

# Variable Exposure Portable Perfusion Monitor

Tech ID: 32772 / UC Case 2022-890-0

## PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,710,236	07/25/2023	2022-890

## FULL DESCRIPTION

### Background

Analyzing tissue perfusion is a common task in many medical procedures as it elucidates the viability of the tissue being examined. Monitoring perfusion parameters is of vital importance in wound healing, identifying ischemic occlusions, assessing success in reconstructive flap surgery and evaluating microcirculation impairment in patients with peripheral artery disease. Laser Speckle Imaging (LSI) is an established imaging modality that allows monitoring of perfusion in the tissue sample. Currently available systems are:

- ▶ Too bulky
- ▶ Very expensive (> \$50,000)
- ▶ Require considerable energy and software/systems processing capacity
- ▶ Provide qualitative information only

For usage during surgery or post-operative monitoring, portable devices are preferred.

### Invention

Inventors led by Prof. Guillermo Aguilar and Dr. Aditya Pandya at UCR have developed a novel, portable perfusion monitor by leveraging the computing capabilities of commercial vision processing systems-on-modules (SOMs) to perform Laser Speckle Imaging at video rates. The developed prototype acquires images to visualize variations in perfusion.

## CONTACT

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## OTHER INFORMATION

### KEYWORDS

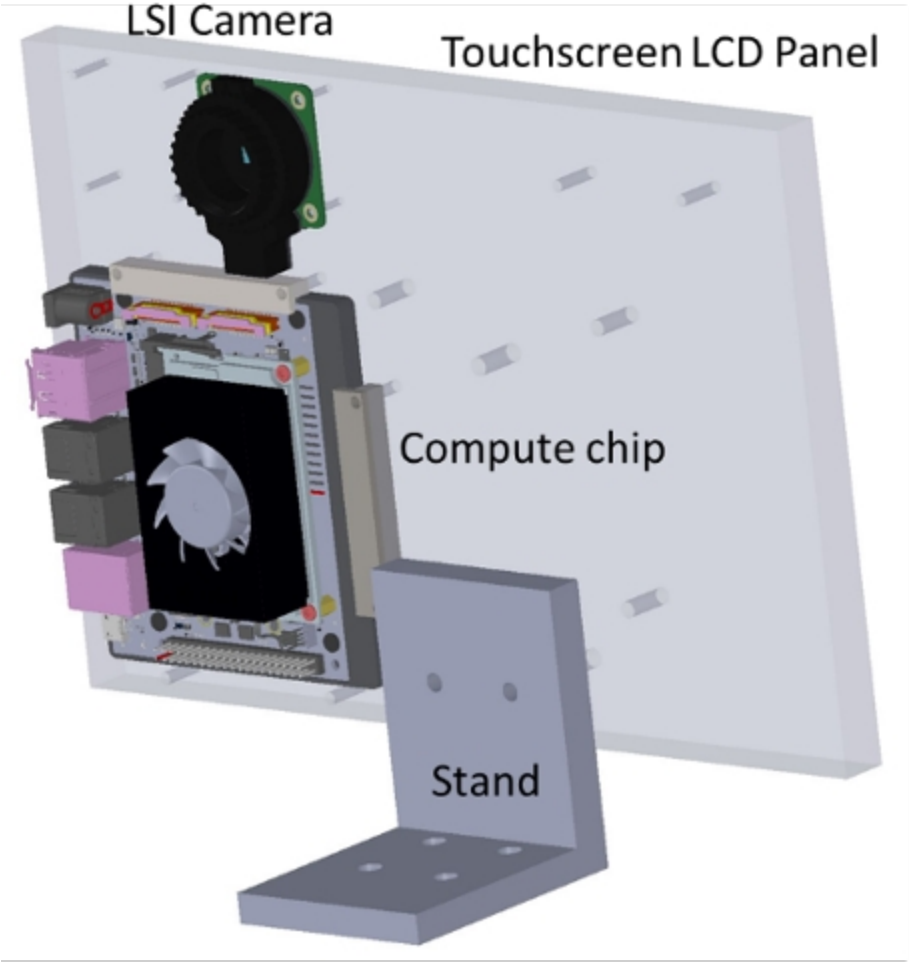
perfusion monitor, blood flow imaging,  
  
plastic surgery, reconstructive surgery,  
  
point of care, tissue imaging, tissue  
  
analysis

### CATEGORIZED AS

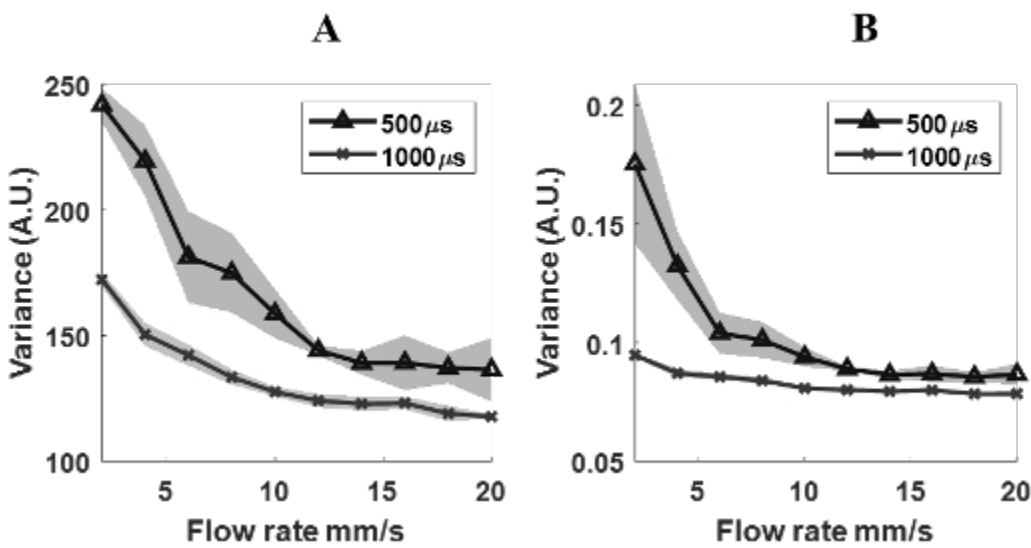
