H T I C

Healthcare Technology Innovation Centre

Collaborate · Innovate · Impact

ADVANCING ENDOSCOPIC TECHNOLOGY

— A joint initiative of —

Indian Institute of Technology
Madras

Dept. of Biotechnology
Ministry of Science & Technology

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ABOUT US

Healthcare Technology Innovation Centre (HTIC), a multi-disciplinary Research & Development Centre, is a joint initiative of the Indian Institute of Technology Madras (IITM) and the Department of Biotechnology (DBT), Government of India that brings together technologists, engineers, doctors, healthcare professionals, industry and government to develop affordable healthcare technologies for the country.

HTIC since its inception in 2011, has grown into a thriving MedTech innovation ecosystem, by engaging with industry, medical institutions, and government to deliver cutting-edge healthcare solutions.

ENDOSCOPY

Special Focus Group at HTIC

We are a dedicated team of engineers, clinicians, and innovators focused on transforming endoscopic imaging. Our mission is to design and deliver advanced, patient-centric solutions that enhance precision, safety, and outcomes in minimally invasive procedures.

Over years of collaboration with clinicians and industry, we developed breakthrough imaging systems for endoscopy.

Vision

Redefine how clinicians see, diagnose, and treat — by bridging research excellence with real-world clinical needs.

Mission

To transform endoscopic procedures with innovative imaging technologies that empower clinicians and enhance patient care.

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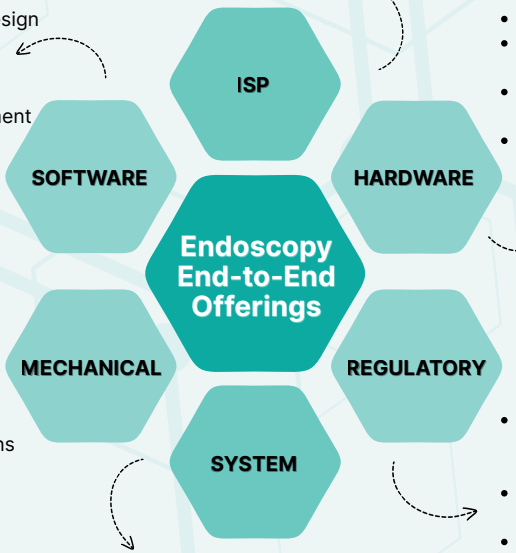
www.endo.hticiitm.org

- High Quality Video Stream Out with Enhanced Resolution and Dynamic Range
- Intelligent Algorithms for Enhancing Diagnostic Outcomes
- Multi-Spectral and AI Driven Imaging Solutions

- Software Architecture Design
- Interactive GUI and UX Optimization
- System Software Design
- Cross Platform Development

- Image Sensor Analog/Digital Front End
- Illumination Control System
- All Components of Video Processing System
- Complete HW Design and Development
- Comprehensive Production Support

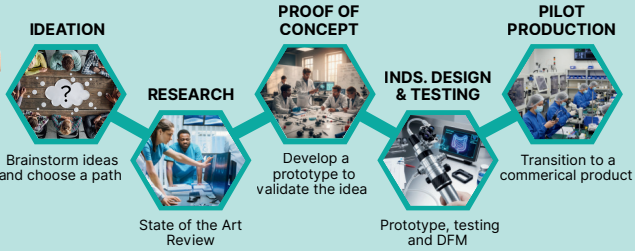


- Video Processor Unit Enclosure Design Solutions
- Scope Design Solutions
- Ergonomic & Energy Efficient Industrial Design
- Requirement Based Custom Designs

