

EV Internship and Faculty Development Pilot

**PJ Ricatto,
Rebekah Han, Patrick Meagher,
Alejandro Olarte, Jonathan Barak,**
Bergen Community College

**Ethan Tassio,
Ben Myshka,**
Raritan Valley
Community
College

EV Internship and Faculty Development Pilot

Education Partners:

Bergen Community
College

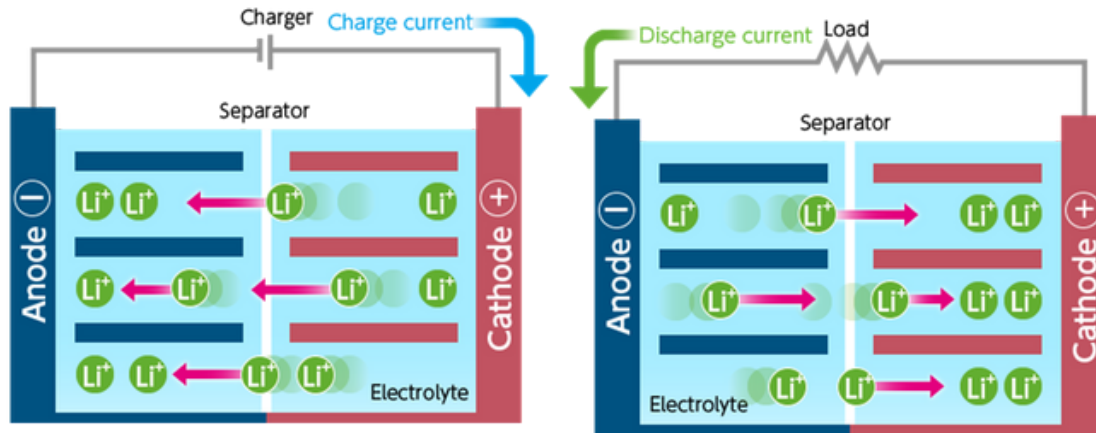
Raritan Valley
Community College

Brookdale Community
College

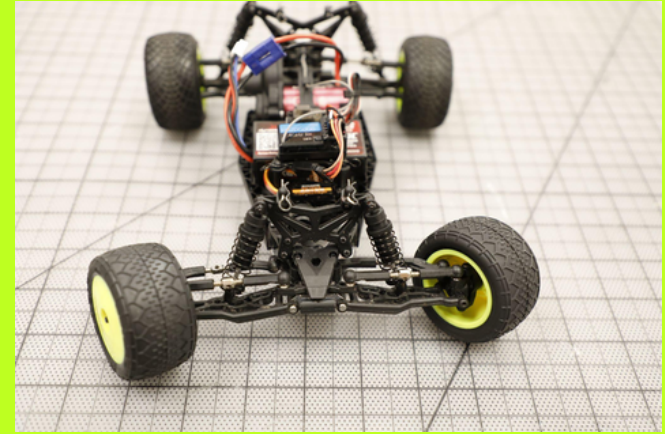
The EV Internship and Faculty Development Pilot is a collaborative project between Bergen Community College, Raritan Valley Community College (RVCC), and Brookdale Community College aimed at expanding workforce training in Electric Vehicle (EV) technology through internships, faculty development, and articulation agreements. This project provides hands-on internship experiences for students in EV-related industries and supports faculty participation in high-quality professional development through the Electric Vehicle Education for New Jersey (EVE-NJ) project, funded by the National Science Foundation.

