R&D for COVID-19 Mitigation, IIT-B, 1 Aug 2020

Biomedical Engineering & Technology Innovation Centre (BETIC)

Supported by RG S&T Commission, Mumbai & DST, Ministry of S&T, New Delhi

VISION: Idea → Invention → Innovation → Impact

Prof. B. Ravi

Mechanical Engineering Department, IIT Bombay

Medical Device Innovation – BETIC Facilities

Medical Device Innovation – Process

I. Define (Doctor)

- Team Building
- Clinical Immersion
- Problem Definition
- Concept & Feasibility

400 Problems

II. Develop (Researcher)

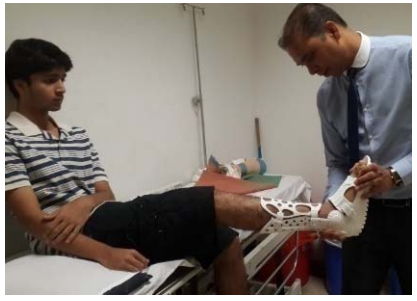
- Detailed Design
- Virtual Prototype
- Rapid Prototype
- Functional Prototype

200 Prototypes

III. Deliver (Entrepreneur)

- Pilot Manufacturing
- Pre-Clinical Testing
- Human Clinical Trials
- Device Certification

50 Patents



IV. Deploy (Investor)

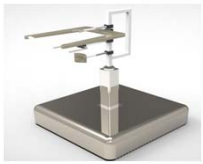
- IPR Management
- Business Model
- Production & Sales
- Scaling & Sustaining

20 Products

Medical Device Innovation – BETIC Products

Glaucoma screener*
(OKO Icare Solutions)

Centric jaw recorder*
(Prosthocentric)



Endotracheal block detector*
(Atmen Technovention)

Smart stethoscope*
(Ayu Devices)

Surgery planner*
(Algosurg Products)

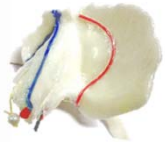
Biopsy gun
(Tenon Meditech)

Diabetic foot screener*
(Ayati Devices)

Clubfoot brace monitor
(Metwiz Materials)

Nasal surgery forceps
(Om Surgical)

Artificial temporal bone*
(Nu Ossa Mediquip)

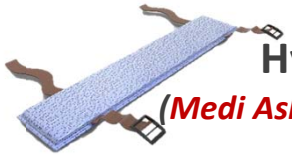


Mandible surgery guides*
(Precisurge)

Laparoscopy instrument
(Eclipse Instrumentation)

Skin spray gun*
(Pacify Medical)

Hybrid splint*
(Medi Asha Technologies)