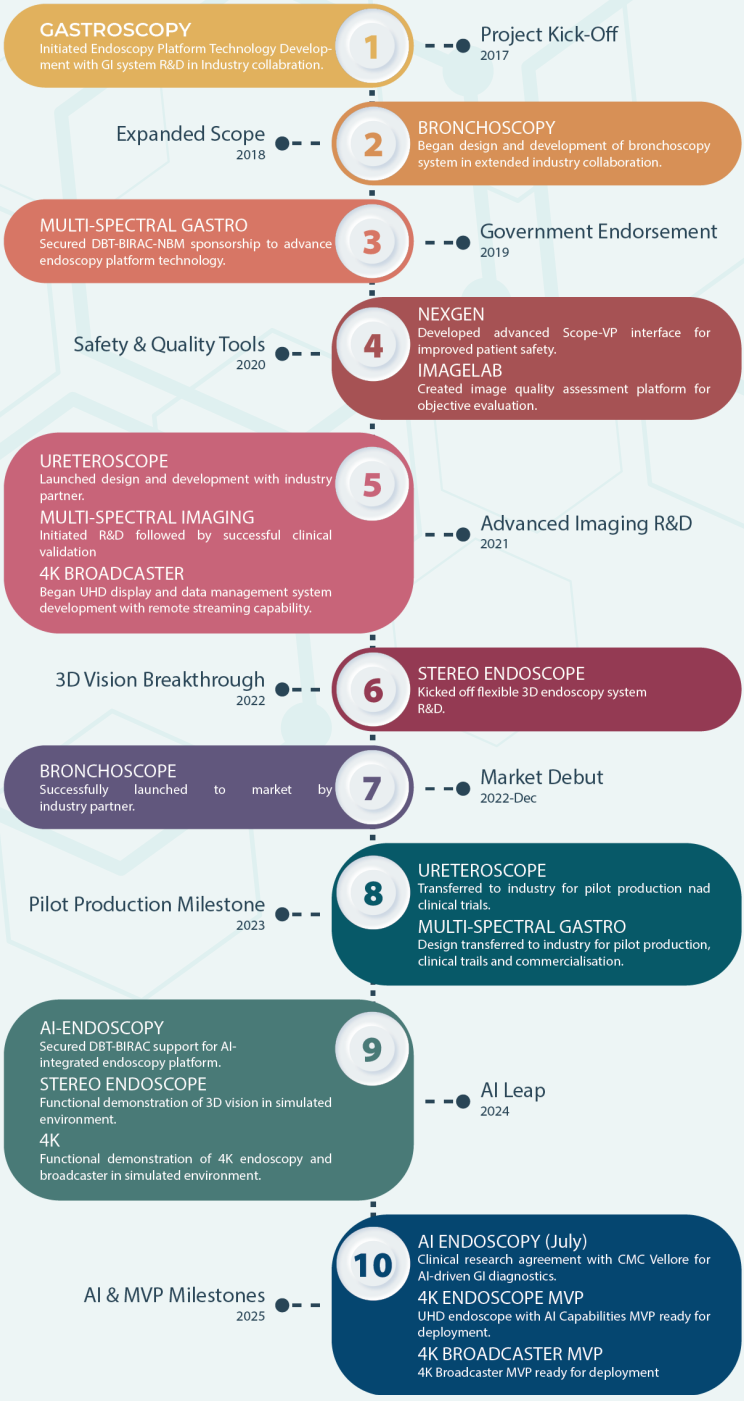
- Pre-Compliance, EMI/EMC Testing & Patient Safety Testing
- Medical Device Certification Consultancy
- Guidance for Ethics Committee Approval
- Clinical Trials & Validation Studies

- From Ideation to Commercialization
- Flexible and Modular System Architectures
- Heterogenous and Scalable Compute Platforms
- Optimised NRE and TCO

HTIC PRODUCT DEVELOPMENT CYCLE



ENDOSCOPY ROADMAP



IMPACTFUL TECHNOLOGY TRANSFERS

BRONCHOSCOPY SYSTEM

6 in 1 Connectivity
Compatible with Broncho, Pleura, Laryngo, Uro, Cysto & Cholangio endoscopes

Super Bright LED at TIP
Phosphor-coated LED for enhanced brightness and wide illumination

mBLU Imaging
Cutting-edge optical and light sensor for precise lesion and polyp detection

