CARIMO

Developed at IIT Bombay

One platform. Endless possibilities.

AI/ML and control systems in one ecosystem: seven software modules and one real kit.
Capture the data, train the model, tune the controller.

CUE
CARI Unified Ecosystem



AIMX Advanced
AI/ML learning platform

DAQ Master
Data acquisition platform

CARI Notebooks
MATLAB® live scripts

FlexiBridge
On-device AI/ML and control

PI / PID
Control experiments

MPC
Predictive control

Fuzzy Logic
Fuzzy control

Real data → Model → Deploy → Real-world insights

From signal to insight, in one ecosystem.

Built for: Students | Educators | Researchers | Industry

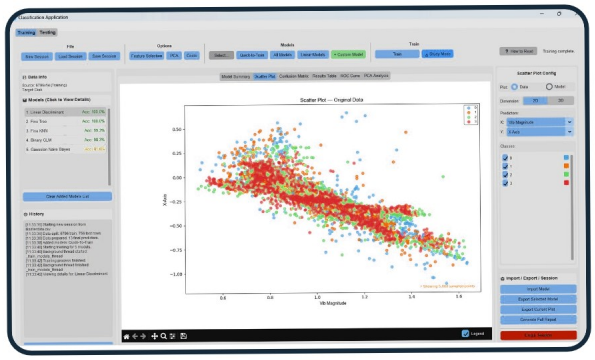
Six modules.
One ecosystem.

CUE
CARI Unified Ecosystem

Python and MATLAB® platforms plus control experiments, all on real motor data.

AIMX Advanced

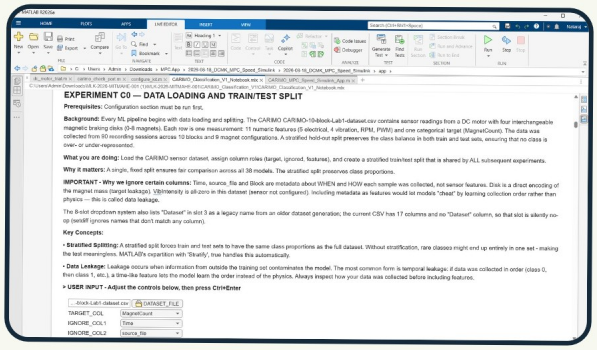
AI/ML learning platform | Python based



- ✓ Machine learning workflows
- ✓ Analytics and insights
- ✓ Model development
- ✓ 90+ models
- ✓ Solve real-world problems

CARI Notebooks

Live scripts | MATLAB® based

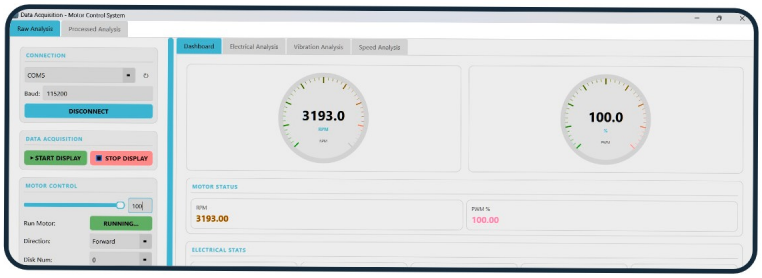


- ✓ Interactive MATLAB® live scripts
- ✓ Data analysis and visualization
- ✓ Machine learning
- ✓ Guided experiments
- ✓ Learning resources

DAQ Master

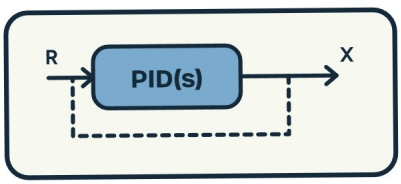
Data acquisition | Python based

- ✓ Multi-channel data acquisition
- ✓ Real-time monitoring
- ✓ Data logging and export
- ✓ Sensor integration
- ✓ Analysis and visualization



PI / PID Simulink®

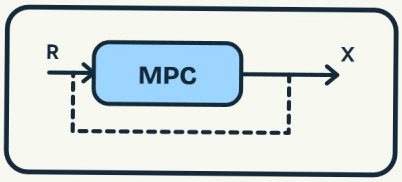
Control experiments



- ✓ Design and run classical control on the kit
- ✓ MATLAB® Simulink®
- ✓ PID(s), PI, PD controllers
- ✓ Real-time analysis

