# Real-Time Imaging in Low Light Conditions

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## BACKGROUND

An expanding field in the application of neural nets, specifically deep convolutional neural networks (CNNs) is the reconstruction of the objects from either the real image or far-field interference pattern. The recording of an interference pattern, such as a hologram, can be used to reproduce the object. There is a need for reliable imaging in low-light conditions for developing technologies like night vision, biological tissue imaging, driver assist systems, and imaging live people for rescue operations.

## BRIEF DESCRIPTION

Prof. Luat Vuong and colleagues from the University of California, Riverside have developed a method for imaging in low light and low signal-to-noise conditions. This technology works by using a dense neural network to reconstruct an object from intensity-only data and efficiently solves the inverse mapping problem without performing iterations with each image and without deep learning schemes. This network operates without learned stereotypes with low computational complexity, low reconstruction latency, decreased power consumption, and robust resistance to disturbances compared to current imaging technologies.
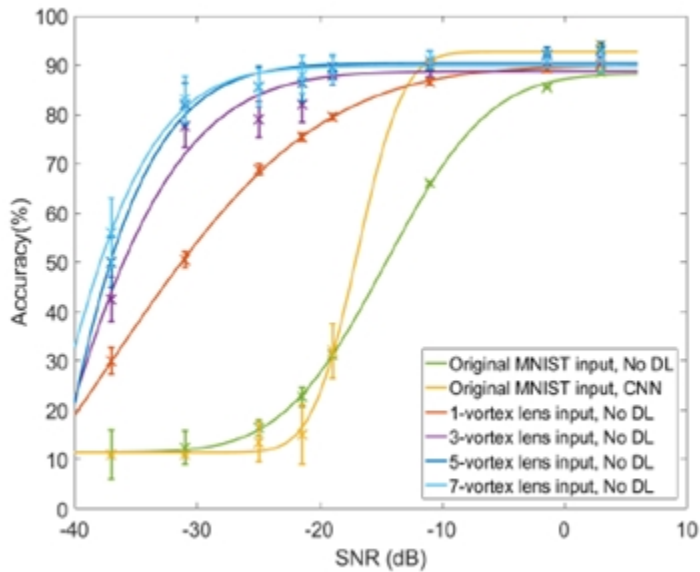


**Fig 1**: Theoretical/simulation accuracy for multi-vortex arrays - 3,5,7 correspondingly using the dense single layer neural net, in comparison to convolutional NN and a single layer NN using conventional imaging. The SNR is provided for the conventional imaging scheme.

## APPLICATION

▶ For applications like driver assist systems, night vision, biological tissue imaging, and imaging live people for house fire rescues.

## PATENT STATUS

| Country | Type | Number | Dated | Case |
|---------|------|--------|-------|------|

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## OTHER INFORMATION

### KEYWORDS

Low light imaging, low signal-to-noise, night vision, neural networks, tissue imaging

### CATEGORIZED AS

▶ **Computer**
   ▶ Software
▶ **Imaging**
   ▶ Other

### RELATED CASES

2020-236-0

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