# Development of biosensors for health monitoring: TinyML in mind


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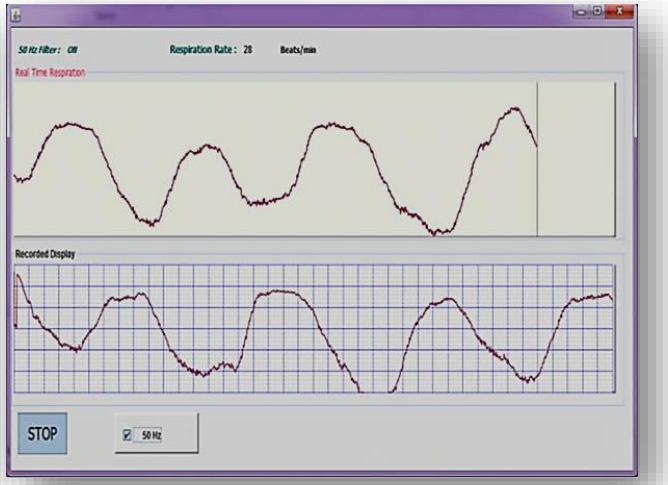
**Dept. of Biomedical Physics & Technology, Housed in the historical *Curzon Hall building*, a UNESCO Heritage Building**

# Bioimpedance based sensor for respiration monitoring



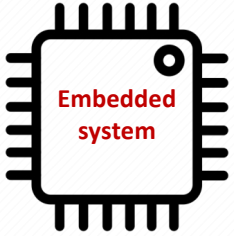

Respiratory Rate Monitoring

## Electrodes and measurement

- Flexible Rubber pad with Velcro band. Metallic electrodes (Nickel coated Cu in the prototype, to be replaced by stainless steel).
- To make the pad comfortable to touch, covered with a cotton fabric with thick cotton buttons sewed at the location of the electrodes. The buttons were soaked with drops of saline for conduction.
- The mother or a nurse wears the electrode in the palm and either holds the baby touching the backside of the thorax with the electrodes, or places the hand with the electrodes on the chest of a lying baby or a sitting child.