Capture to USB
Save images and videos directly to a pendrive

URETEROSCOPY SYSTEM

4 in 1 Connectivity
The Video Processor is compatible with Uretero, Cysto, Cholangio and Arthro endoscopes

Disposable Insertion Tube
Single-use design ensures sterile and infection-free procedures

MVE Imaging and In-Built Data Acquisition
Enhances vascular/mucosal patterns visibility, has built-in data storage for video and image capture

Integrated Touch Display
10 inch Full-HD touchscreen for better usability and portability

GASTROSCOPY SYSTEM

3 in 1 Connectivity
Video processor supports FullHD+ Gastro, Colono and Duodeno scopes

Super Bright LED at TIP
Advanced phosphor-coated LED for brighter, wider illumination

mBLU Imaging
Advanced optical & digital imaging technology for accurate detection of lesions/polyps

In-Built Data Acquisition
Save images and videos directly to a pendrive

Integrated Touch Display
Integrated Touch display with interactive GUI for enhanced User Experience

AVAILABLE FOR LICENSING

ADVANCED 4K ENDOSCOPE VIDEO PROCESSOR

HIGHLIGHTS

3 in 1 Connectivity
Support for FullHD+ Gastro, Colono and Duodenoscopes, 4K Laparoscopes

Integrated Touch Display and 4K Output
Interactive GUI for control and 8 multi format display outputs with High Resolution for better visualization and diagnosis

In-Built Data Acquisition
In-built memory for image and video saving, retrievable using an external pendrive

Intelligent Diagnostic Assistance
AI enhanced diagnostic accuracy

- One System Any Scope
- AI-Enabled
- Scalable & Upgradable
- Multi-Format Display Outputs

APPLICATIONS

- Gastro/Colony/Lapro

AVAILABLE FOR LICENSING

COMPACT VIDEO PROCESSOR

HIGHLIGHTS

Connectivity
Support for Rigid Endoscopes

Multi Format Display Output
4 Display Outputs: 3× 4K Digital Video Outputs and 1× DVI Full HD Output

In-Built Data Acquisition
In-built memory for image and video saving, retrievable using an external pendrive

PIP, PAP and POP Output
Simultaneously view 1x 3G SDI input with Picture-in-Picture(PIP), Picture-and-Picture (PAP) and Picture-out-Picture (POP)

- One System Any Procedure
- Scalable & Upgradable
- Multi-Format Display Outputs
- Complete Scope Compatibility

APPLICATIONS

- UGI/LGI Endoscopy
- Ureteroscopy/Cystoscopy
- Bronchoscopy
- Laparoscopy

AVAILABLE FOR LICENSING

ULTRA PORTABLE VIDEO PROCESSOR

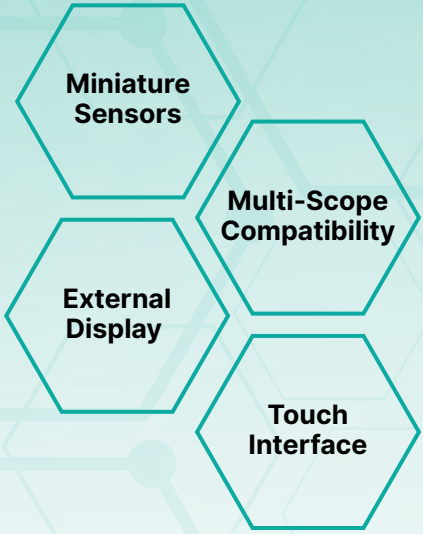
HIGHLIGHTS

Multi-Scope Compatibility
Supports Uretero and Broncho, extendable to Cholangio, Arthro, Cysto scopes

External Display Output
Supports an external medical monitor through HDMI when required

Lightweight Design
Easy to carry device with a powerful processing capabilities

Medical Grade Touch Display
10-point capacitive Touch display can also be used with gloves, enhanced user experience.



