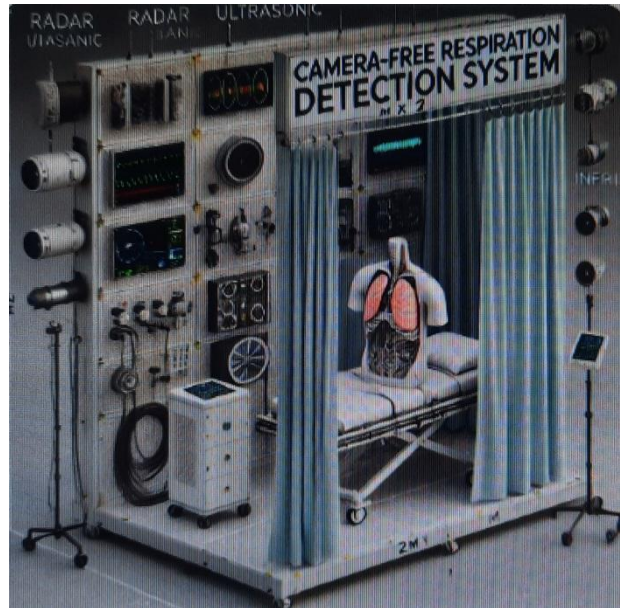


## Contactless Vital Sign Monitor

In many emergency surveillance applications, reliable contactless monitoring of vital signs and remote detection of buried or hiding people are strongly needed. In some healthcare applications, contactless monitoring of vital signs is required when attaching measurement sensors (e.g., ECG electrodes) is not desired to damaged skin (burn etc.) or the possibility of exposing medical staff to toxic materials. A contactless vital sign monitoring system may also provide a cost-effective and versatile method to monitor sleeping elderly people in a caring home environment.



This project aims first to offer a realizable and reliable solution and build a camera-free system which can provide the following features and second to develop a mechanical respiration simulator:

- Detect the existence of living beings at a minimum of four different locations within a 2m x 2m test area surrounded by an **opaque** textile curtain. The probability of detection should be at least **80%** with an acceptable probability of false alarm.
- All sensing equipment should be placed on the same side and outside the opaque curtain,
- After the device starts to scan, it must produce a warning within **300** seconds,
- Measures the respiration frequency of a living being,
- Monitor and classify the respiration activity (i.e., breathing modes such as regular breathing, irregular breathing, apnoea periods etc.),
- The system should not need an external power supply,
- For test purposes, realize a **mechanical simulator** replicating the chest-wall movement (the physical displacement and frequency of the human rib cage, respiration activity modes) due to respiration.

Although cameras are prohibited in this project, more than one sensing technology can be used simultaneously.

### Extra features:

- Realizing the above tasks from behind a 10 to 30 cm thick brick wall,
- Realizing the above tasks behind or inside the debris,
- The system can perform all signal processing steps independently, instead of an external computer.

### Equipment support:

If needed, the sponsoring company will provide standard gain antennas, low gain power amplifiers, RF mixers, and RF filters. The use of ADALM-PLUTO (SDR Active Learning Module) is recommended.