Expression of Interest

Passive terahertz imaging camera based on uncooled antenna-coupled bolometer array

EURIPIDES Forum in Graz
June 13-15, 2012

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Project vision

- Real-time imaging
- Compact & easy-to-use
- Reliable
- Low cost in fabrication and operation
- Good sensitivity
- Good resolution

Still no such commercial uncooled 2D camera for ~1THz passive real-time imaging with the pW range sensitivity

Fields of Application

Security - Safety
To find concealed objects
To see through dust, fog...

Ex: VTT-NIST Nb 4K cooled camera

Health
Medical diagnosis
Pharmaceuticals control

Ex: Cancer, R.M. Woodward, J. Dermatology, (2003);

Industry
Defect NDT
Locate, count items in package

Ex: ceramic knife
Ex: chocolate bar with needle inside (Schuster ISCC2011)

Proposed imaging sensor: antenna-coupled bolometer 2D FPA

- High performance CMOS reading
- Uncooled temperature operation
- Standard silicon microelectronic processes
  - Sensitivity ~10’s of pW
- Image resolution better than 1cm (0.6 – 1THz) & broadband detection capability
Proposed 0.6-0.8THz passive imaging camera

Present know-how
Real-time active THz imaging demonstrated with antenna-coupled a-Si microbolometer arrays in the 1.5-3.5THz range, with high technological yield in full Si compatible process

- 2D large array: 50µm pitch 320x240 pixels
- Monolithic sensor: Retina + CMOS ROIC
- High fabrication yield: Operability > 99%
- Max optical absorption ~90% for 2 designs @1.7 THz & 2.4THz
- High sensitivity: 30pW @2.5THz

Project objectives

- Develop a **passive terahertz imaging** camera based on **uncooled array** monolithic sensor that complies with multi-purpose applications.
- Innovation lies on **antenna-coupled bolometer** array with high sensitivity (in the pW range) in the 1 THz vicinity, operating at ambient temperature and delivering a video output signal. Multicolor capability is envisaged

Adjustment of CEA Leti
LETI is looking for partners for the project

- Integration players, for the optical system design & fabrication, for the camera hardware and housing design and manufacturing
- End-user key players in application fields like security, non-destructive controls, medical imaging, pharmaceutical tests, for system specification and applicative tests

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