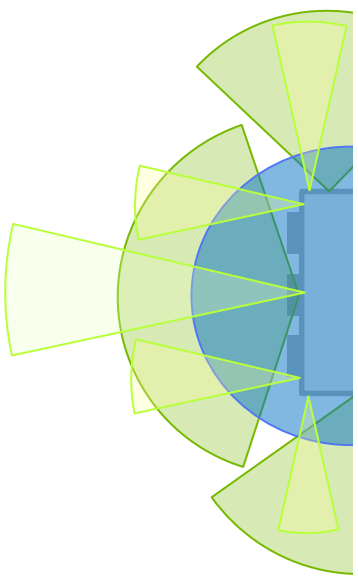
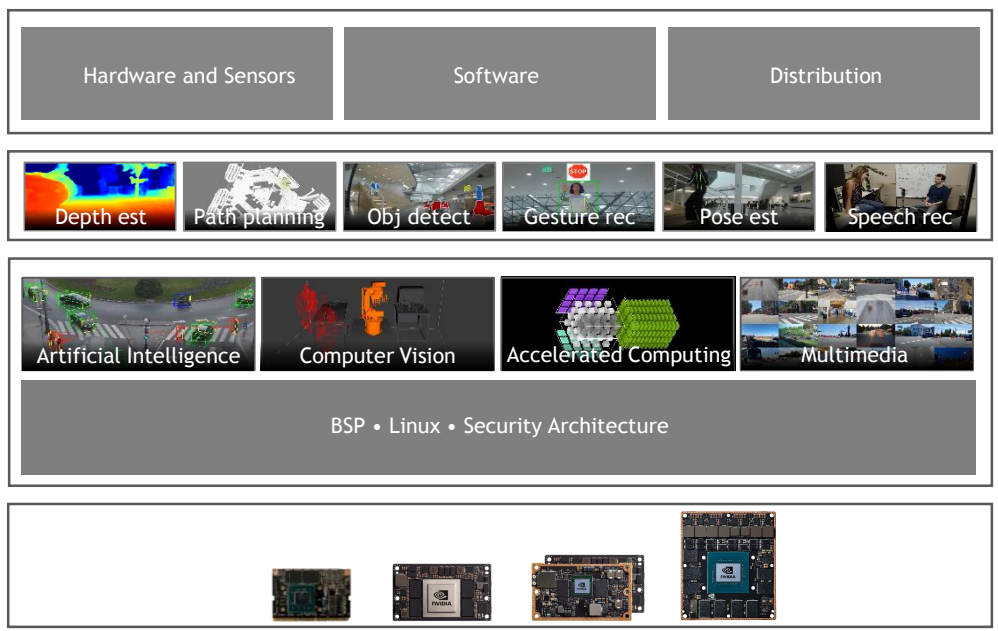
NVIDIA JETSON & ISAAC

