



PSCR 2021

THE DIGITAL EXPERIENCE

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NIST



Saving Lives One Pixel at a Time: PSCR's Enhancing Computer Vision Challenge



NIST

#PSCR2021



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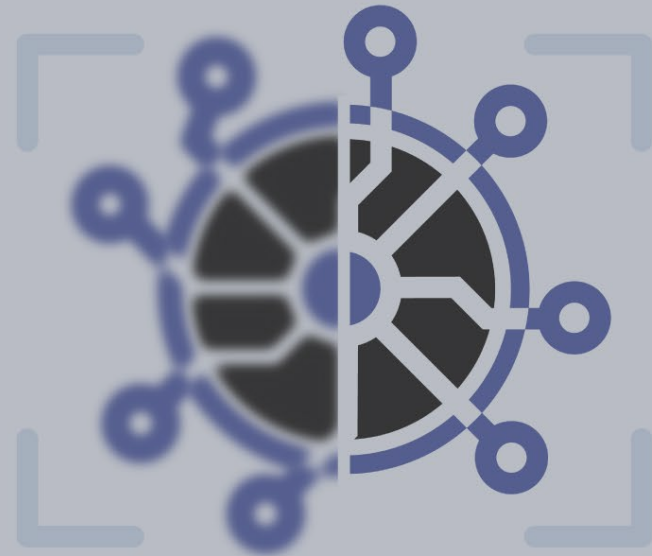
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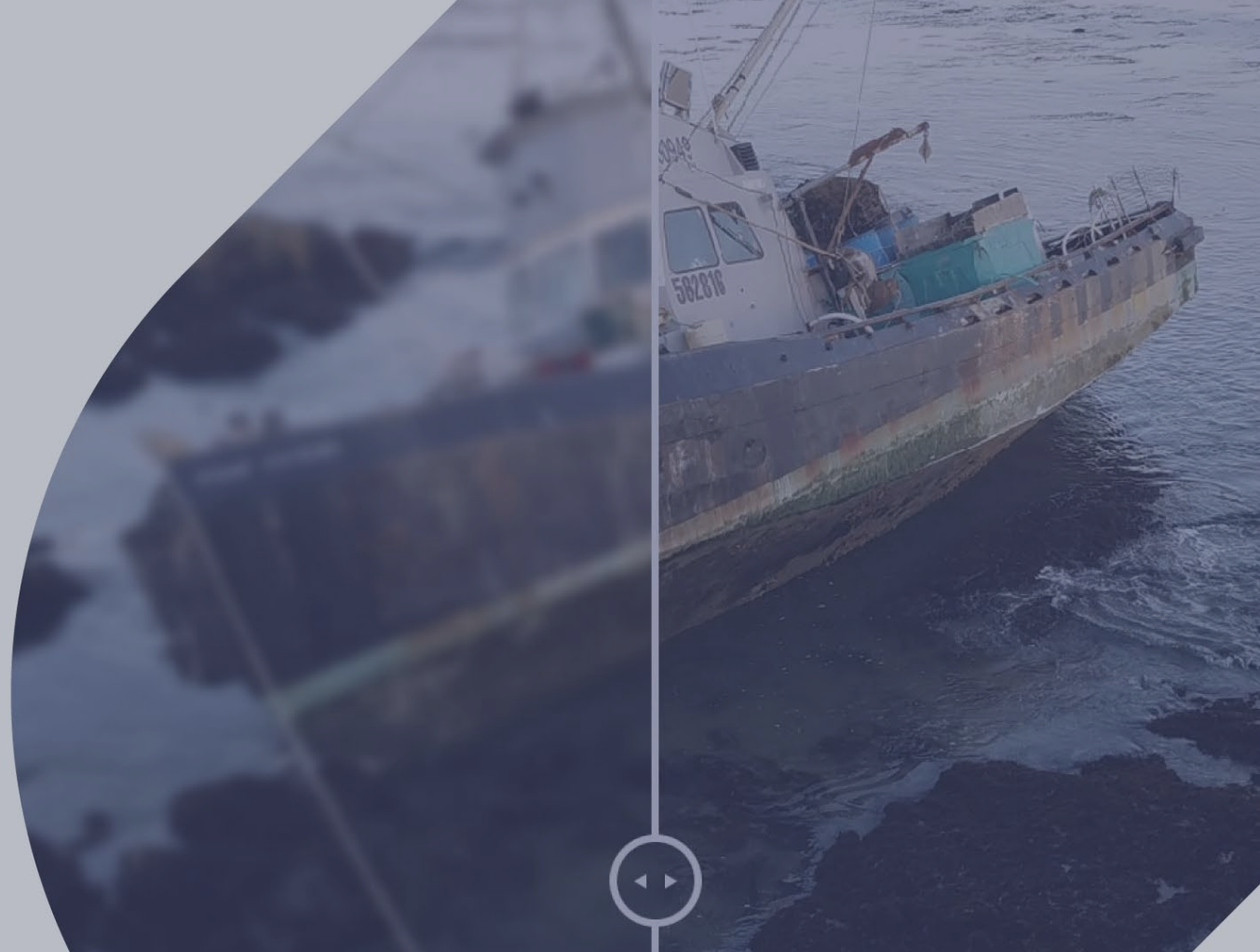
SESSION AGENDA