EV Rover Awareness Laboratory

Steven Cohen,
Teacher of Mechatronics,
Applied Technology High School
Bergen County Technical Schools
Paramus NJ



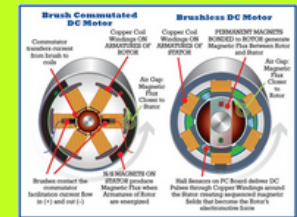
How lithium Batteries Work



**PhyPhox IMU
Analysis App**



**Electric Motor
Analysis**



Best Practices Guide: EV Go-Kart Design Challenge



2023 AACC/NSF
Community College
Innovation Challenge

Finalists



ELECTRIC GO KART DEVELOPMENT

Researchers: Richard Boada, Brandon Sarango, Breyson Tacza
Mentors: Dr. P.J Ricatto, Prof. Mark Balzarette



NJ PATHWAYS
TO CAREER OPPORTUNITIES
Aligning Education to Build an Innovative Workforce

Problem

- **Growing** concern about the EV skills gap
 - As the automotive industry transitions toward EVs, the **demand for skilled technicians** will skyrocket
 - Shortage of IMI TechSafe Technicians expected by 2029

Solution

- Create an **affordable and accessible** Electric Go Kart Kit and Best Practices Guidebook
- Perfect for high schoolers and community college students, our kit offers a **hands-on design challenge** to create an EV-Go-Kart in just one semester

Results

- Technical schools and community colleges aim to **expand** their automotive program with an introduction to EVs
- Our guidebook provides a detailed **list of materials, design challenges** for customization, and invaluable **best practices** and **manufacturing methodologies**
- Our prototype 2.1 reaches speeds of **40+ mph**
- **This program costs under \$3,500** and is suitable for students of all skill levels, offering hands-on experience in electrical, steering, and structural elements

Summer 2023

- **Accomplishments:**
 - Braking and Steering System
 - Pedal Placement
 - Safety upgrades
 - Performance Testing

Research Steps

- I. Research & Development**

48 Volt Motor
- II. Prototype & Design Iterations**

48 Volt 1.2kW LiFePO4 Battery
- III. NJ Pathways Partnership**
- IV. Customer Discovery**
(Administrators, Educators, Auto Mechanics, Electric Vehicle Manufacturers)

300 Amp Motor Controller

ASK US HOW TO BUILD YOUR OWN EV

WATCH US IN ACTION





EV Go-Kart Design Challenge

The EV Go-Kart Design Challenge created in NJ Pathways Year I was piloted at four participating high schools in Year 2:

1. Bergen County Technical School - Teterboro
2. Applied Technology High School - Paramus
3. John Dwyer Technology Academy - Elizabeth
4. Thomas Edison Career and Technical Academy - Elizabeth



EV Go-Kart Design Challenge



PATHWAY CONNECTIONS:

Connection to High School (Non-Credit)

Connection to High School (Dual Enrollment)

Community College (Non Credit)

Community College (Credit)

Apprenticeship Development

PLA for Apprenticeship RTI

PLA

Connection between Community Colleges (1+1)

Experiential Learning

Connection to CBOs

Adult Learners

Adult Literacy

Connection to 4-Yr College/University

Professional Development

Pilot

EV Internship and Faculty Development Pilot

Pathway Connection Progress:

This May four Bergen Community College (BCC) Engineering and Engineering Technology students completed a 100-hour internship at VOLVO USA headquarters in Mahwah, NJ. The students divided their time between the Tech Training Center and the Battery Development Group.

A second BCC cohort is scheduled to begin in early June.

Sixteen Raritan Valley Community College (RVCC) students will begin Automotive Service professional internships this summer at local automotive dealerships. Traditional internship experiences have been adapted to include an EV service component.