MPC Simulink®

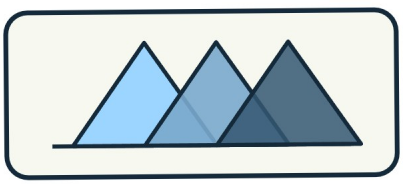
Predictive control



- ✓ Advanced predictive control
- ✓ MATLAB® Simulink®
- ✓ MPC controller design
- ✓ Real-world applications

Fuzzy Logic Simulink®

Fuzzy control



- ✓ Design and run fuzzy logic controllers on the kit
- ✓ MATLAB® Simulink®
- ✓ Fuzzy inference system
- ✓ Real-time performance

CUE: One platform. Endless possibilities.

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The hardware at the centre.

One Machine Learning Kit generates the real data every CUE module works on.

CUE
CARI Unified Ecosystem

Machine Learning Kit

Experiment. Learn. Build. Innovate.



A compact benchtop plant: a real motor, real sensors and a USB link to your PC.

Hardware datasheet

Processor	ARM Cortex-M4F, 84 MHz, FPU, 12-bit ADC
Motor	PMDC with quadrature encoder
Speed	Up to ~3200 RPM, ±8 RPM accuracy
Current sensor	±3 A range, ±2.5% accuracy
Vibration sensor	3-axis MEMS accelerometer, ±2 g
Motor driver	Integrated H-bridge, up to 3.5 A peak
Load system	Hot-swap magnetic load disks
Vibration control	PWM-adjustable knob, 0 to 100%
Connectivity	USB 2.0 to PC, timestamped CSV export
Power and body	12 V DC adapter, durable ABS enclosure

Works with Windows 11. Specifications may change.

Real data
Experiment with real-world signals

Model
Build, train and validate AI/ML models

Deploy
With FlexiBridge, run models and controllers on your own board

Real-world insights
Understand through visualization

For engineering education | **Hands-on learning** | **From fundamentals to advanced concepts** | **Supports research and innovation** | **Ready-to-use academic solution**

Learn faster. Interact deeper. Educational portal

Next page: FlexiBridge, the two-board lab →

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Two boards.
One live loop.

FlexiBridge
Hardware module

An embedded systems and on-device AI kit for college labs. This is where AI/ML models and controllers are deployed to real hardware, with the hard part already done.

Machine Learning Kit

The plant



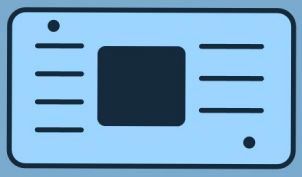
A ready-made black box. Real motor and sensors, sealed.

live sensor data →

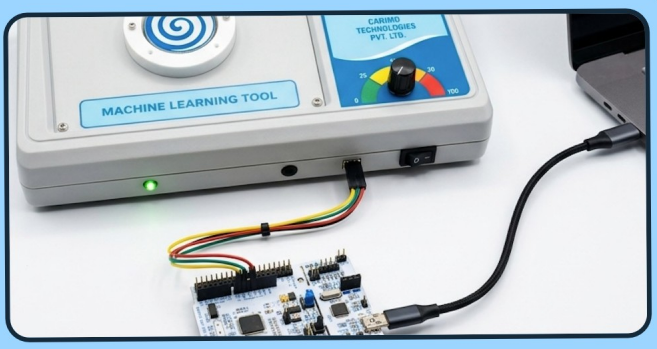
← simple commands

Your students' board

The brain



Fully programmable. Students add sensors and run their own models here.



Plug in. Connect. Start experimenting.

What students build

- **On-device AI**
  Train Random Forest and Decision Tree models in Python, then run them on the board.
- **Real-time control**
  Run PID and MPC on live hardware.
- **Sensor fusion**
  Add your own sensors and combine them with the kit data.
- **Data collection**
  Log and label your own datasets.

A simple SDK

No serial parsing, no protocol work. Students call a few functions and spend their lab time on the algorithm, not the plumbing.

```
FB_Init(); // set up once
while (1) {
FB_Update(); // refresh live data
// read values with simple getters
}
```

What students take away

Hardware in the loop
Every experiment runs on a real motor.

Focus on the algorithm
The plant is sealed, so students work on the part that matters.

Embedded, AI and control
Three core skills practiced together in one lab.

Bridge your experiments to endless possibilities.

Works with: Arduino Mega · Arduino Due · STM32 Nucleo · STM32 Blue Pill · ESP32 · + more

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