- Introductions
- Background: What is computer vision?
- Challenge goals: contributions to future technologies
- SMEs: perspectives from industry & government
- Conclusion: Impacts & next steps

INTRODUCTIONS



Enhancing Computer Vision *for* Public Safety Challenge



INTRODUCTION

Creating a new line of research in computer vision to develop life-saving tools for public safety

Challenge completed: August 2020 – May 2021

**Challenge winners are featured in the [Tech Demos](#)*

PANELISTS



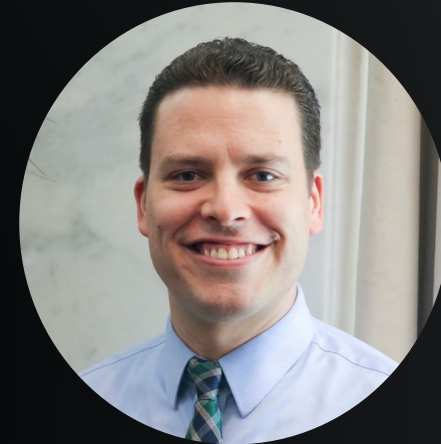
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Background: What is computer vision?



Computer Vision

Emulates the human visual system

Camera	≈ eye
CPU	≈ brain

TECHNOLOGY CURRENTLY IN USE



Popular Technology

- Camera's face focus
- Panorama stitching
- License plate reader
- Facial recognition for authentication
- Ball tracking for live sports broadcasts

Apps

- Language translation
- QR code
- Identify plants
- Estimate calories
- Voiceover for the blind





IMAGE QUALITY PROBLEMS

Low-quality images disrupt computer vision.

First responders operate in environments that are difficult for cameras.

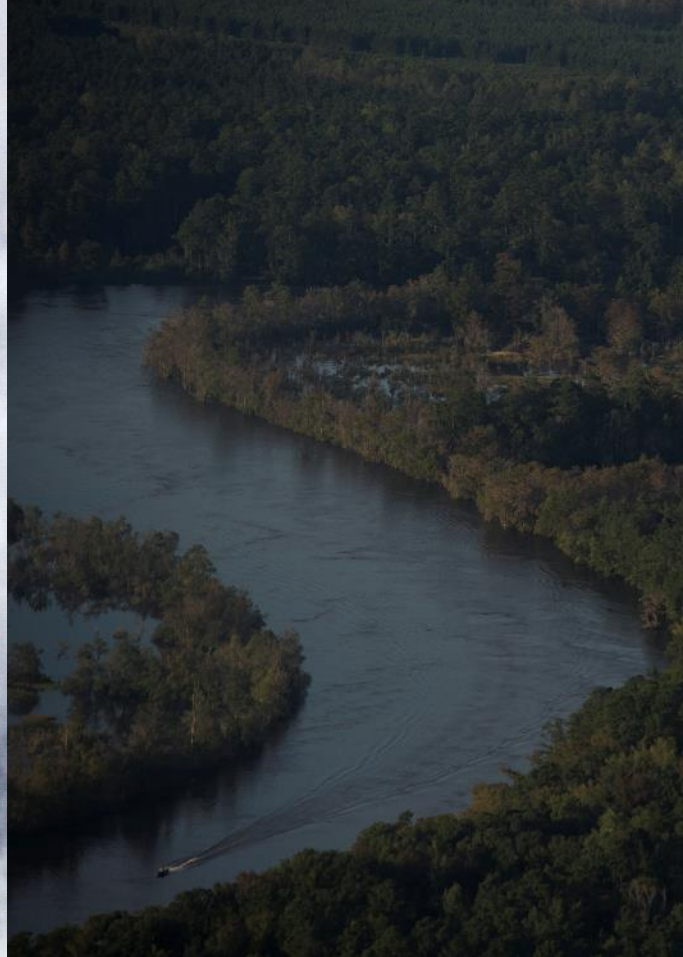




Camera Impairments

First responders operate in environments that are difficult for cameras.

Computer vision will fail in areas where the camera cannot “see.”



Camera Impairments

First responders operate in environments that are difficult for cameras.

Each type of impairment must be identified and responded to differently.



Camera Impairments

First responders operate in environments that are difficult for cameras.

Inaccurate colors hinder first responders.
What about computer vision?