APPLICATIONS

- OPD Diagnostics
- Mobile Care
- Office Procedures
- Training

AVAILABLE FOR LICENSING

3D ENDOSCOPE VIDEO PROCESSOR

HIGHLIGHTS

3 in 1 Connectivity
Video processor supports Gastro, Duodeno, and Colonoscopes

Immersive VR Experience
VR integration to perceive gastro-intestinal tract in 3D for near-surgical vision and better depth visualisation

In-Built Data Acquisition
In-built memory for image and video saving, retrievable using an external pendrive

Size Measurement and 3D Reconstruction
Accurate measurement of polyp/lesion and 3D scene reconstruction using the depth information

- Unparalleled Depth Perception
- AI-Powered Assistance
- Future-Proof & Upgradable
- Customizable Viewing

APPLICATIONS

- Colonoscopy
- Duodenoscopy
- Gastroscopy

AVAILABLE FOR LICENSING

ADVANCED 4K MULTI-FORMAT VIDEO MANAGEMENT SYSTEM

HIGHLIGHTS

Multi Display Input and Output
2 display inputs - 2x Digital Video Inputs, 8 display outputs - 4x 4K Digital Video Outputs, 2x DVI Outputs and 2x SDI Outputs

In-Built Data Management and RTSP
High quality video and image data storage and retrieval, stream over IP for remote consultation

PIP, PAP and POP Output
Simultaneously view multiple inputs with Picture-in-Picture (PIP), Picture-and-Picture (PAP) and Picture-out-Picture (POP)

Display Resolution Upscaling
Upscales an input to higher resolution, Full HD to 4K for Digital Video Output and 3G to 12G in SDI

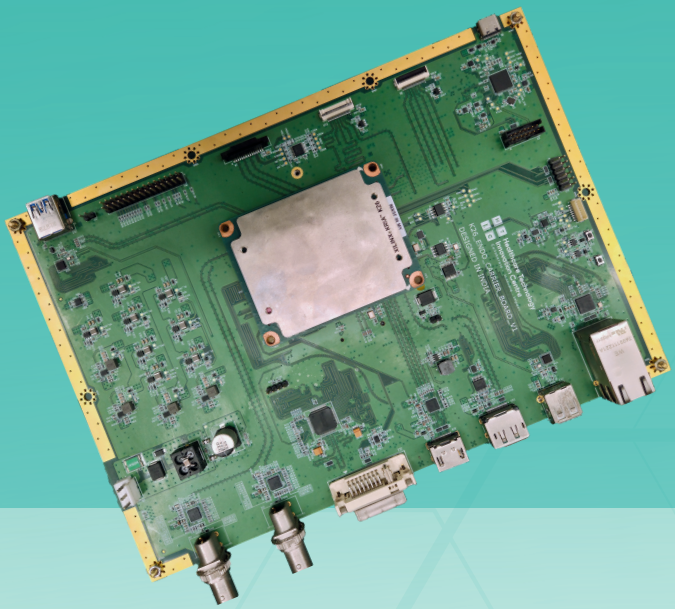
- Multi-Input Switch/Mix
- HQ Video Rendering and Recording
- Expandable Onboard Storage
- Real-Time Network Streaming

APPLICATIONS

- Medical imaging (endoscopy, OT, microscopy)
- Industrial video management

AVAILABLE FOR LICENSING

CUSTOM IMAGING SOLUTION BOARD



HIGHLIGHTS

Dual MIPI Camera Interfaces
Includes dual MIPI CSI interfaces for High-Resolution camera integration

Ultra HD Output & Multi-Format Support
Multiple 4K Digital Video Outputs plus Full HD via DVI

Flexible UI Input & Storage Options
Supports SDI video input, 50 hours of video internal storage (expandable), and real-time network streaming.

Fully Customizable for OEM Needs
Designed for rapid deployment with customizable hardware options including DSI touch or membrane panel interfaces.