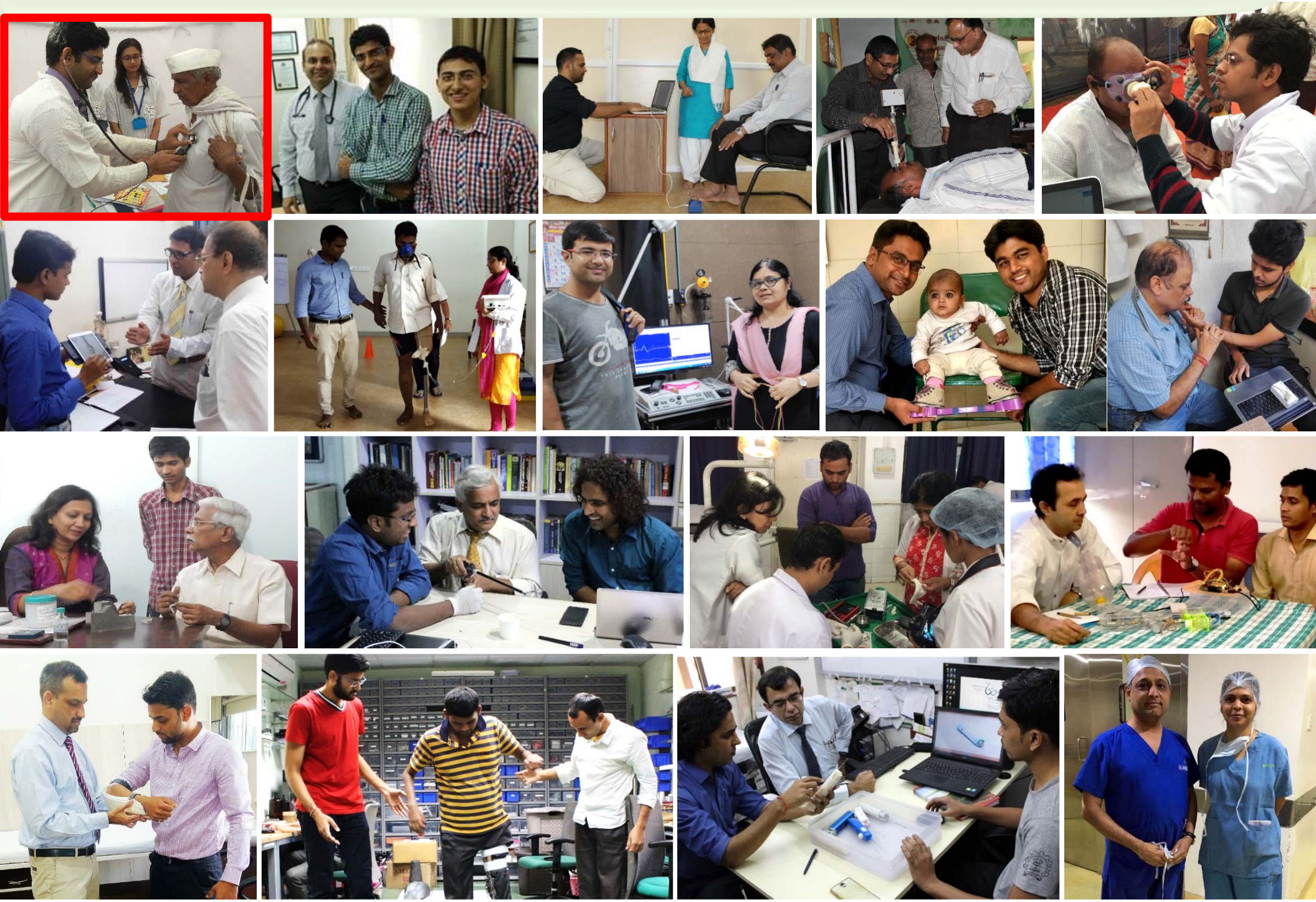


Knee ankle foot orthosis*
(Aumeesh Tech)

Prosthetic leg
(Ratna Nidhi Chritable Trust)

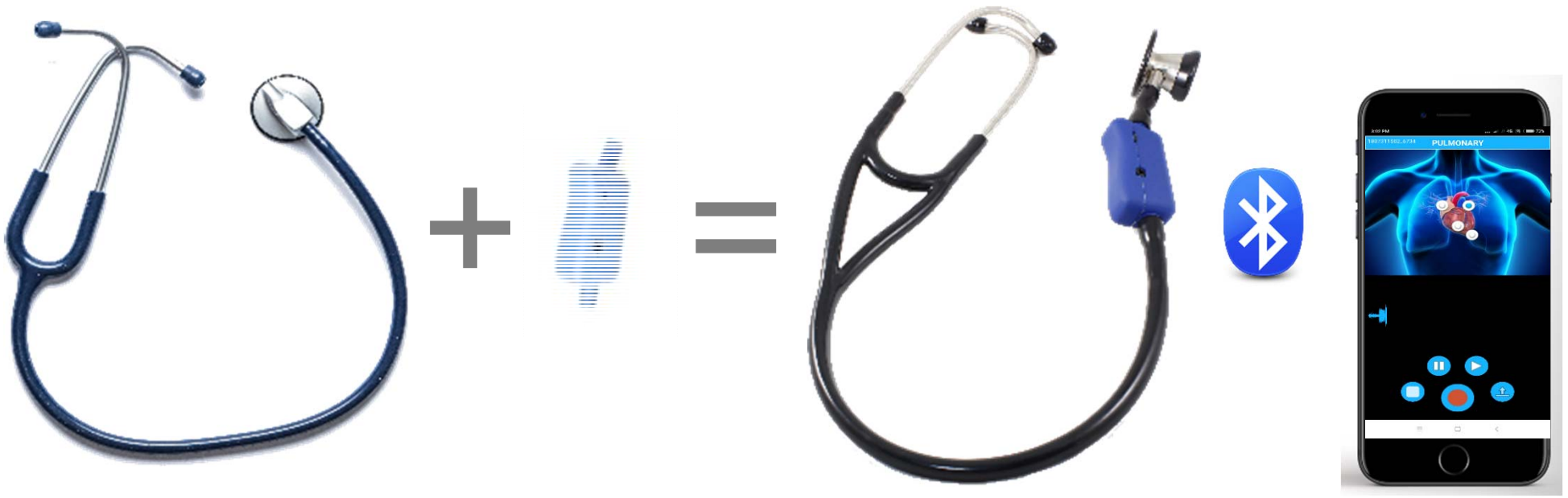
** BIRAC BIG Award →* ● *Startup company* | ● *Industry partner*

