Project Portfolio

Dhruv Shah
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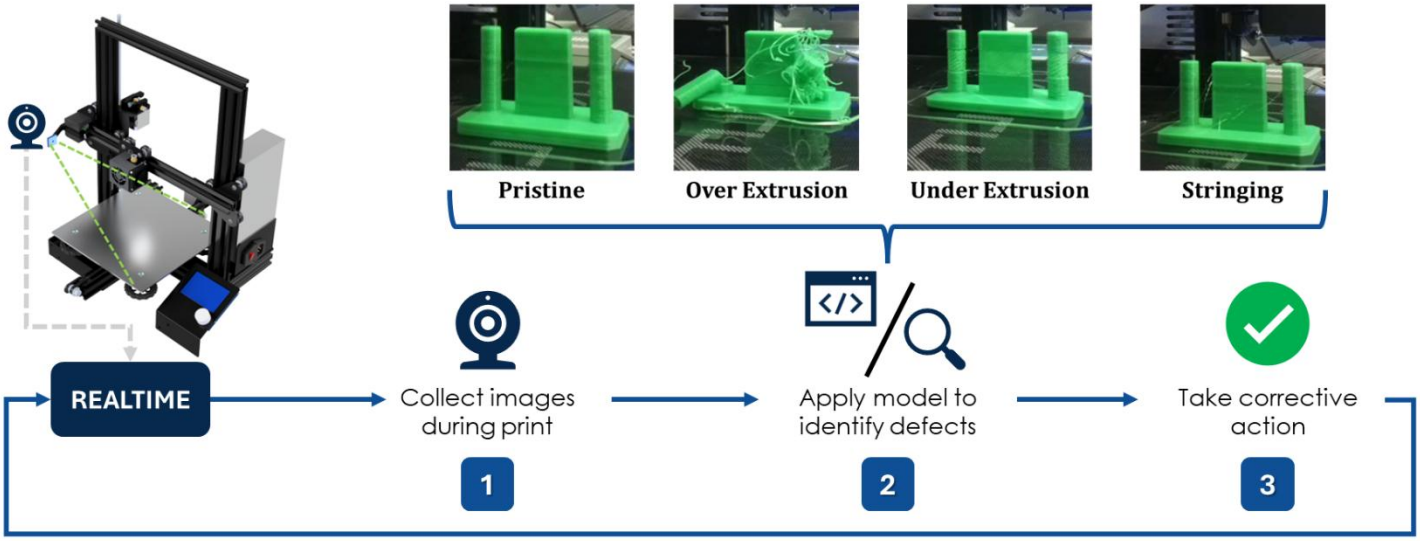
Realtime 3D Print Monitoring

2021 – 2022 | Theoretical & Applied Mechanics Group

Objective: Address the defects which arise during 3D printing process by instrumenting a printer with a closed-loop optical monitoring system equipped with a computer vision model to detect and classify abnormal states.



Skills: Computer vision, deep learning, FDM 3D printing, Docker containerization, Python (PyTorch, TensorFlow, OpenCV), CAD

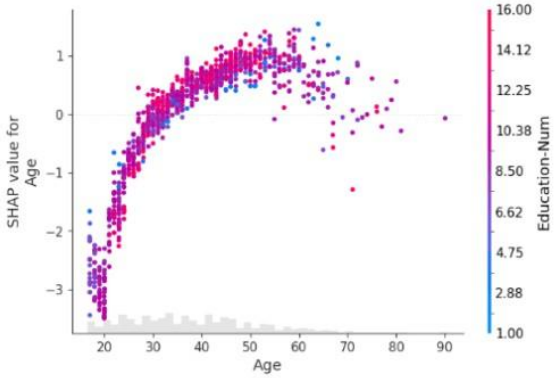
Similar Projects: Fire hazard detection during autonomous inspections in maritime machinery spaces using robotic quadruped platform

Attrition Forecasting using Machine Learning

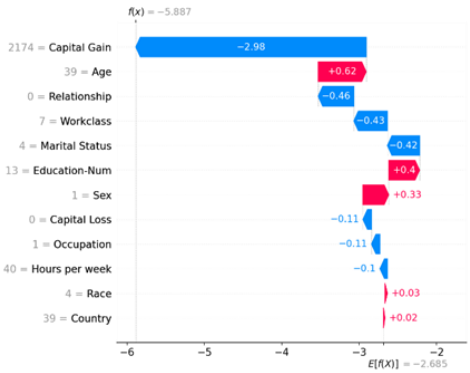
2024 – Present | Naval Surface Warfare Center – Philadelphia Division

Objective: Optimize organization resources by forecasting employee attrition using neural networks. This involved preprocessing large amounts of time-series feature sets to identify a time-dependent probability that an employee may leave the organization either through separation or retirement.