- Customizable User Interface
- AI-Ready Platform
- Multi Format Outputs
- Real-Time Network Streaming

APPLICATIONS

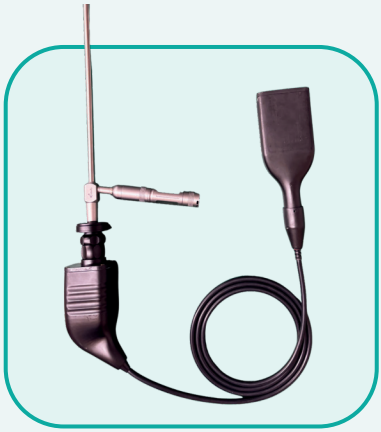
- Medical Endoscopy
- Industrial and Machine Vision applications

CUSTOM SCOPE DESIGN & MANUFACTURING

From your requirements to a ready-to-use scope, we make it happen.

We deliver fully functional scopes—from rigid and flexible to single-use

- Miniaturized precision tips with integrated sensors and LEDs
- Smooth angulation
- Customizable channels



Camera Head for Rigid Endoscope

Flexible Re-usable Endoscope

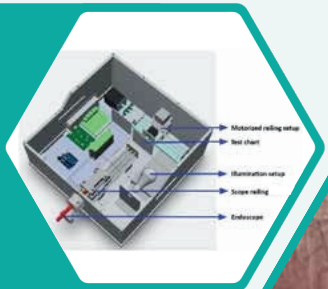
Flexible Single Use Endoscope

Each scope is ready-to-use and crafted to meet stringent industry standards, ensuring exceptional performance and reliability in every procedure.

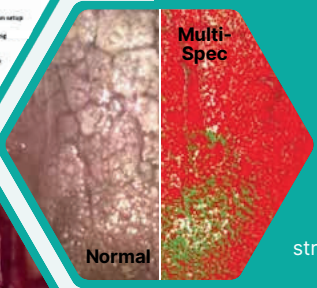
OUR RESEARCH

Image Lab

Image quality assessment tool for achieving diagnostically accurate and visually appealing images.



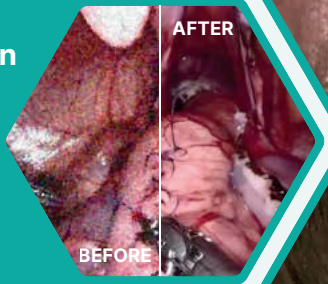
Multi-Spectral Imaging



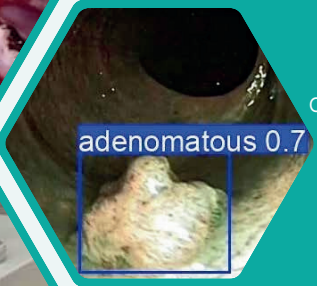
Implements a range of wavelengths beyond the visible spectrum to provide detailed information about tissue structures and pathologies.

Super Resolution

For image quality enhancement with applications in surgery, edge detection, positioning and blood vessel visualization.



Endo AI



Our AI-Powered platform is designed to enhance the diagnosis and reporting of gastrointestinal conditions through endoscopic exams.

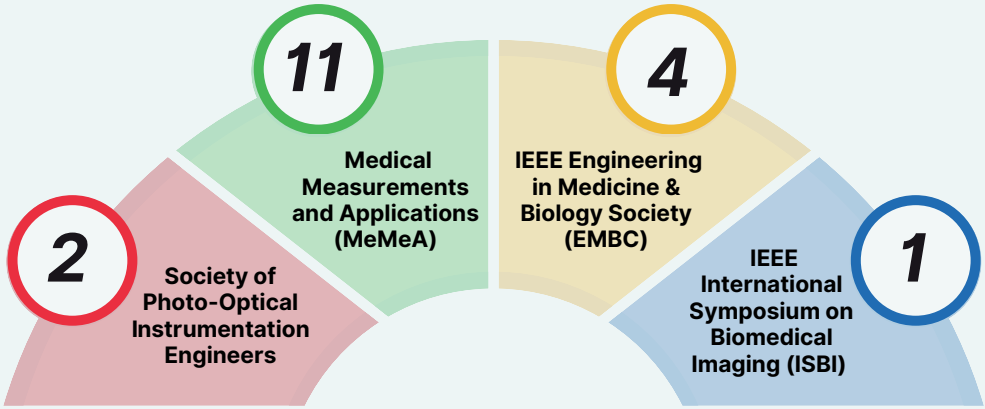
Stereo Endoscopy

A research prototype built with an in-house scope and processor, enabling 3D visualization via a head-mounted display to improve depth perception and surgical precision.