Medical Device Innovation – Clinical Validation



Smart Stethoscope – Digital Auscultation

Modular unit to convert standard stethoscope into digital



Bluetooth connectivity | Hi-fidelity amplification | Noise reduction

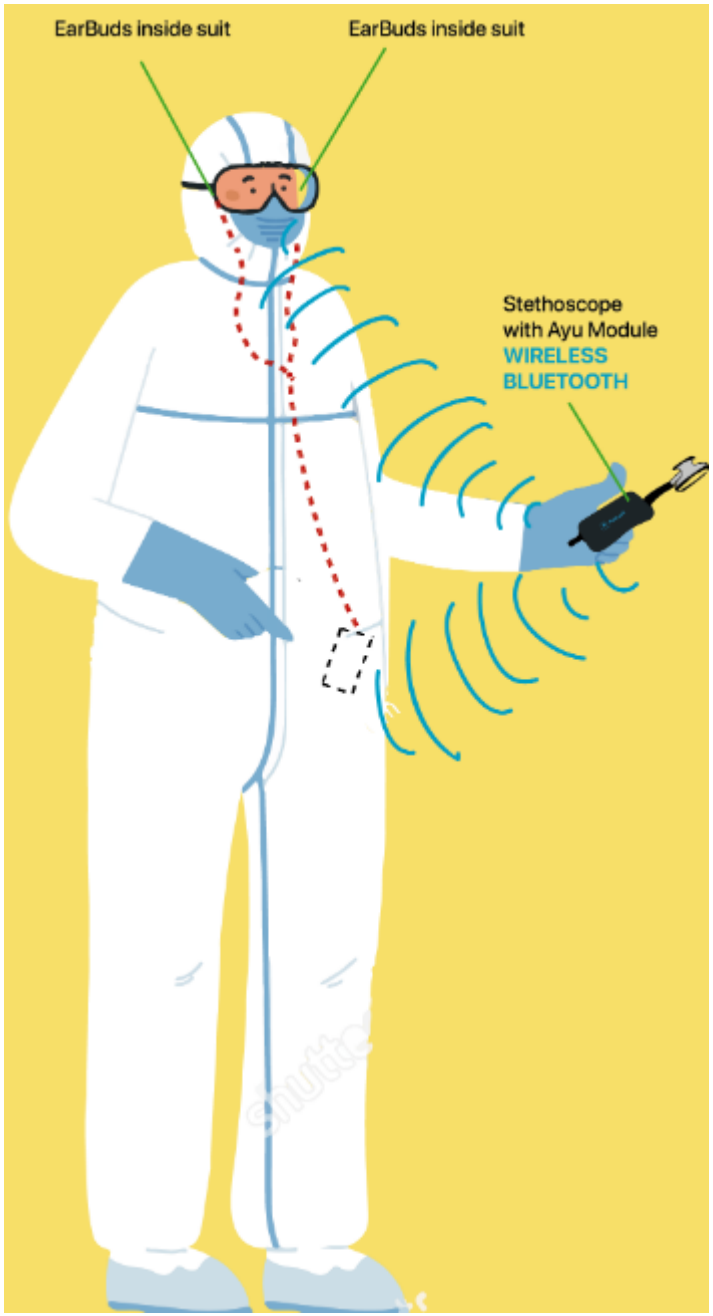
Recording | Playback | Visualization | Sharing through mobile app

