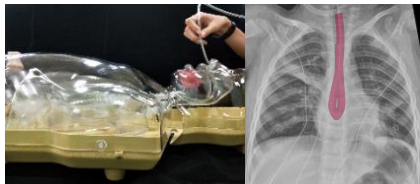


## Motivation: Nasogastric (NG) Tube



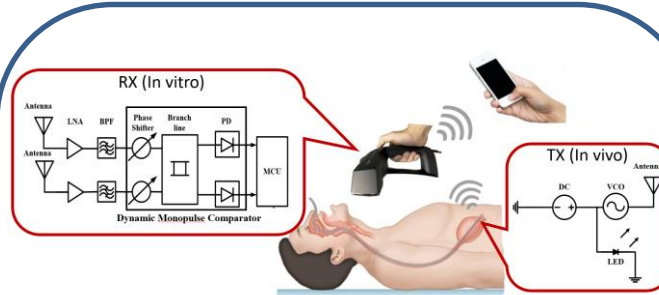
- ⊕ NG Tube is utilized to aid patients who have difficulty with swallowing.
- ⚠ The tube insertion risks are kinking, misplacement, and dislodgement.
- 🧠 Misplacement is the most dangerous as it can result in improper insertion into the bronchial tubes.



## Positioning systems

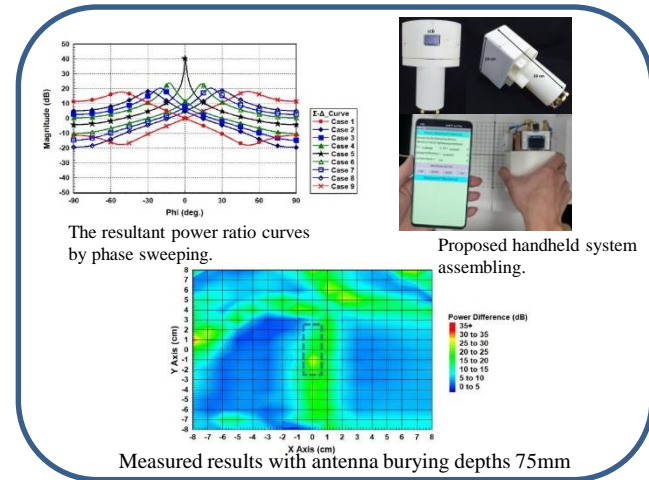


- Compared with traditional technology
- 👍 Advantages of positioning systems
    - Low cost and low profile sensing
    - Increase detection speed
  - 👍 Published radar system
    - 👤 Moderate tissue interference
    - 🌐 Interact with smartphones for convenient access and readout



Tube positioning system consists of an in-body transmitting tag and an off-body handheld radar-based sensor.

- ✓ Transmitting tag:
  1. Attached to the guidewire or NGT into the body.
  2. Small in size and flexible.
- ✓ Monopulse radar:
  1. Integrated with chip antennas, low-noise amplifiers, and bandstop SAW filters.
  2. Adding tunable phase shifters turns the monopulse comparator into a dynamic radar receiver.
  3. An Arduino pro-mini module for control the circuit as well as process the data.
  4. Bluetooth module (HC-05) and a LCD display
  5. User interface program



1. Feasibility of the proposed concept has been proved
2. Continue to try deeper measurements to ensure it fits each patient's body type.
3. This system can be applied to other types of medical tubes to help prevent tube misplacement.
4. Hopefully, someday in the future, it can help improve patient care as well as reduce healthcare costs.