JETSON PLATFORM OVERVIEW

NVIDIA JETSON
SOFTWARE-DEFINED AUTONOMOUS MACHINES

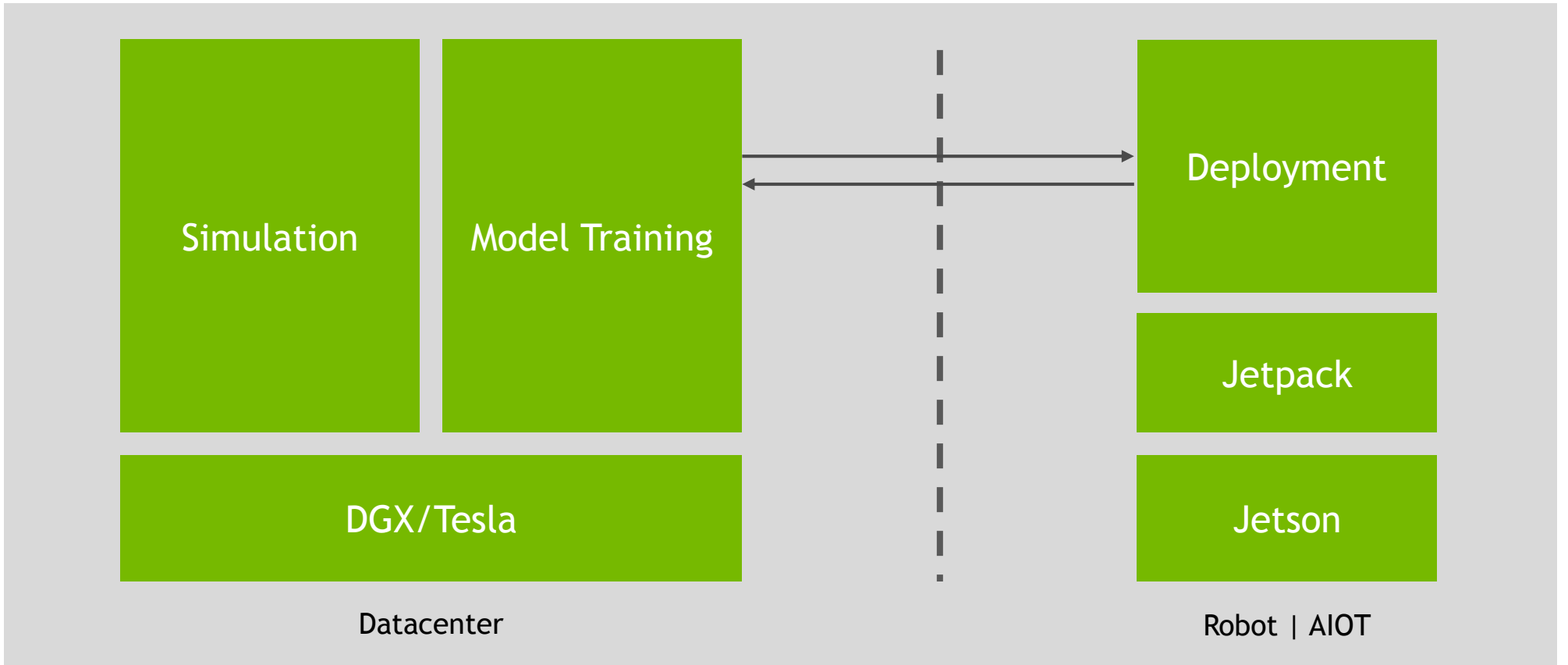
Powerful and efficient AI, CV, HPC | Rich Software Development Platform
Open Platform | 250K Developers





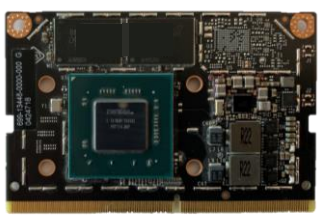
NVIDIA AI PLATFORM

From data center to machines

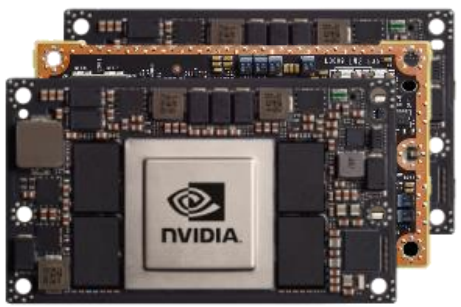


THE JETSON FAMILY

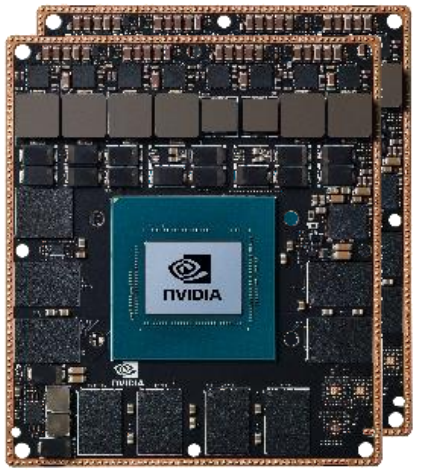
From AI at the Edge to Autonomous Machines



JETSON NANO
5 - 10W
0.5 TFLOPS (FP16)
45mm x 70mm
$129



JETSON TX2 Series
(TX2, TX2 4GB, TX2i*)
7.5 - 15W*
1.3 TFLOPS (FP16)
50mm x 87mm
Starting at $249



JETSON AGX XAVIER Series
(AGX Xavier 8GB, AGX Xavier)
10 - 30W
5.5 - 11 TFLOPS (FP16)
20 - 32 TOPS (INT8)
100mm x 87mm
Starting at $599