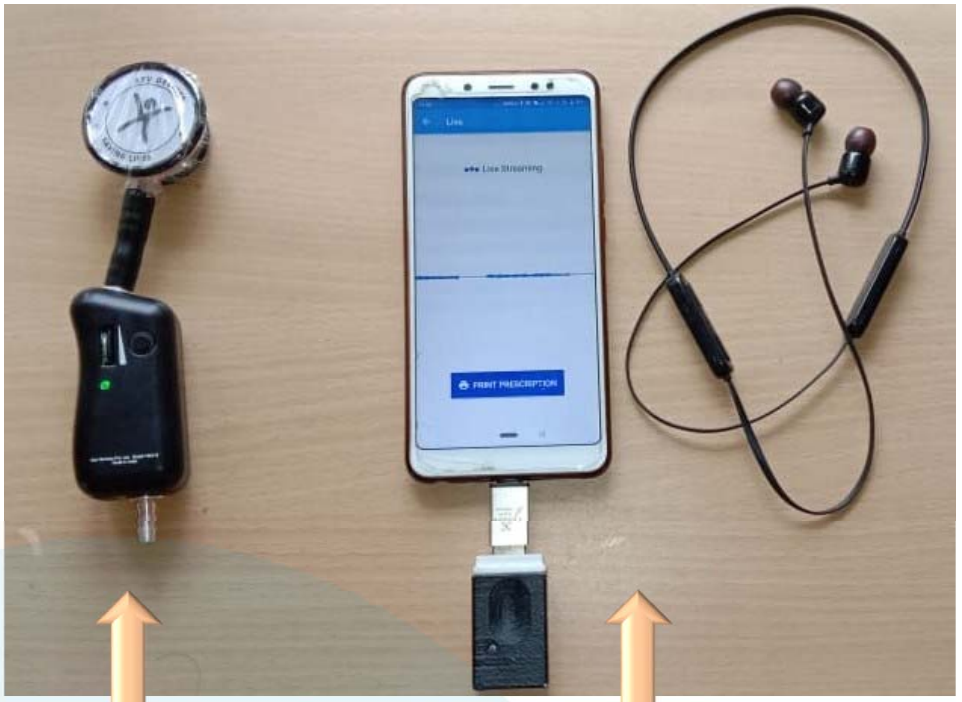
BETiC

Ayu Devices

DEVICES FOR SAVING LIVES

Smart Stethoscope – Safe Auscultation





Smart Stethoscope – Safe Auscultation

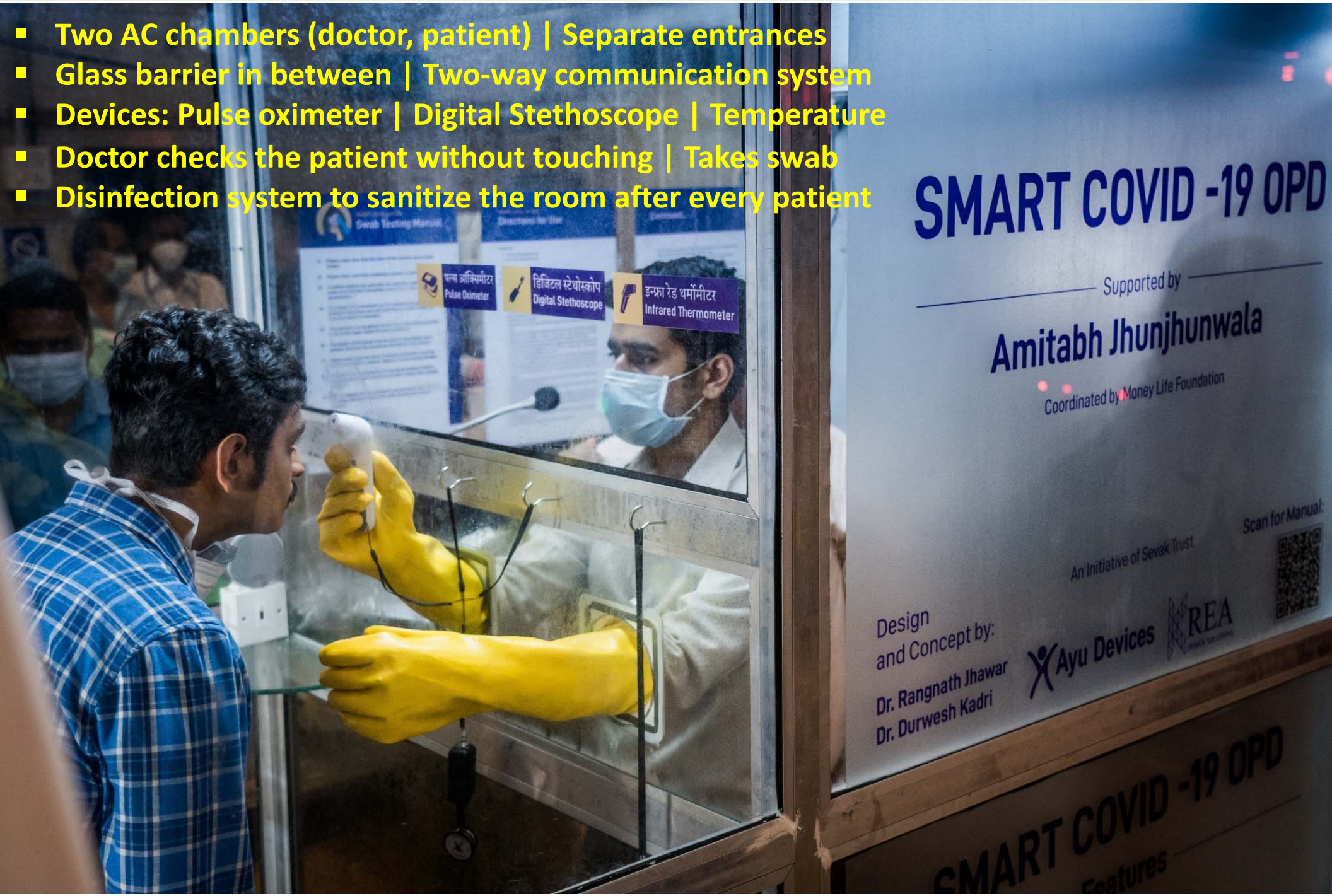
Dr Alka Jadav Sion Hospital

Hi Adarsh
Just read about your digital stethoscope in Newspapers.
I am Dr Alka Jadhav professor pediatrics at sion hospital.
I have been working with Prof Narendra Shah from IITB and Prof Venkatesh since last 5 years.
13:52

I feel these stethoscopes will be of great help in COVID 19 situation.
We will need atleast 5 or may be more.
13:55

Smart COVID Booth – Safe Screening

- Two AC chambers (doctor, patient) | Separate entrances
- Glass barrier in between | Two-way communication system
- Devices: Pulse oximeter | Digital Stethoscope | Temperature
- Doctor checks the patient without touching | Takes swab
- Disinfection system to sanitize the room after every patient



Smart COVID Booth – Safe Screening

15 SMART COVID OPDs
Sir J.J. Hospital
St. George's Hospital
Nair Hospital
Cama & Albless Hospital
HHSB Thackerey Hospital
Cooper Hospital
Sion Hospital
Rajawadi Hospital
Hospital in Lucknow
IIT Bombay Hospital

Smart Contactless Hand Sanitizer

Hospital

Office entrance gate

Shopping mall

Cinema entrance

Food court entrance

School/college entrance

GYM entrance

Home entrance

Construction

Shop entrance

Temple entrance

1. Mount on wall minimum 5 feet or as per requirement by drilling machine and fill sanitizer by opening cap
2. Plug in to power supply of 12 volt approx. 2 amp
3. Switch on the power supply to start
4. Maintain maximum distance of 10 cm
5. 2 ml sanitizer drop is enough for killing virus or bacteria by adopting proper sanitizing procedure given in top

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OKO ICARE SOLUTIONS
innovations that care.....