ENHANCE COMPUTER VISION BY IDENTIFYING IMPAIRMENTS



PULLING THE FUTURE FORWARD

IDENTIFY IMPAIRMENTS AND RESPOND INTELLIGENTLY



Control Cameras

Pan, zoom, bit-rate, lighting



Identify & Address Problems

Noise reduction filter, avoid “blind” spots

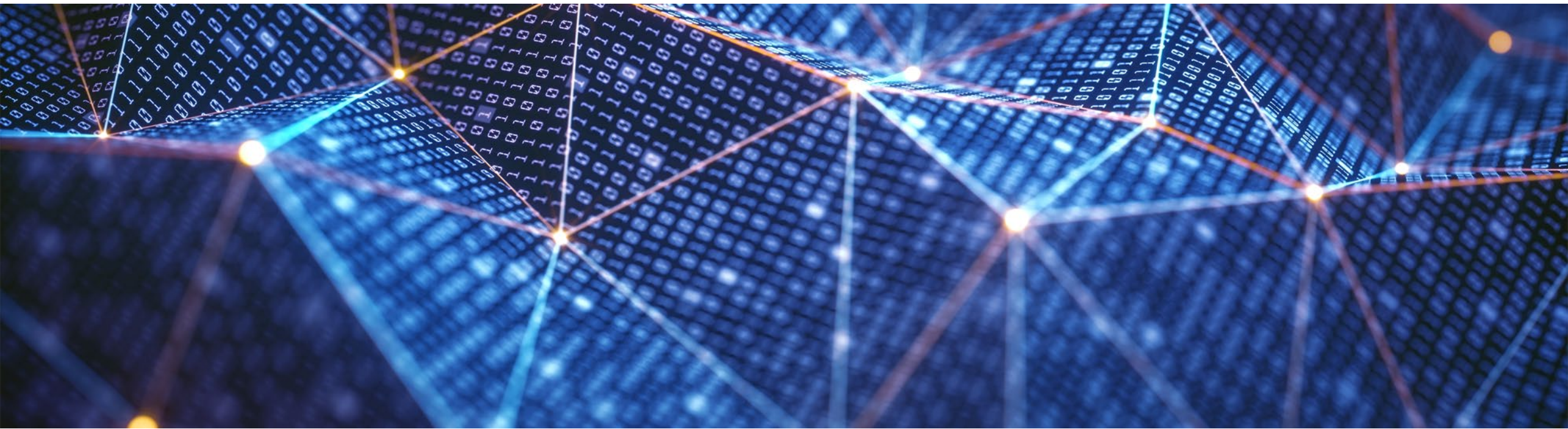


Make Strategic Decisions

Choose among multiple algorithms, as visual conditions change

Challenge Goal: Future Technologies

WHY A COMPETITION ABOUT COMPUTER VISION?



This Challenge supports public safety missions by advancing the research capacity of computer vision algorithms and no-reference (NR) metrics.

OPEN INNOVATION TOOLS & GOALS



Research Community

PSCR asked solvers to create image datasets and innovate on failure rate assessments.



Vision

Create robust computer vision systems to support public safety operations.



Awards for Innovation

This challenge offered a prize purse of \$240,000 to attract new innovators and researchers.



New Research Opportunities

Contestants created new tools to aid researchers in this new line of R&D.

DEVELOPING TOOLS FOR THE FUTURE OF PUBLIC SAFETY



Addressing Public Safety Missions

This Challenge supported public safety missions by advancing the research capacity of computer vision algorithms and no-reference (NR) metrics.



Tools Redistributed for R&D Purposes

Winning contestants could choose to redistribute their final submissions for research and development purposes on the Consumer Digital Video Library (CDVL).

Perspectives from Industry & Government

PERSPECTIVE: SUBJECT MATTER EXPERTS

- Why were you excited to support this challenge as a subject matter expert?

PERSPECTIVE: SUBJECT MATTER EXPERTS

- What opportunity does PSCR's investment in this prize challenge provide to the computer vision community?

PERSPECTIVE: SUBJECT MATTER EXPERTS

- How does PSCR's involvement help further advance computer vision technology for public safety?

PERSPECTIVE: SUBJECT MATTER EXPERTS

- What outcome(s) of the challenge are you most excited about?

PERSPECTIVE: SUBJECT MATTER EXPERTS

- What do you expect the impact of this program will be on the computer vision research community generally, and on the future of public safety operations specifically?

Conclusion: Impacts & Next Steps

CHALLENGE OUTCOMES

IMPACTS:

- PSCR received several quality submissions
- Winning submissions are featured in the **Tech Demo** space

Datasets are available to the public:

- Released on CDVL at www.cdv.org
- Leveraged by the research community for R&D purposes only

NEXT STEPS:

- NIST and NTIA through the PSCR program will continue researching computer vision
- To learn more, contact:

Margaret Pinson at mpinson@ntia.gov or visit www.cdv.org

Scott Ledgerwood, PSCR's UI/UX Portfolio Lead, at scott.Ledgerwood@nist.gov



THANK YOU

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