AI at the edge — Fully autonomous machines

Multiple devices - Same software

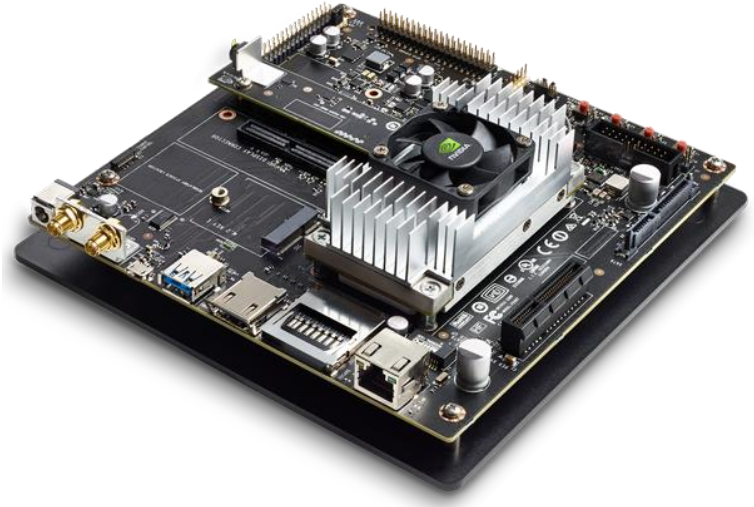
Listed prices are for 1000u+ | Full specs at developer.nvidia.com/jetson

*i = for industrial environments

JETSON DEVELOPER KITS

For Engineers, Makers, and Learners

JETSON NANO
5W | 10W
0.5 TFLOPS (FP16)
$99



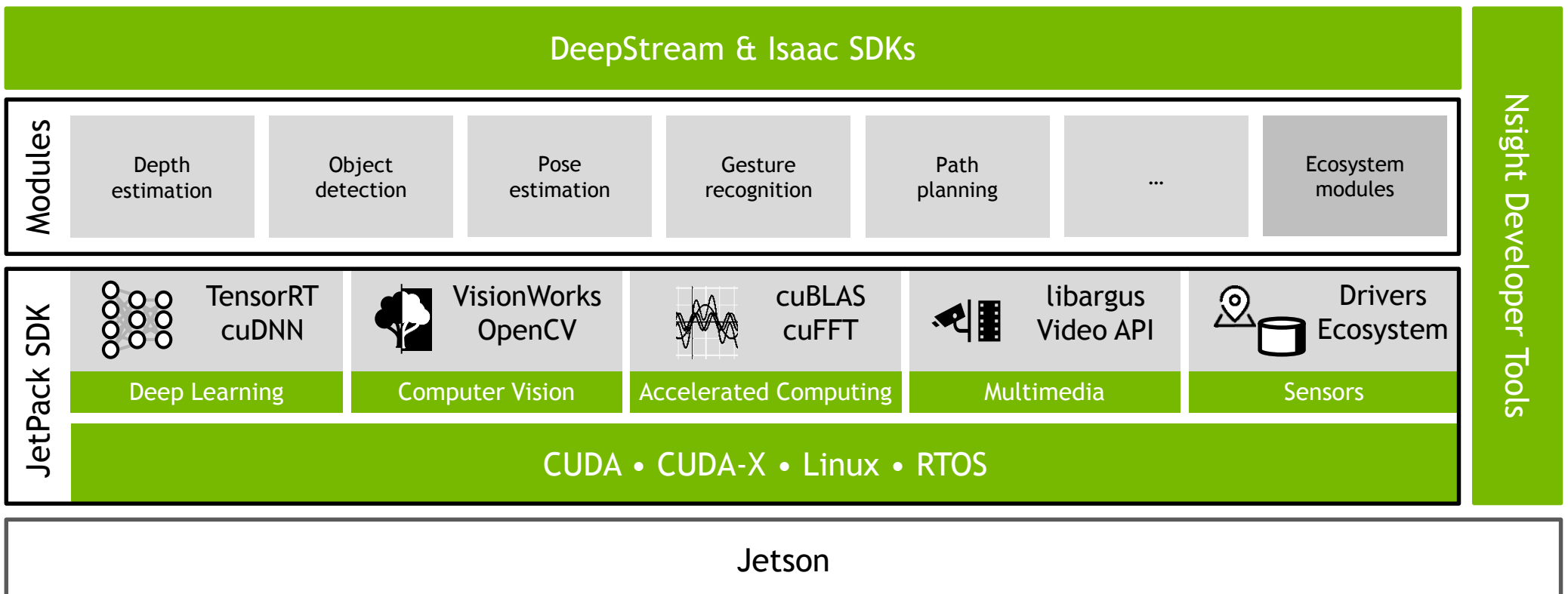
JETSON TX2
7.5W | 15W
1.3 TFLOPS (FP16)
$399 ($299 EDU)