VISVESVARAYA NATIONAL INSTITUTE OF TECHNOLOGY
NAGPUR

Smart Hand Sanitizer + Thermal Scanner

Hospital

Office entrance gate

Shopping mall

School/college entrance

Home entrance

Shop entrance

Cinema entrance

Food court entrance

GYM entrance

Construction

Temple entrance

1. Mount on wall minimum 5 feet or as per requirement by drilling machine and fill sanitizer by opening cap
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OKO ICARE SOLUTIONS
innovations that care.....

VISVESVARAYA NATIONAL INSTITUTE OF TECHNOLOGY · NAGPUR ·

Personal Protective Equipment

Disposable Hoods

Intubation Box

100,000 face shields
donated to frontline warriors

Face Mask, Shield

BETiC

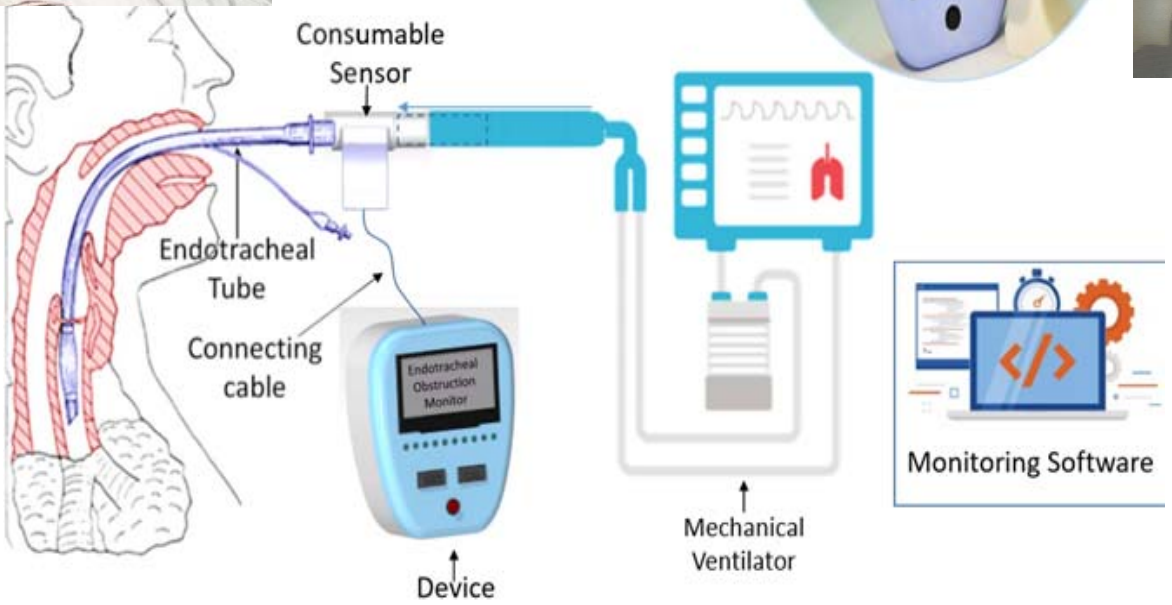
MediAsha
Hopes for a healthy life...