Localized lung ventilation monitoring

Tiny ML



# Smartphone based sensing for respiration monitoring

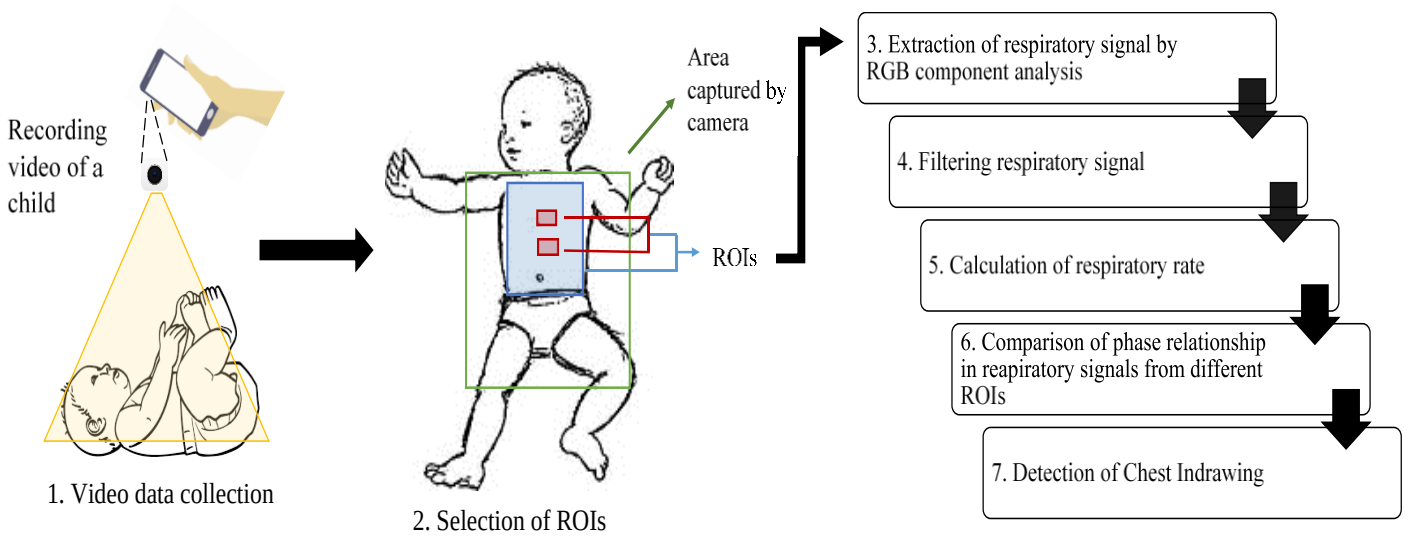



*Fig: Flow diagram of the proposed video-based method for monitoring respiration rate and chest indrawing.*

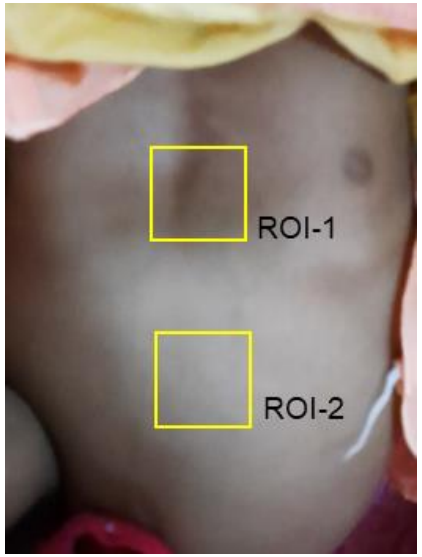



*Fig: Selection of regions of interest for the detection of chest indrawing.*

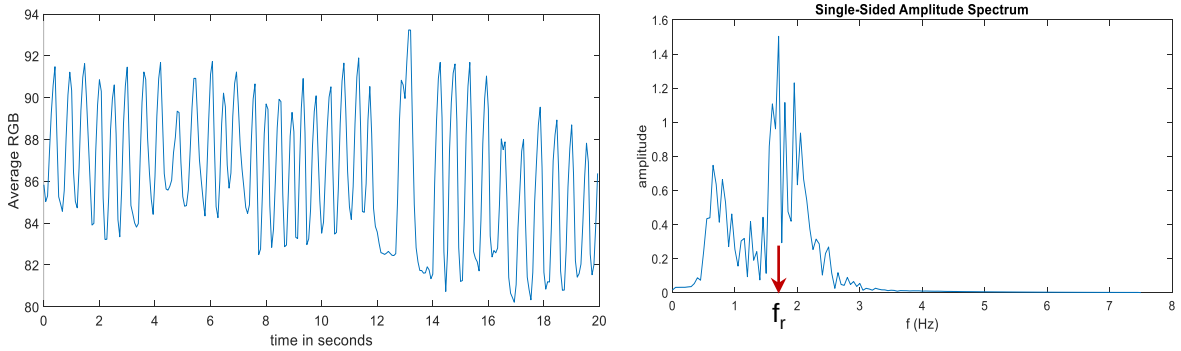



*Fig: Respiratory signal before filtration obtained by extracting RGB on video frames during breathing (left); frequency domain spectrum of the respiratory signal with frequency in Hz (right).*