JETSON AGX XAVIER
10 | 15W | 30W
11 TFLOPS (FP16) | 32 TOPS (INT8)
$699

Multiple developer kits - Same software

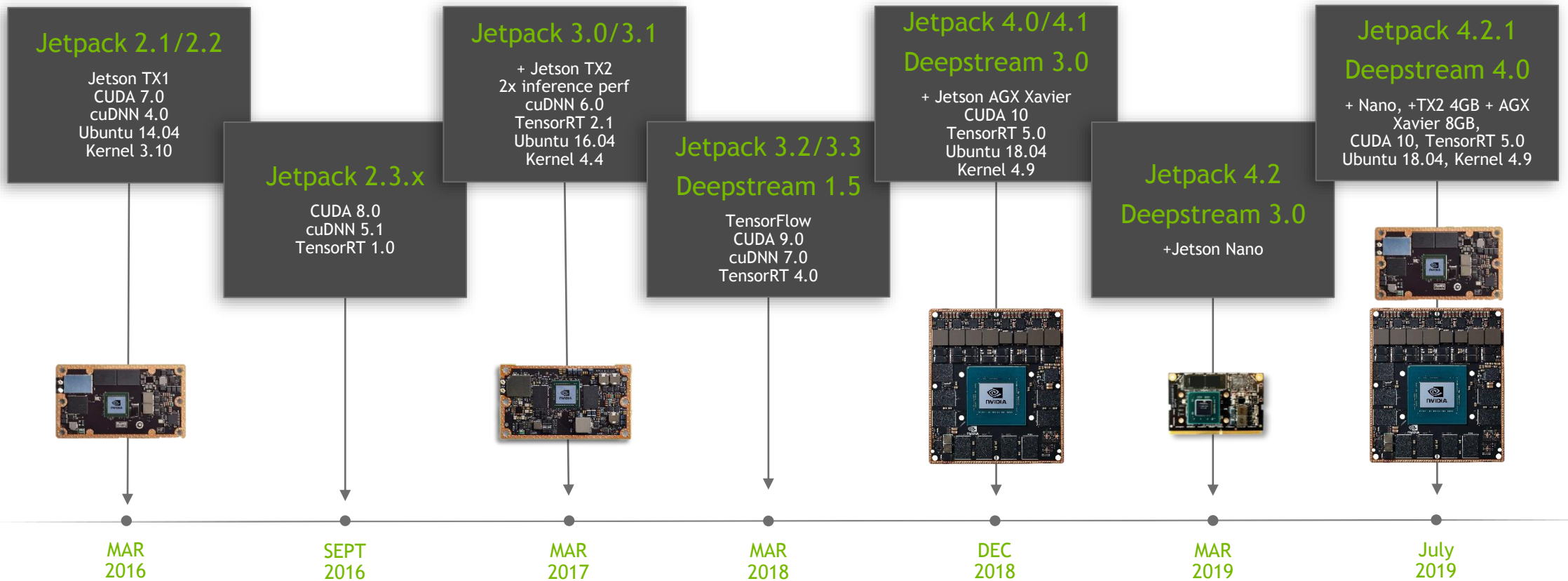
Full specs at developer.nvidia.com/jetson

JETSON SOFTWARE



Jetson software: developer.nvidia.com/jetson

CONTINUOUS SOFTWARE INVESTMENT



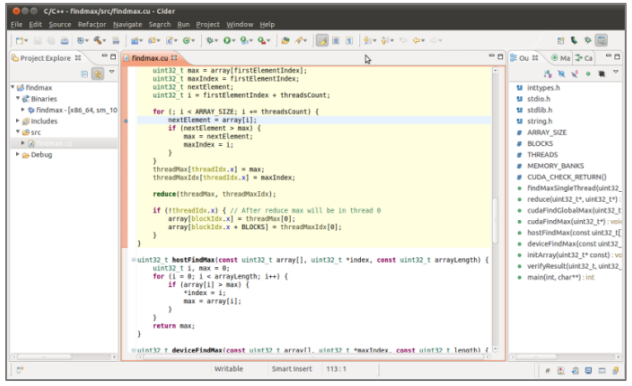
JETSON DEVELOPER TOOLS

Comprehensive tool suite to accelerate development

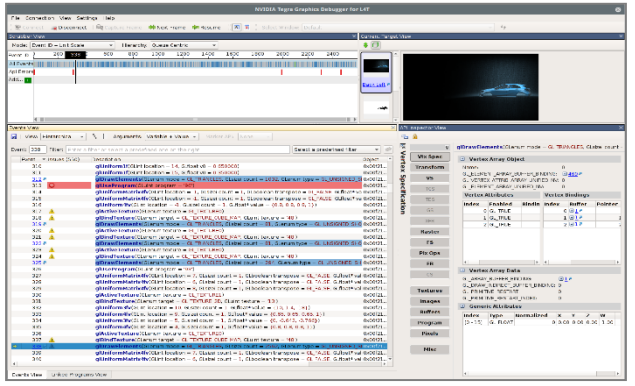
System wide application tuning and optimization