Internship Summary

Spring 2025



VOLVO

What I Learned - Rebekah

- **Car servicing**
 - Tire pressure, oil changes, software updates, registration
 - Diagnosing problems (problem-solving)
 - Exposure to power tools
 - (Enjoyed) test driving the cars
- **Exposure to VIDA** (diagrams, how-tos) and how repairs are documented
- **About myself** – I really enjoyed the hands-on aspect
 - I'm changing my major to electrical engineering
 - I need a garage; I want to stay in the automotive industry
- Working in a **corporate space** (Microsoft Teams) and as a team
 - I initially thought the garage door was automatic
- What might impact the **SOH** of batteries/battery faults
 - Connection between the shop and then looking at TIE/DRO
- How much branding and company vision (personally) matters



What I learned - Alejandro

- **Car servicing**
 - How to rotate tires, changing oil, fixing/diagnosing other issues with the car
 - PDI's (Pre-Delivery Inspection)
- **Data Analysis**
 - Using TIE and DRO to find SOH levels of batteries before and after they were restored
- **Würth & Snap-On**
 - Seeing the types of tools used in workshops has taught some of the tools I should be using to fix my own car or even for personal projects
- **Car Design**
 - Seeing Volvos up close taught me a multitude of things of how Volvo cars are made especially how designers/engineers think.
- **How to work in a corporate environment**
 - I have learned to communicate to others in a corporate manner as well as communicating through Microsoft Teams as it was my first time using the app



What I learned – Patrick

Industry Exposure & Operational Insight

- Gained valuable insight into the structure and strategic priorities of the automotive industry through hands-on experience.
- Observed the efficiency of Volvo's service workflows, particularly those enabling fleet uptime and minimizing operational disruptions.

Technical Learning & Understanding of Systems

- Developed a deeper working knowledge of failure diagnostics across electric and internal combustion platforms (Using DRO & TIE) critical for interpreting emerging EV/ICE market dynamics.
- Utilized battery pack health data (SOH) and module-level diagnostics to assess common failure causality and improve predictive maintenance and battery recycling strategies.
- Identified how production consistency and component aging affect long-term performance, drawing parallels with degradation patterns seen in other high-use consumer electronics.
- Benefited from a collaborative and professional work culture. The Volvo teams were supportive, and the environment was welcoming and well-structured.

Design Philosophy & User Centric Engineering

- Studied Volvo's design philosophy—where form serves function—to enhance safety, usability, and user trust in both daily and use case-critical contexts.
- Connected personally with Volvo's brand ethos: a commitment to resilience, reliability, and safeguarding what matters most, underscoring the impact of thoughtful, innovative, and robust engineering.



PATHWAY CONNECTIONS:

Connection to High School (Non-Credit)

Connection to High School (Dual Enrollment)

Community College (Non Credit)

Community College (Credit)

Apprenticeship Development

PLA for Apprenticeship RTI

PLA

Connection between Community Colleges (1+1)

Experiential Learning

Connection to CBOs

Adult Learners

Adult Literacy

Connection to 4-Yr College/University

Professional Development

Pilot

EV Internship and Faculty Development Pilot



PATHWAY CONNECTIONS:

Connection to High School (Non-Credit)

Connection to High School (Dual Enrollment)

Community College (Non Credit)

Community College (Credit)

Apprenticeship Development

PLA for Apprenticeship RTI

PLA

Connection between Community Colleges (1+1)

