

A Method And System For Detecting And Segmenting Internal Impurities in An Object Of Interest

Application Number: 202411081925

Inventors: Yogesh Dasgaonkar, Dr.Radhe Shyam Sharma

ABSTRACT

Embodiments disclose a self-organizing antenna array wave concentrator device comprising a self-organizing antenna array unit (102) and an ultra-low power, radiation-safe Channel State Information, CSI, signal concentrator and 3D imaging device (101). The wave concentrator device consists of at least one transmitter (or a plurality of transmitters) and at least one receiver (or a plurality of receivers). An object of interest (a fruit or a human chest or a plurality of fruits) is placed between the transmitter and receiver. The device outputs an 3D impurity point cloud. From the point cloud, a segmentation framework constructs a 3D image of the impurity. From the generated 3D image, the system estimates the intensity, volume and the spread rate of the impurity within the object of interest.

KEY APPLICATION AREAS

1. Healthcare & Medical Diagnostics – Detection and monitoring of lung infections, abnormalities, and disease progression.
2. Agriculture & Food Processing – Non-destructive detection of internal defects, spoilage, and impurities in fruits and vegetables.
3. Portable Imaging Systems – Low-cost, radiation-free imaging for remote and resource-constrained locations.
4. Industrial Quality Control – Internal inspection of products without cutting or damaging them.
5. Environmental & Remote Monitoring – Drone-based and robotic inspection systems for automated sensing.

POTENTIAL USE

1. Early detection and tracking of lung infections and respiratory diseases.
2. Automated fruit sorting based on internal quality and spoilage.
3. Real-time 3D imaging and impurity mapping using Wi-Fi signals.
4. Monitoring the volume, intensity, and spread rate of internal anomalies.
5. Deployment on robots and drones for remote health and agricultural inspections.
6. Simultaneous screening of multiple fruits or patients with AI-based predictive analytics.