Workload balancing across GPU, CPU, DLA

Multi-platform development



CUDA-aware editor

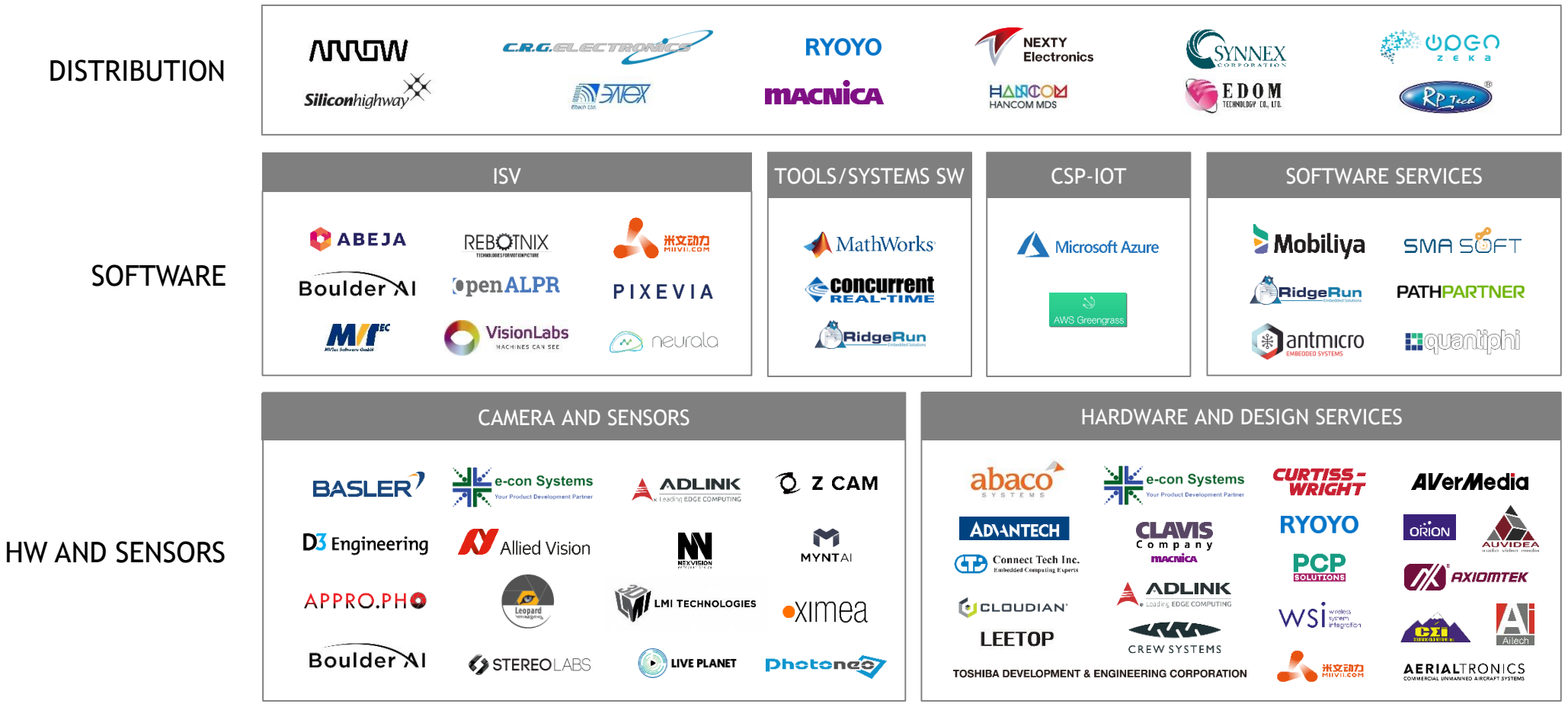


CPU/GPU debugger
Compute and graphics

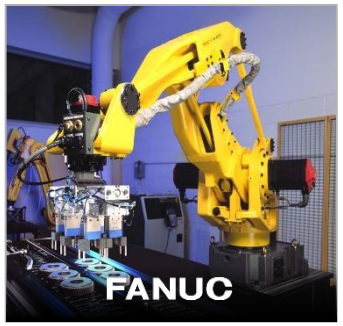
Visual profiler and system trace

Develop → Profile → Analyze → Optimize

JETSON ECOSYSTEM



JETSON SUCCESS STORIES



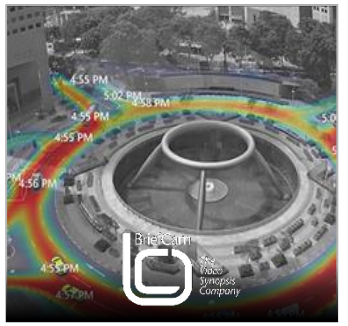
Industrial

Aerospace/Defense

Construction

Agriculture

Healthcare



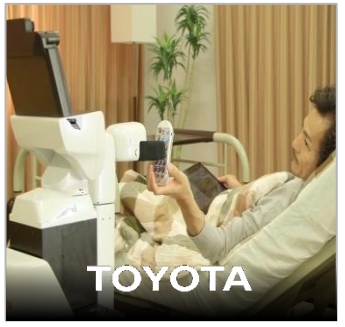
Smart City

Retail

Logistics

Delivery

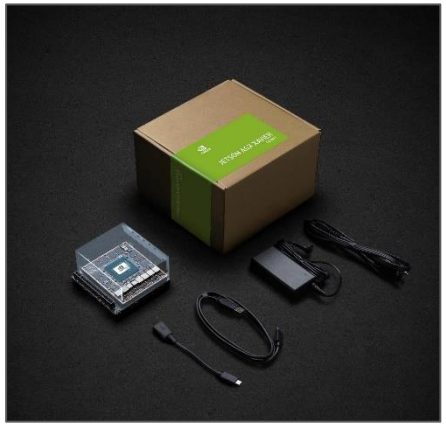