- ▶ **Optics and Photonics**
  - ▶ All Optics and Photonics
- ▶ **Computer**
  - ▶ Software
- ▶ **Imaging**
  - ▶ Medical
- ▶ **Medical**
  - ▶ Devices
  - ▶ Diagnostics
  - ▶ Imaging
- ▶ **Sensors & Instrumentation**
  - ▶ Medical

### RELATED CASES

2022-890-0



LSI imager prototype. An LSI camera was attached to the computer chip.



Average variance within ROI plotted for temporal (A) and spatial images(B) for two exposure times 500 $\mu$ s and 1000 $\mu$ s. Shaded regions represent +/- 1 standard deviation.

ADVANTAGES

The significant aspects of this novel device are:

- ▶ Simultaneously provides spatial and temporal variance images.
- ▶ It is possible to visualize flow regimes.
- ▶ The system is robust and efficient allowing for low-latency data processing that is important for real time image processing.
- ▶ Can be used with existing display technologies (e.g., smartphones), furthering the technology's portability, adaptability and usability in various, relevant usage situations.

SUGGESTED USES

Applications that could benefit from this inexpensive, hand-held LSI device invention are:

- ▶ Point-of-care tissue analysis
- ▶ Intraoperative and perioperative applications
- ▶ Wound management
- ▶ Identifying ischemic occlusions
- ▶ Reconstructive flap surgery
- ▶ Patients with peripheral artery disease

STATE OF DEVELOPMENT

The inventors have built a working prototype.

They are actively pursuing collaborators for optimization of the device and for testing with mice.

INVENTIONS BY DR. AGUILAR

Please review [all inventions by Dr. Aguilar and his team](#) at UCR

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