the shape of the interface. The interface mechanism is referred to as the "controller", while the steerable tip is referred to as the "manipulator". The user, by actuating the controller, is able to intuitively control the distal miniaturized manipulator at the tip that mimics the imposed configuration (viewing angles) of the controller.

Unique Features

- Intrinsic mapping: the manipulator (continuum) mimics the controller's configuration (continuum)
- This is the first disposable endoscope for rapid upper-gastrointestinal tract evaluation
- Intuitive control resulting from the intrinsic mapping. A traditional endoscope contains actuating wheels that steer the endoscope's tip. There is no intuitive mapping between a wheel-driven interface and a resultant shape of a continuum tip.
- The ability to be utilized at the patient's bedside—outpatient office setting, inpatient hospital ward, etc. (not solely in the OR, Endoscopy Suite, ED, or ICU).
- Self-contained unit—one package; no need for a large "cart" with monitors and multiple large pieces of equipment to transport

Intellectual Property Status

- US Patent Application Filed: [US 20200015657A1](#)
- EPO Patent Application Filed: [EP 3576596A1](#)
- China Patent Application Filed: 201780085425.9
- India Patent Application Filed: 201917026449

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