TRUTH
STRENGTH
ENDURANCE
COLLEGE OF ENGINEERING
PUNE

Endo-Tracheal Tube Blockage Detector

Developed Prototype, Tested on virtual environment

Prototype



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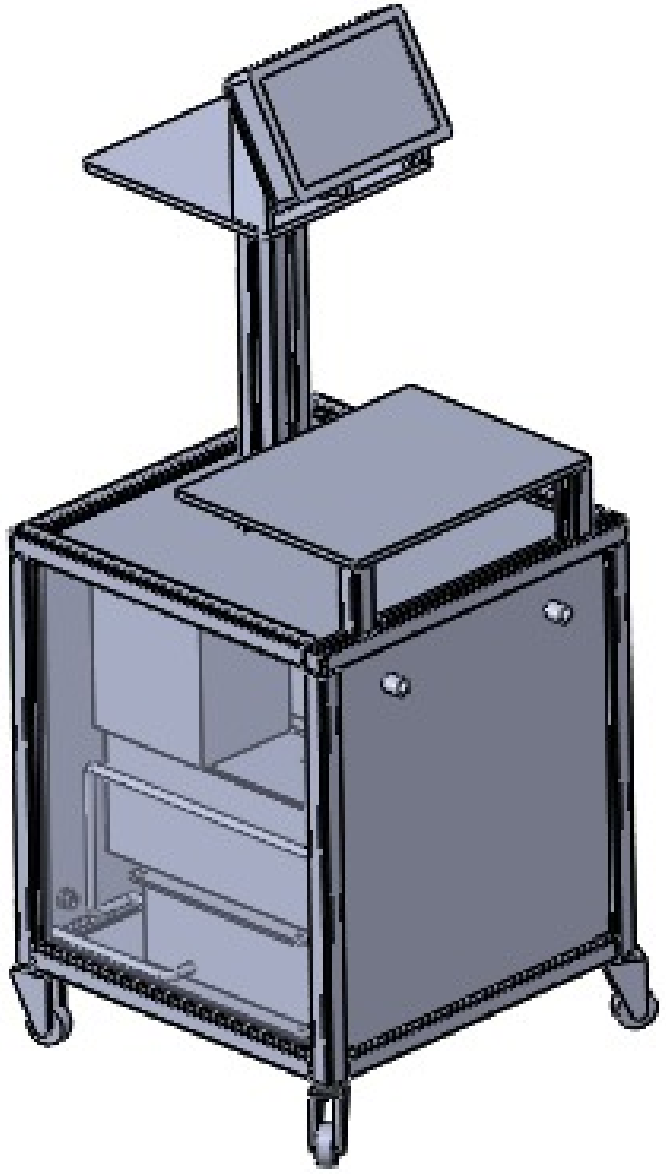
ATMEN TECHNOVENTION

TRUTH STRENGTH ENDURANCE COLLEGE OF ENGINEERING PUNE

ICU Ventilator (Specifications and Concept)

Key Features

- **Suitable** for both adults and pediatric patients
- **Parameters monitored:** Respiratory phase/type, Exhaled tidal & minute volume, Respiratory rate, Total leak percentage, Spontan. minute volume, I:E ratio, PIP & PEEP, Mean & Plateau pressure.
- **Multiple modes-** pressure/volume control
- **Touch display** to adjust/set the parameters
- **Graphic display-** Flow/Pressure/Volume vs. Time
- **Automatic-** Systems check | Alarms, history
- **Battery backup-** 4 hours minimum
- **IEC 60601-1-4** (Medical electrical equipment)



Key Specifications

- **Maximum peak pr- 60 cm water**
- **Peak respiratory rate- 60 BPM**
- **Inspiratory time- 0.3-5 seconds**
- **Tidal volume- 50 to 2000 ml**
- **Peak flow rate- 240 LPM**
- **PEEP- 0-30 cm of water**
- **Pressure support- 40 cm of water**
- **Insp. to exp. ratio- 1:4 to 4:1**
- **Flow sensitivity- 1 to 10 LPM**
- **Volume accuracy- 2-3% of FS**

Innvolution

ICU Ventilator (First Prototype)

BETIC Team and Network

BETIC Team: Biomedical | Design | Electronics | Manufacturing | Quality

IIT Bombay | COE Pune | VNIT Nagpur

KJSCE Mumbai | MIT-ADT Pune | Symbiosis Pune | GHRCE Nagpur

SINE, IIT Bombay | NCL-VC Pune

GMC & JJH Mumbai | HITRT Mumbai | MGMIHS Sanpada | BJMCH Pune | DMIMS Wardha | BKLWRH Dervan

Maharashtra (MSInS) | Gujarat (GTU) | Andhra (AMTZ)

More Information…

BETIC

About Partners Services Impact Events

Running Partner for Medical Device Innovation

Purpose Journey Team Resources

About BETIC

Medical devices are critical for healthcare. Indigenous development of novel, suitable, reliable and affordable devices leads to social impact as well as high-value jobs. Since its inception in 2014 at IIT Bombay, Biomedical Engineering and Technology Innovation Centre (BETIC) is building the necessary eco-system by connecting stakeholders – government, academia, medical community, industry, investors and facilitators. The team met several hundred doctors, identified 400 unmet needs, created 200 novel concepts, and filed 50 patents. Further, they developed 20 devices, incubated 15 startups, licensed 5 products to industry, and launched a few in the market.

Prof.b.ravi@betic.org

Thank You!