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Physiological Measurement

IPEM Institute of Physics and Engineering in Medicine

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PAPER

## Video based non-contact monitoring of respiratory rate and chest indrawing in children with pneumonia

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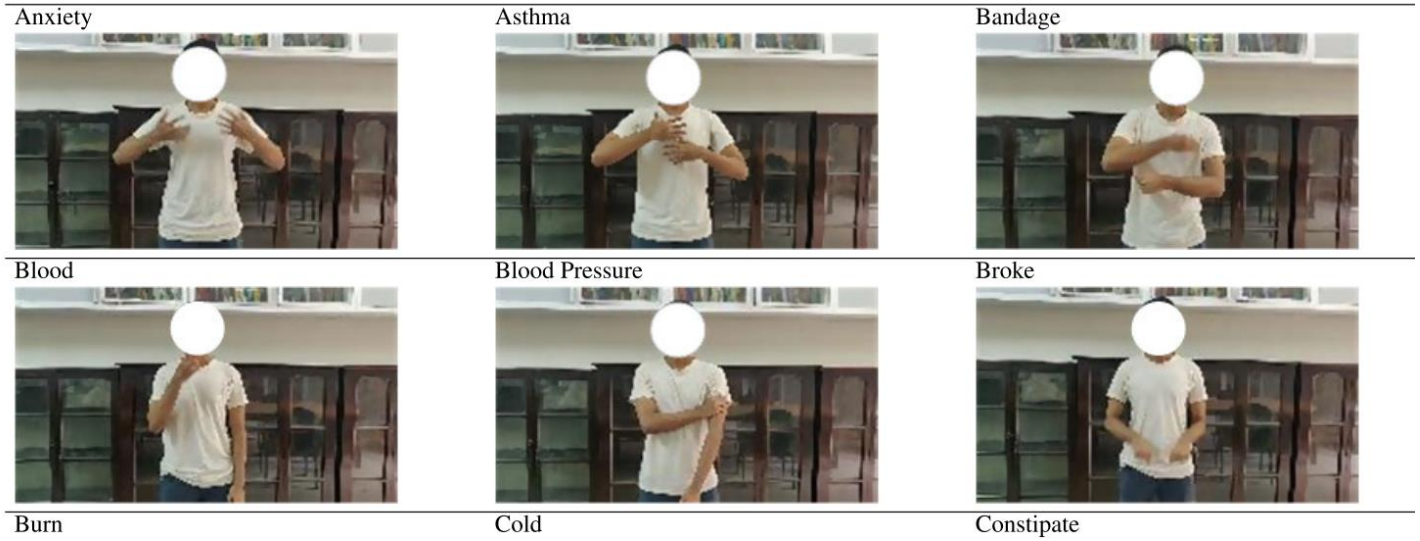
Embedded system

Tiny ML

# Enabling healthcare to hearing and speech impaired community




Word-level sign language detection method was developed, which is an attention-based MobileNetV2-BiLSTM model for a dataset that is related to sign words frequently used in patient-doctor interactions.

Tiny ML

Embedded system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RESEARCH ARTICLE

## MediSign: An Attention-Based CNN-BiLSTM Approach of Classifying Word Level Signs for Patient-Doctor Interaction in Hearing Impaired Community

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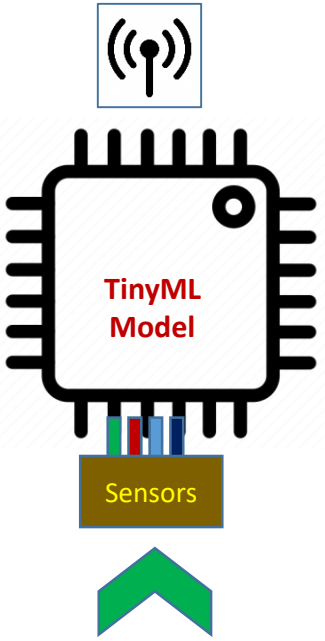
# Biosensor for fish pathogen monitoring:
## Future plan employing TinyML

- Fish diseases are critical for the sustainable growth of the aquaculture industry.
- An early pathogen detection and intervention can save a lot.


# Biosensor for fish pathogen monitoring:
## Future plan employing TinyML


Power and connectivity constraint




pH
Conductivity
Light absorbance
Temperature
Enzyme


Notify the farmers creating an alarm in their smartphones and help them to take preventive measures at the earliest possible time.

# Thank You