ACHIEVEMENTS

Bagged 5th place in the Round-II (PolypGen2.0 - detection task) in 4th International Endoscopy Computer VisionChal- lenge Aimed at promoting "novel DeepL method develop- ment in endoscopy" EndoCV2022

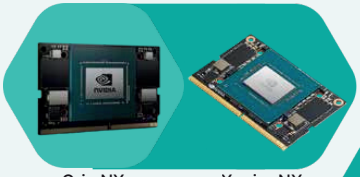
OUR PUBLICATIONS



SILICON TECHNOLOGY

- Designed for versatility, HTIC solutions serve hospitals, clinics, and remote or underserved areas.
- From compact units to advanced systems, HTIC makes cutting-edge healthcare accessible anywhere.
- HTIC utilizes High-performance, Heterogenous computing platforms from AMD Xilinx and NVIDIA to develop high-performance, real-time video processors for medical endoscopy.
- These platforms deliver low-latency, energy-efficient, and high-precision imaging, enabling accurate diagnostics and smooth surgical workflows.

Jetson Xavier Compact Imaging Systems



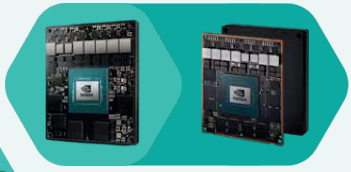
Orin NX Xavier NX

NVIDIA JETSON

AMD XILINX

Zynq UltraScale+ Kria K26 SoM

Jetson Orin High performance Computing Systems



AGX Orin Xavier AGX

- HTIC integrates sensor front-end solutions using technologies from AMD Xilinx, Lattice, and Infineon.
- This combination ensures a strong balance of performance, reliability, and cost-efficiency.
- The result is scalable, high-quality systems designed to support a wide range of endoscopic applications.

AMD XILINX LATTICE SEMICONDUCTOR infineon

Sensor Front-End Specialized Logic

EZ-USB CX3

Artix 7 FPGA

Lattice Crosslink FPGA

ACCELERATING INNOVATION THROUGH STRATEGIC PARTNERSHIP

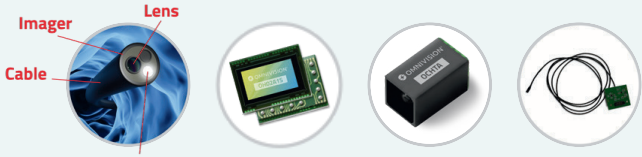
Healthcare Technology Innovation Centre
Collaborate · Innovate · Impact

OMNIVISION®

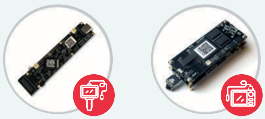
- Partnership since 2017 to co-develop advanced endoscopy technologies.
- Combining OmniVision's imaging expertise with HTIC's research strength to create clinically relevant innovations.
- Focused on compact, high-resolution, and cost-effective solutions that move quickly from lab to clinic.

Technology Leadership in MEDICAL Imaging

Camera



Video Processor Unit



Consumption

1 **4K2K to 200 x 200**
- Full Range of Size and Resolution

2 **PureCel®Plus-S Pixel**
- Improved Sensitivity
- Full Well Capacity
- Zero Blooming
  Low Noise
  Low Power

3 **Nyxel®**
- Enhanced NIR Sensitivity

4 **High Dynamic Range**
- Extend Dynamics Range to Standard CMOS

5 **Anti-Reflective Coating**

6 **AntLinx™ Analog / Digital Interface**

7 **hCSP Package**

ACCELERATE YOUR PRODUCT INNOVATION WITH OUR CUTTING-EDGE ENDOSCOPY TECHNOLOGY SOLUTIONS

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