Cameras

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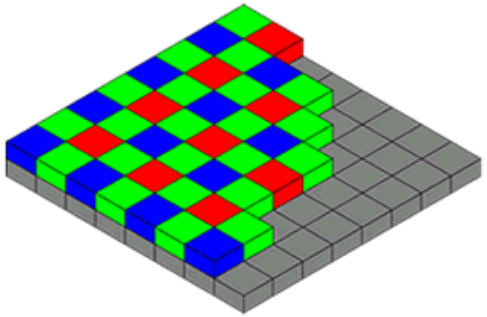
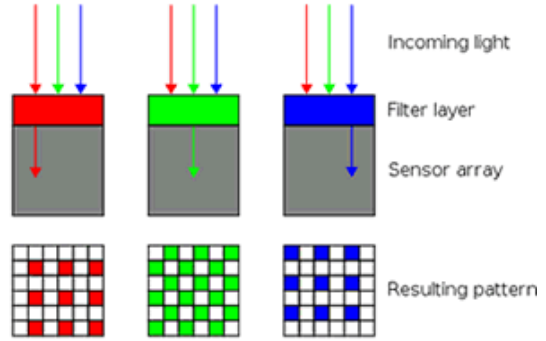
Standard RGB Smartphone Cameras





Purpose

Capture scenes according to three "distinct" wavelengths of light (red, green, blue)

Techniques

- Bayer filter array + demosaicing

Example mHealth Applications

- Skin cancer screening
- Oral health monitoring
- Diagnostic test reading

More Than Just RGB: Depth

Purpose

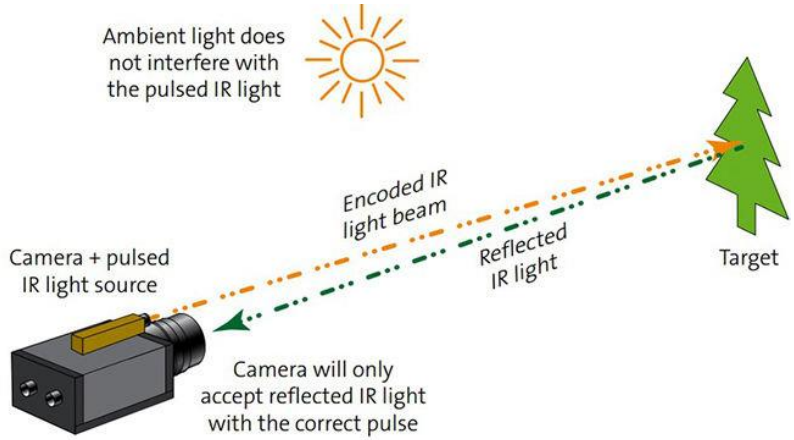
Measures how far away objects are within a scene

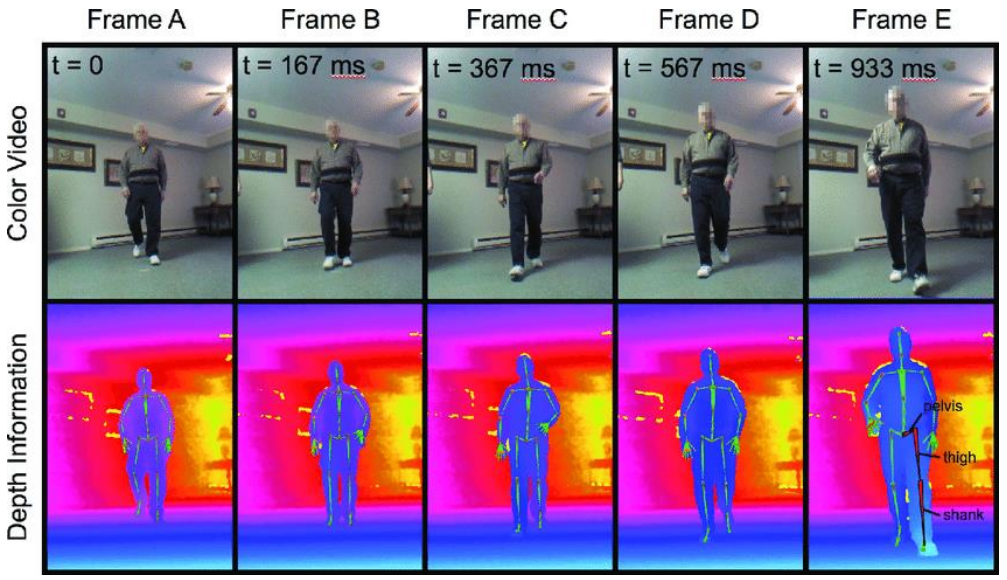
Techniques

- **Structured light:** Project a pattern in IR and measure how the scene distorts it
- **Stereo:** Measures disparity between two cameras separated by a short distance (like our eyes)
- **Time-of-flight:** Measures the time it takes for a pulsed light to be reflected back

