Ryan Burgert

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Education

- **Stony Brook University: PhD Student of Computer Science**
  Research Areas: Robotics, Sim-to-Real, Computer Vision, Diffusion Models *Aug 2020 - Present*
  Relevant Courses: *Computational Geometry, Computer Vision, Machine Learning, Introduction to Robotics*
- **Stony Brook University: Bachelors of Science**
  Double Major: Computer Science and Applied Mathematics *Sep 2015 - May 2020*
  Honors: *Graduated Cum Laude, University Scholars Program, Honors CS Program, CEAS Dean's Scholarship, Presidential Scholarship*

Experience

- **Adobe Research**: Research Intern (Full-time) *May 2023 - Present*
  - **Topics**: Working on new frontiers for text-to-image generation. More details will be disclosed later.
- **Research Assistant**: Stony Brook University (Full-time) *September 2020 - Present*
  - **Topics**: Researching the use of differentiable rendering to bridge the reality gap for robotic simulations used for robotic reinforcement learning. Also researching generative 3d models.
  - **Advisor**: Advised by Professor Michael Ryoo.
- **iRobot**: Machine Learning Intern (Full-time) *May 2020 - Aug 2020*
  - **Project**: Used Blender3D to create synthetic training data, and used unpaired image translation algorithms to make the renderings more realistic, such as CycleGAN in PyTorch.
  - **Impact**: The new training data yielded better real-world accuracy in object detection and classification tasks.
- **Zebra Technologies**: Computer Vision Intern (Full-time, then part-time) *May 2019 - Feb 2020*
  - **Project**: Used OpenCV and Python to create a new template matching algorithm, using contours instead of SIFT.
  - **Impact**: Outperformed company's previous implementation speed by factor of 30. See imgur.com/a/BOxxT6d
- **Zebra Technologies**: Software Engineering Intern (Full-time) *May 2018 - Aug 2018*
  - **Project**: Designed and implemented computer-vision system to increase worker productivity by tracking boxes in warehouses for augmented reality application using OpenCV, C++, and NVIDIA Jetson.
  - **Impact**: My key contribution to this project is now patented by Zebra. See imgur.com/a/eyFBoYJ
- **Air Techniques**: Software Engineering Intern (Full-time) *May 2017 - Aug 2017, Dec 2017 - Feb 2018*
  - **Project**: Used MATLAB to create software that automatically analyzes the image quality of dental x-ray scanners.
  - **Impact**: Saved over $40,000 annually by letting engineers test hardware in-house instead of outsourcing to Germany

Research

- **TRITON: Neural Neural Textures make Better Sim2Real**: First-author paper, accepted to CORL 2022. It combines neural textures with unpaired image translation to create better sim2real environments for robotics. Unlike previous approaches, TRITON provides temporal consistency over indefinite timescales. Our project website: tritonpaper.github.io.
- **Peekaboo: Text to Image Diffusion Models are Zero-Shot Segmentors**: First-author paper, will be presented in CVPR 2023's ODRUM workshop. In this paper we introduce an algorithm that can segment regions of an image given a text prompt, using stable diffusion without any additional training. Our preprint: arxiv.org/pdf/2211.13224.pdf.
- **Diffusion Illusions: Hiding Images in Plain Sight**: CVPR Demo 2023. Text-to-image generation of optical illusions and stenography. See the highly interactive website for more info: diffusionillusions.com
- **Biomedical Research**: Collaborating with Stony Brook's department of Neurosurgery, designed software to measure patients' facial micro-expressions, which can provide an objective coma severity measurement. Paper is currently under review. Our preprint: www.medrxiv.org/content/10.1101/2022.10.28.22276059v1
- **Physics Research**: Co-authored "A Fish Out of Water: The Archer Fish's Rocket-Like Launch," presented at Gallery of Fluid Motion, 71st Annual Meeting of the APS Division of Fluid Dynamics, 2018. Created photorealistic animation using Blender 3D: youtu.be/auodWP98vas
- **Undergraduate Honors CS Thesis**: Designed custom 3D game engine, programming language, and editor using ThreeJS, React, and MongoDB. Lead a team of 9 students to create a web-based biomedical virtual laboratory, "Lab in a Cube," which provides a GUI for professors to create custom labs for their students. Presented in Conference on Instruction and Technology 2019, a statewide symposium. For a demo, open bit.ly/labinacube, click "load Lab", enter "ANNZ."

Projects

- **Lightwave**: I invented a portable synth instrument, called the Lightwave: https://ryanndagreat.github.io/LightwaveWebsite
- **CEWIT Hackathon 2017**: Won two awards for "Know Before You Go", which uses computer vision to find free parking spaces. Project was featured in both *Newsday* and *The Statesman*
- **Light Painting Robot**: A robotic arm that creates 3D light paintings. See youtu.be/6rcRQtEdCII.

Skills

- **Languages**: *(Proficient)*: Python, Java, JavaScript, MATLAB, C, C++ ; *(Familiar)*: C#, MIPS, LaTeX, SQL, Go
- **Libraries**: *(Unordered)*: PyTorch, OpenCV, ThreeJS, Node.JS, React, MPI, Prompt Toolkit
- **Software**: *(Unordered)*: Blender3D, Arduino, Git, Unreal Engine, Unity3D, Photoshop, Audacity, FL Studio, Jupyter