



CENTER FOR SMART
STREET
SCAPES

Research Experience for Teachers (RET)

2025 Lesson Plans



Joel Bianchi
Energy Tech High School



Lesson Plan

AI OBJECT DETECTION WITH RASPBERRY PI

Class Type: Engineering

Grade: 9-12

Overarching Focus of Lesson: Use AI and physical computing to solve a real-world problem through a senior design project

Objectives:

- Identify and define a real-world problem that can be addressed using AI object detection.
- Acquire and utilize a pre-trained or custom-trained AI model (YOLO).
- Run AI detection models on a Raspberry Pi for "edge" computing.
- Integrate electronics (lights, sound, motion) to create a physical computing response based on AI output.
- Document and present their final project, including design decisions and Python code.



*Grae Carter
Columbia Secondary
School*



OBJECT DETECTION FOR OYSTERS

Class Type: ICT + GenEd

Grade: 7

Overarching Focus of Lesson: Students will explore the connections between New York City's history, its harbor ecology, and the role of technology in environmental restoration. The lesson blends marine biology, environmental justice, and introductory AI concepts to help students see themselves as scientists, technologists, and stewards of New York City's waterways.

Objectives:

- Use computer vision tools to explore environmental problem-solving
 - Identify key species in NYC waterways including oysters, tunicates, algae, and signs of human interaction
 - Understand the ecological role of marine species in habitat restoration
 - Connect scientific research to local history, labor, and environmental justice in New York City's waterfront communities
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*Maria Martinez
Olympic Heights
Community High*



Lesson Plan

AI FOR IMPACT: MAPPING HURRICANE DESTRUCTION AND DESIGNING RESPONSE PLANS

Class Type: 504/IPE/ESE/ELL

Grade: 11

Overarching Focus of Lesson: This unit explores how AI can support engineering decisions in the aftermath of natural disasters. Students analyze satellite data to identify damage, apply data visualization techniques, and use engineering and project management principles to design an optimized cleanup and recovery schedule.

Objectives:

- Data-Driven Decision Making

- Use AI-generated data (e.g., image analysis or damage detection models) to assess the severity and distribution of hurricane impacts.
 - Interpret and represent this data using graphs, tables, and spatial tools.
 - Project Management in Engineering Design Thinking
 - Apply principles of project management and engineering design to propose feasible and effective cleanup/recovery plans.
 - Consider constraints such as time, resources, accessibility, and population vulnerability (based on student research).
 - Communication of Technical Information
 - Communicate findings and solutions using clear visual, oral, and written formats, including charts, maps, and planning documents.
 - Justify decisions using evidence-based reasoning.
 - Real-World Relevance & Resilience
 - Understand how technology (AI) and engineering can intersect in disaster recovery.
 - Reflect on the importance of prioritization and community-centered design in the context of natural disasters and urban resilience.
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*Tchnavia Merrick
Math Engineering And
Science Academy
Charter High School*



Lesson Plan

GRAFFITI VISION: ENGINEERING AI TO SEE STREET ART

Class Type: Engineering

Grade: 9

Overarching Focus of Lesson: The focus of this lesson is to help students understand how engineers train AI models to recognize and solve real-world problems. Building on their year-long study of AI, students will apply their knowledge by training a YOLO v11 model to identify and classify different types of graffiti. Through this process, students will explore how datasets are created, how models learn to detect patterns, and the challenges engineers face in ensuring accuracy and fairness in AI systems. By testing their trained model on graffiti images, students will evaluate whether AI can accurately classify street art and reflect on the limitations and possibilities of using AI in complex, creative contexts.

Objectives:

- Students will learn how engineers use labeled data to train models like YOLO v11 to detect and classify real-world images.
 - Students will explore how AI identifies patterns in data (graffiti styles) and applies rules to classify images into categories.
 - Students will evaluate the accuracy of their model, considering why AI might misclassify graffiti and how dataset quality impacts results.
 - Students will investigate how AI can be applied to solve community-based or real-world problems, such as identifying or categorizing graffiti.
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*Migdalia Sanabria
Columbia Secondary
School*



Lesson Plan

DATA COLLECTION: NYC E-BIKE CRASHES

Class Type: ICT

Grade: 6

Overarching Focus of Lesson: Students will explore the intersection of urban design, transportation safety, and data science by examining Streetscapes research and human interactions to learn to co-exist safely.

Objectives:

- The goal is for students to identify spatial and environmental factors that may contribute to crash hotspots and propose data-informed recommendations for safer streets.
 - By conducting hands-on investigations using NYC Open Data, students will analyze patterns in e-bike crash data across New York City.
 - Students will be able to select their Independent variable and the Dependent Variable is to measure the #of e-bike crashes
 - Through this unit, students will strengthen their skills in research, critical thinking, and civic responsibility, while gaining firsthand experience in using public data to solve real-world urban issues.
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*Zaccariah Toaha
Fort Hamilton High
School*



Lesson Plan

JOB SKILLS IN A WORLD OF AI

Class Type: General, Elective

Grade: 9

Overarching Focus of Lesson: Job Skills in a World of AI

Objectives:

- AI Models to be effective need to be trained on large amounts of data.
 - This understanding can guide us in understanding what careers will continue to exist in the future.
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