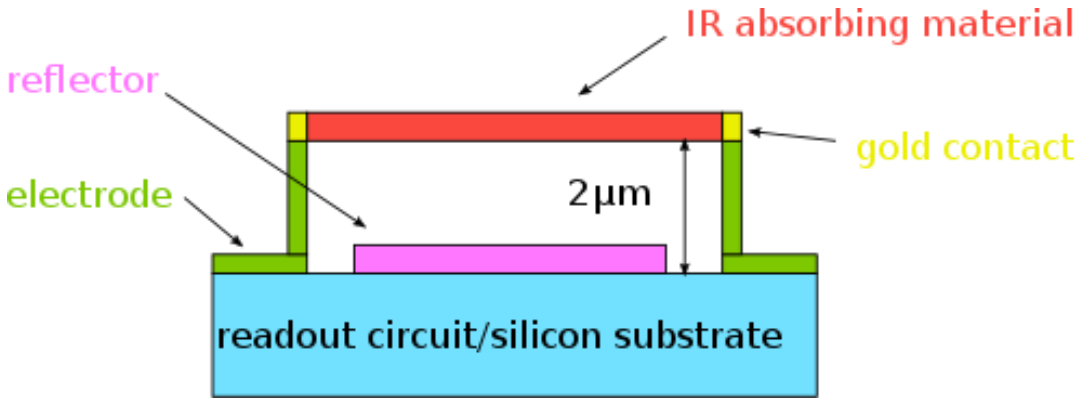
Example mHealth Applications

- Range-of-motion measurement
- Gait analysis





More Than Just RGB: Thermal

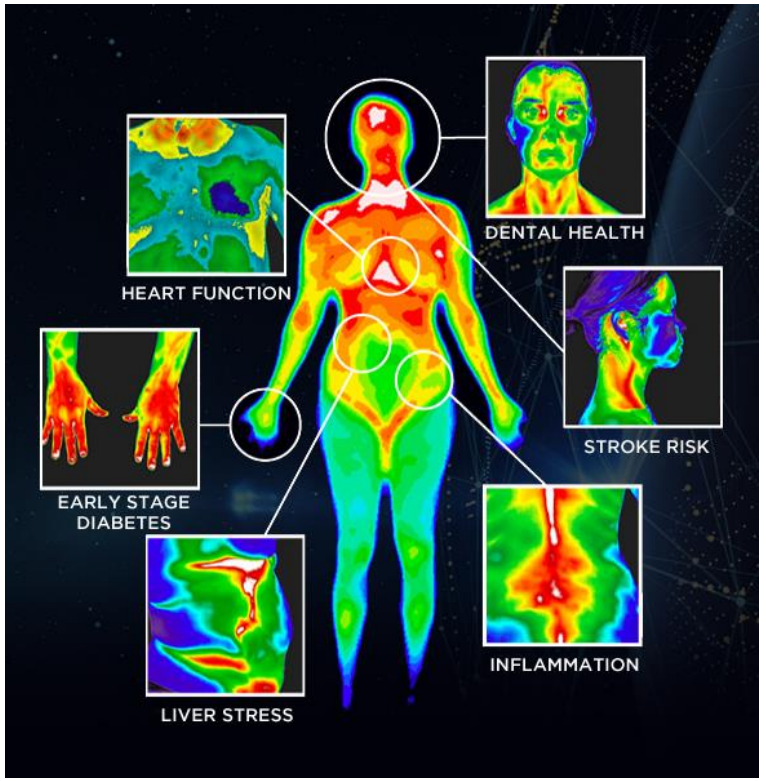


Purpose

Measures radiant heat from distant objects

Techniques

- Microbolometer pixels absorb IR wavelengths (7.5–14 µm) and change their resistance

