



# Endotracheal intubation with computer vision

**A machine learning-based intubation tube for autonomous or computer-assisted endotracheal intubation.**

**IP Status:** PCT Pending; **Application #:** PCT/US2021/072292

## Applications

- Endotracheal intubation
- For use in hospital, ambulance, or remote/battle-field intubation

## Key Benefits & Differentiators

- Reduces airway trauma, unfavorable hemodynamic response to intubation
- Enables endotracheal intubation even if fluid present in airway
- Incorporates spatial orientation and depth of perception provides relative anatomy of airway
- Increases precision and is user-agnostic

## Technology Overview

Endotracheal intubation - placement of a flexible tube in the windpipe - is a challenging and potentially traumatic procedure that requires significant expertise. Improper intubation procedures can lead to severe post-operative pain, vocal injuries, and tracheobronchial injuries that could lead to severe morbidity and mortality. Current injury mitigation strategy includes time-consuming preoperative examination (including medical history such as airway pathology, reflux, etc.) and planning, and heavy reliance on the experience of the healthcare professional.

Anesthesiologists at the University of Minnesota have conceptualized a novel intubation device that navigates from the top of the mouth or the nose to a patient's trachea with the least amount of human guidance. Using the combination of computer vision and machine learning, this device will be able to crawl through the airways bypassing any natural as well as unforeseen/abnormal obstructions (such as epiglottis, blood clots, contusion, vomitus, etc.) By incorporating depth and spatial perception along with improved vision by means of widening the field of vision and capturing the relative anatomy, we postulate that an inexperienced operator can intubate efficiently and with ease. Better maneuverability would also reduce unfavorable hemodynamics such as tachycardia and hypertension from excessive pressure applied on the airway structures associated with laryngoscopy, making it more tolerable in patients with coronary artery disease. This device also reduces trauma that can further compromise the airway, the need for intervention, and additional costs to the system.

## Phase of Development

**TRL: 2-3**

Researchers have demonstrated proof of concept.

## Desired Partnerships

This technology is now available for:

## Technology ID

2020-389

## Category

Engineering & Physical Sciences/Instrumentation, Sensors & Controls  
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Life Sciences/Diagnostics & Imaging  
Life Sciences/Medical Devices  
Software & IT/Artificial Intelligence

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### **Researchers**

- [Tjorvi Perry, MD, MMSC](#) Associate Professor, Department of Anesthesiology