Model Explainability Study*



Feature Contributions*



***NOTE:** Mock data is shown

Skills: Deep learning, Python (TensorFlow/Keras, SHAP, Pandas, Dash), Tableau, PowerBI

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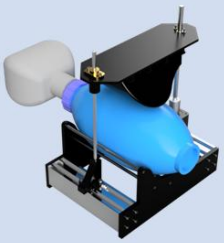
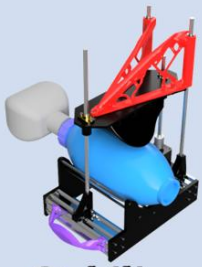
Automated Resuscitator for COVID-19 Emergency Use

2020 – 2021 | Theoretical & Applied Mechanics Group

Objective: To address the demand for ventilators at the onset of the COVID-19 pandemic, a team was assembled at Drexel University to design and manufacture an inexpensive and portable respiratory device which automates resuscitation with an FDA-approved bag-valve mask. I led the design and manufacturing efforts for this team.

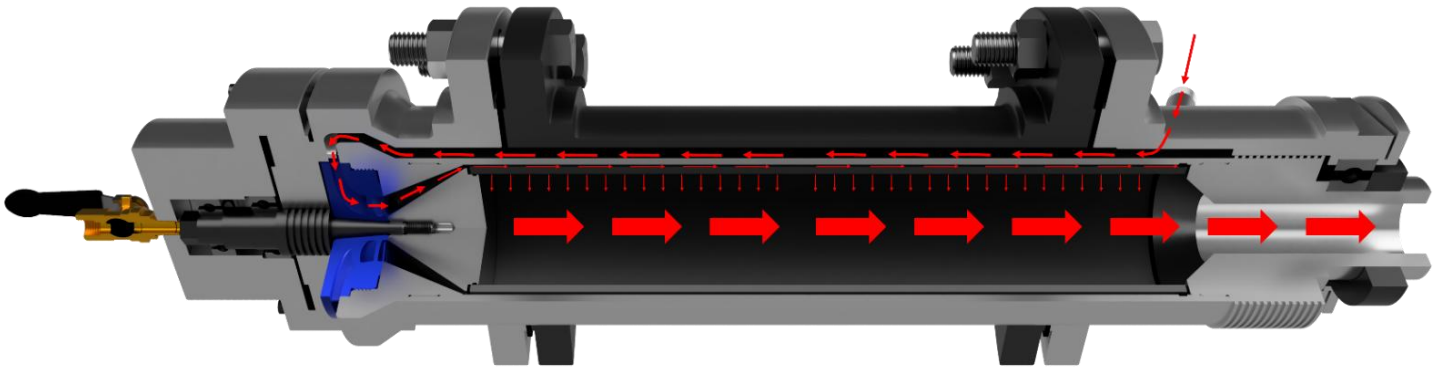
Design Iterations	 **Design**	 **Stabilize**	 **Manufacture**
	▪ Automate mechanical compression ▪ Incorporate performance requirements	▪ Utilize computational analysis tools ▪ Design components to withstand loads	▪ Identify manufacturability constraints ▪ Reduce mass/cost

Skills: CAD, digital design, FDM 3D printing, closed-loop sensory feedback control

Centrifugal Nuclear Thermal Rocket

2022 – 2023 | Drexel University Senior Capstone in Partnership with NASA MSFC

Objective: As part of senior design project with NASA Marshall Space Flight Center, my team and I designed a prototype fuel element for NASA's theorized concept of a nuclear thermal propulsion engine.



Skills: CAD, GD&T Analysis, Python, CNC Machining, SLM 3D Printing

Published Work: I co-authored a paper which was presented at the 2023 Nuclear and Emerging Technologies for Space (NETS) conference, hosted by the American Nuclear Society: *Parametric Analysis of the Design Point for a Centrifugal Nuclear Thermal Rocket Fuel Element*