Inspection



Service

Collaboration

JETSON - START NOW



JETSON DEVELOPER KIT

Start developing now

Starting at $99

developer.nvidia.com/buy-jetson

TWO DAYS TO A DEMO

Create your first demo today

developer.nvidia.com/embedded/twodaystoademo

DEEP LEARNING INSTITUTE

Training • Labs

Nanodegrees

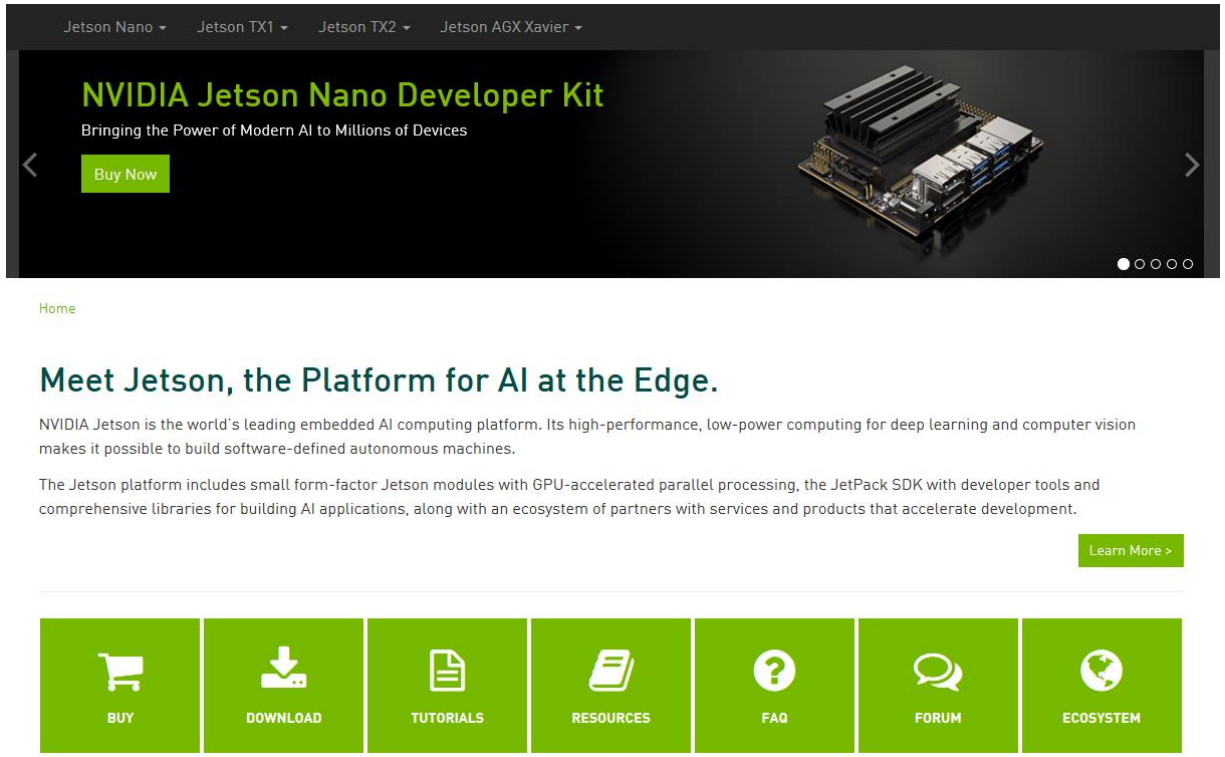
nvidia.com/DLI

GTC

Largest event for GPU developers

gputechconf.com

JETSON - START NOW

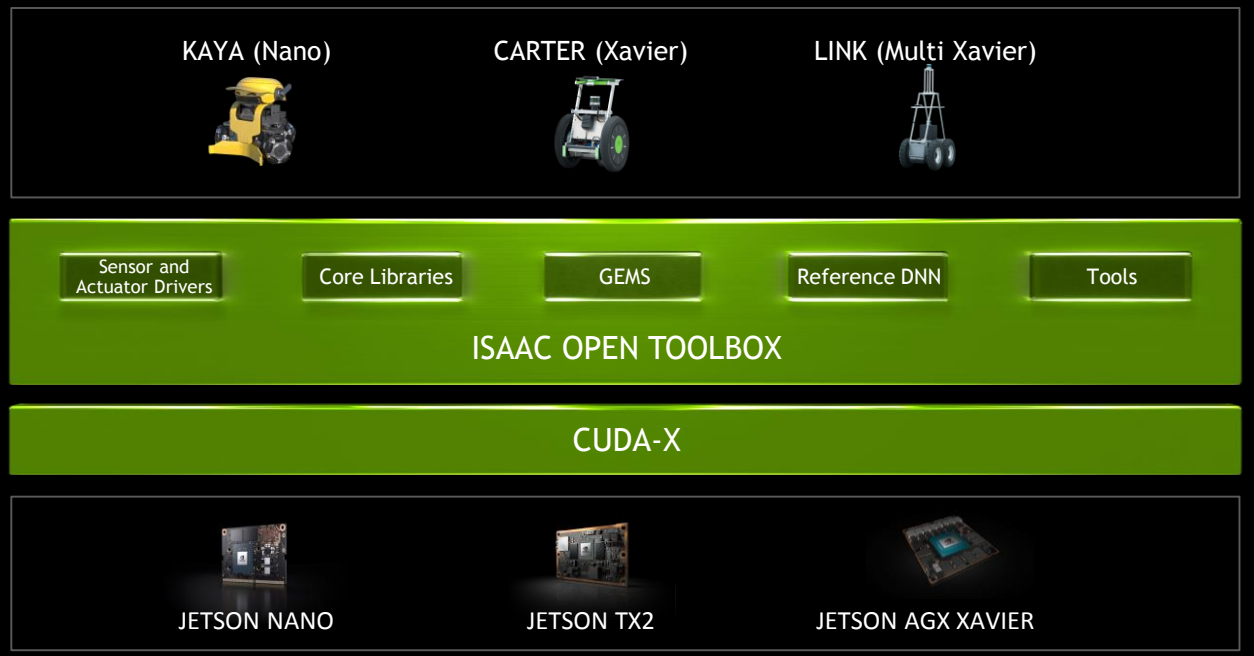


AUTONOMOUS MACHINES

https://developer.nvidia.com/embedded-computing

NVIDIA ISAAC

ISAAC



Isaac Robot Engine

Isaac Sim

Isaac Gym

Isaac Robot Engine – Modular robot framework | Isaac Sim - Virtual robotics laboratory
Isaac Gym – Reinforcement learning simulator | Isaac Robot Apps – Kaya, Carter and Link
Available at developer.nvidia.com/isaac-sdk

NVIDIA ISAAC ROBOTICS SOFTWARE

ISAAC SDK — a collection of APIs and tools to develop robotics algorithm software and runtime framework with fully accelerated libraries.

ISAAC GEMS — Isaac Intelligent Machine Acceleration applications, a collection of NVIDIA-developed robotics algorithm software.