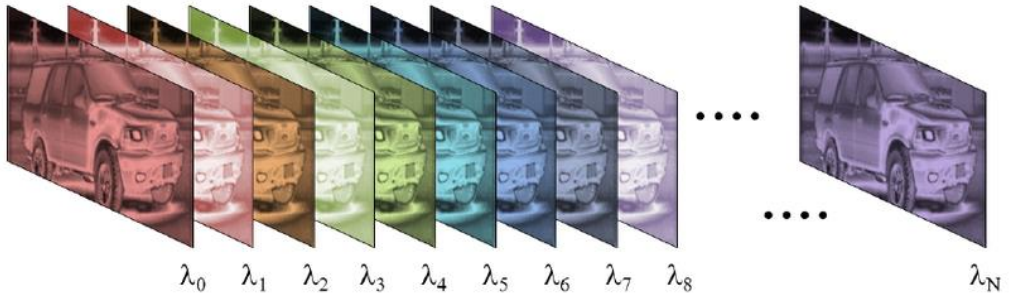


Example mHealth Applications

- Inflammation detection
- Fever screening

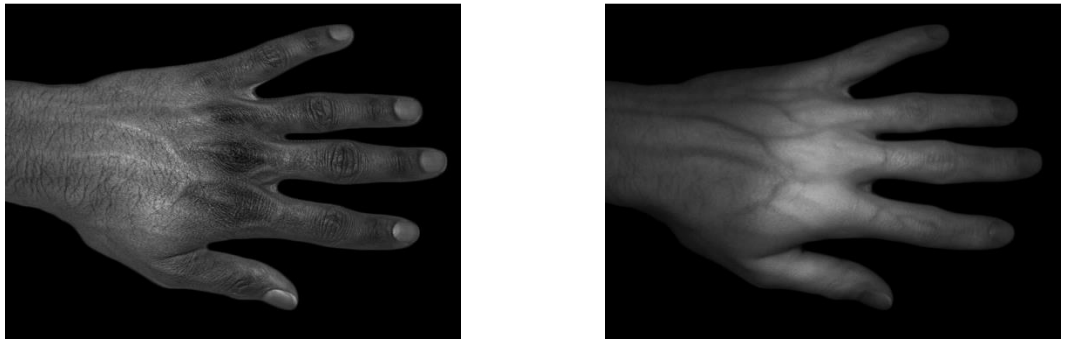
More Than Just RGB: Hyperspectral / Multispectral

Purpose
Captures scenes at multiple wavelengths (visible + IR)



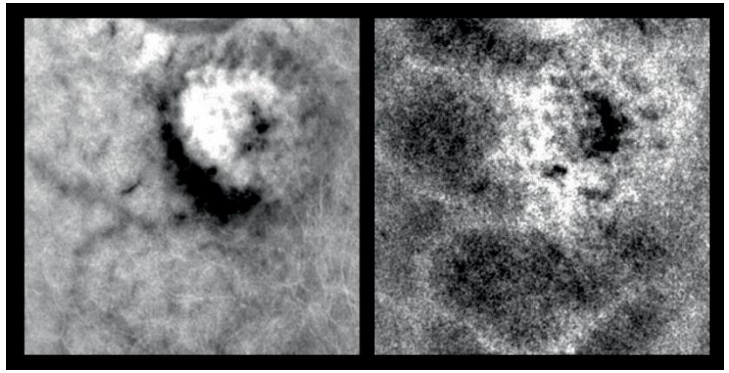
Techniques

- **Active:** Sweep through different LEDs
- **Passive:** Sweep through different filters



Example mHealth Applications

- Vein localization
- Blood oxygen saturation in fingertips, eyes, etc.
- Bruise analysis



Where Are The Smartphones?

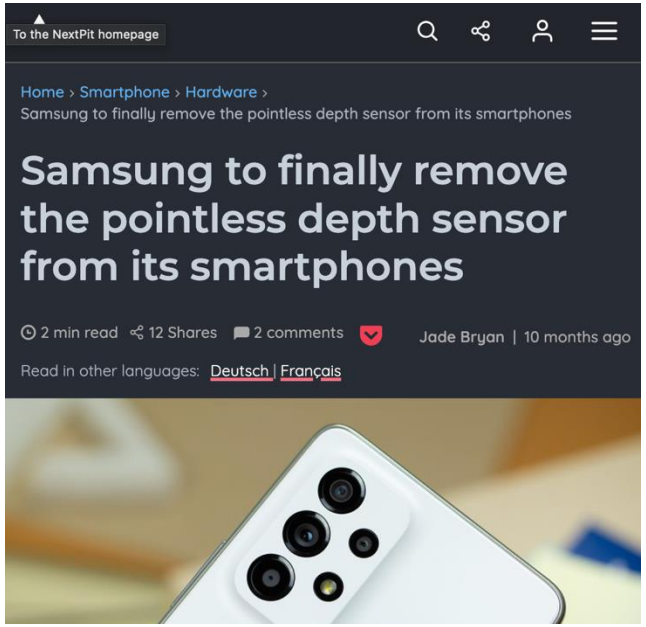
Sophisticated cameras have occasionally made their way into specific smartphone models

Smartphone hardware is often driven by consumer demand, but what are the “killer apps” and are they worth the cost?

AGM Glory G1S's rear camera array is uniquely polarizing.

Cameras

Packed into the rear camera array is a 256×192 thermal imaging camera with a temperature range of -20°C to 550°C, and a 20-megapixel night vision IR camera with IR LED illumination.



Resources

Why You Need an Android Smartphone with a Thermal and IR Camera (ZDNET ‘22)

Medical Hyperspectral Imaging: A Review (Lu and Fei ‘14)