Experiential Learning

Connection to CBOs

Adult Learners

Adult Literacy

Connection to 4-Yr College/University

Professional Development

Pilot

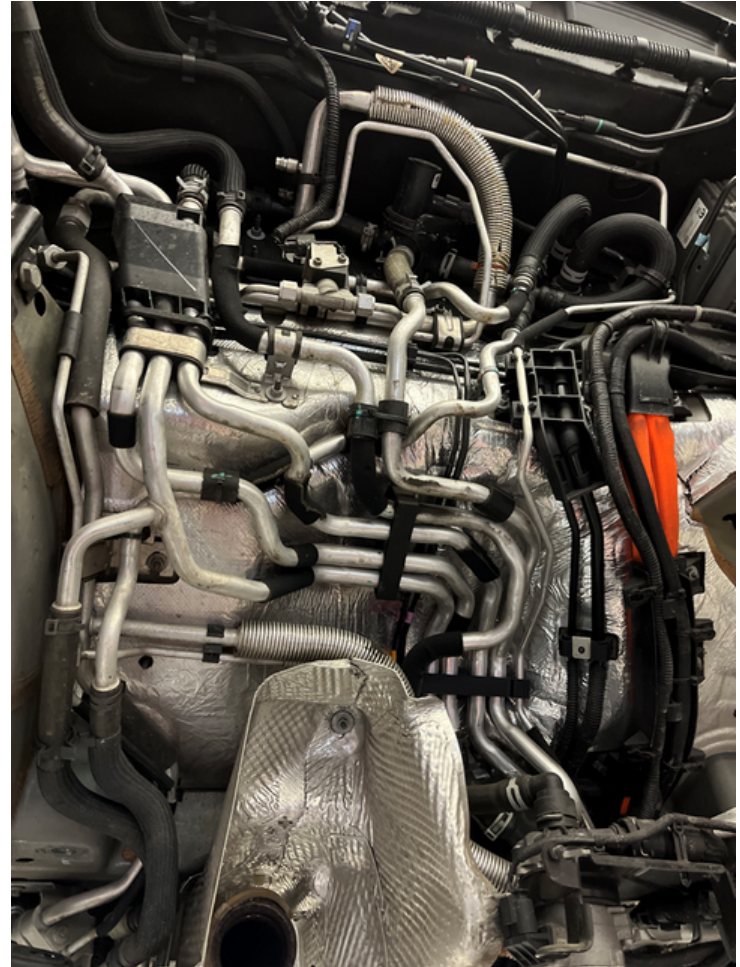
EV Internship and Faculty Development Pilot



Pacifica Hybrid Firewall

Electric Powertrain assembly removed from vehicle for engine replacement.

- Amount of cooling hoses and a/c plumbing required for optimal and safe operation of this vehicle.
- 3-way coolant valve for controlling flow through the heater core to provide cabin heat.
- Bottom right mounted to the bracket is an electric coolant pump.
- Orange cables are the positive and negative leading from the high voltage battery (380V DC) to the Power-Inverter Module mounted on top of the electric transmission (E-CVT).



High Voltage Battery from the STLA Large Platform

These photos are the Stellantis Boston Training Center.

I was fortunate enough to be able to take a 3-day class to learn about electric vehicles and do vehicle specific training on the Promaster BEV.

This is from a segment of training where we went over safe high voltage BEV battery lifting procedures as they weigh about 1,400~ lbs.

This additional training was fully sponsored by my dealership.



PATHWAY CONNECTIONS:

Connection to High School (Non-Credit)

Connection to High School (Dual Enrollment)

Community College (Non Credit)

Community College (Credit)

Apprenticeship Development

PLA for Apprenticeship RTI

PLA

Connection between Community Colleges (1+1)

Experiential Learning

Connection to CBOs

Adult Learners

Adult Literacy

Connection to 4-Yr
College/University

Professional Development

Pilot

EV Internship and Faculty Development Pilot

Pathway Connection Progress:

Bergen Community College faculty members have aligned the General Education (GE) and core courses to support a 1+1 articulation agreement in Automotive Technology. The goal is to allow students to complete their first year at BCC and transfer to either Brookdale or RVCC to complete the Automotive Service Technician degree with an EV specialization in their second year.

PATHWAY CONNECTIONS:

Connection to High School (Non-Credit)

Connection to High School (Dual Enrollment)

Community College (Non Credit)

Community College (Credit)

Apprenticeship Development

PLA for Apprenticeship RTI

PLA

Connection between Community Colleges (1+1)

Experiential Learning

Connection to CBOs

Adult Learners

Adult Literacy

Connection to 4-Yr College/University

Professional Development

Pilot

EV Internship and Faculty Development Pilot

Pathway Connection Progress:

CTE faculty from Bergen and RVCC have access to EV service technology professional development sessions hosted through the EVE-NJ NSF-funded program.

One Bergen CTE faculty member has already completed an EV training program.