ISAAC SIM — a highly realistic virtual simulation environment for developers to train autonomous machines and perform hardware-in-the-loop testing with Jetson Xavier.

WHAT IS ROBOTICS

https://en.wikipedia.org/wiki/Robotics

CHALLENGES

Large Established Players - Specialized HW and SW

Startups - Open Source SW

All – AI-powered Robots

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WHY NVIDIA ISAAC™?

Three Key Benefits

ACCELERATE DEVELOPMENT OF ROBOTS

using a hardware + software platform built for robotics

DEPLOY PRODUCTION-GRADE ROBOTS AT SCALE

using an open and extensible platform for industrial, service, and commercial robots

BUILD SMARTER ROBOTS

leveraging AI, computer vision, simulation, and other algorithms accelerated by NVIDIA compute platforms

Isaac is a platform for robot development and simulation that's optimized for NVIDIA hardware platforms

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ISAAC ROBOTICS PLATFORM

Isaac Downloads

Download the NVIDIA® Isaac SDK and related files below.

Item	Description	Link
Isaac SDK 2019.1	NVIDIA® Isaac SDK 2019.1 sources and pre-compiled packages.	Download ›
Isaac SDK nightly 2019-05-28	Nightly build of NVIDIA® Isaac SDK 2019-05-28 sources and pre-compiled packages.	Download ›
IsaacSim nightly 2019-05-29	Nightly build of NVIDIA® Isaac SIM 2019-05-28 sources and pre-compiled packages.	Download ›
Kaya Robot Reference Design	Kaya robot reference design and 3D printable parts. Detailed instructions are available in the Isaac developer guide documentation.	Download ›
Isaac SDK Developer Guide	Documentation, developer guide for NVIDIA® Isaac Software Development Kit (SDK).	View ›
Isaac Sim Content XML	NVIDIA® Isaac Sim sources and content. Setup instructions can be found in the Isaac Sim Developer Guide.	Download ›
Kaya Sim App for Isaac SDK	Kaya app add-on for the Isaac SDK. Quick start instructions can be found in the Isaac Sim Developer Guide.	Download ›
Isaac Sim Developer Guide	Documentation, developer guide for NVIDIA® Isaac Sim.	View ›

https://developer.nvidia.com/isaac/downloads

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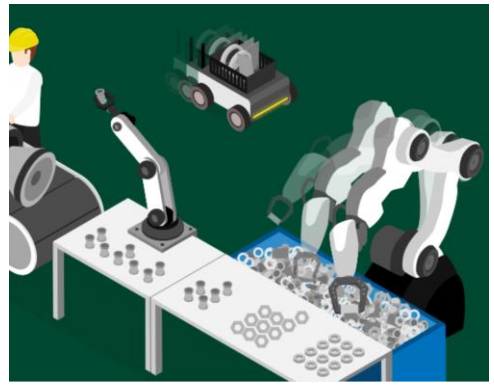
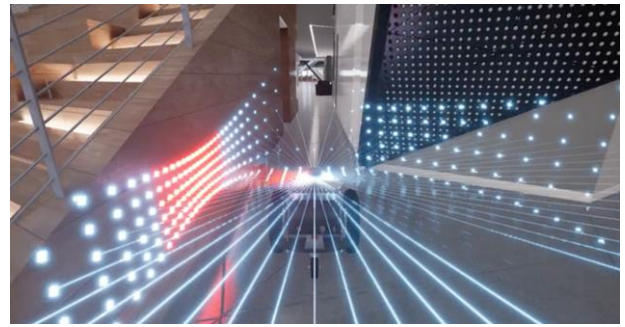
INVITATION TO ECOSYSTEM

To use Isaac platform to make it easy for robotics developers

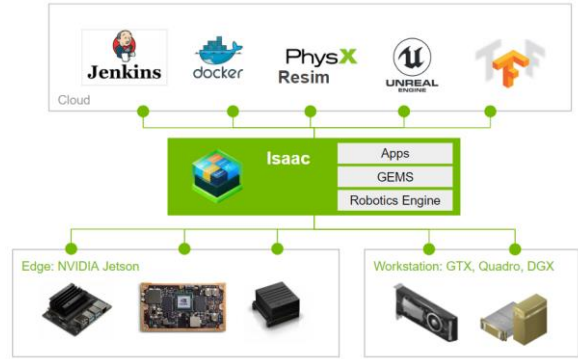
Deploy AI powered robots at scale.

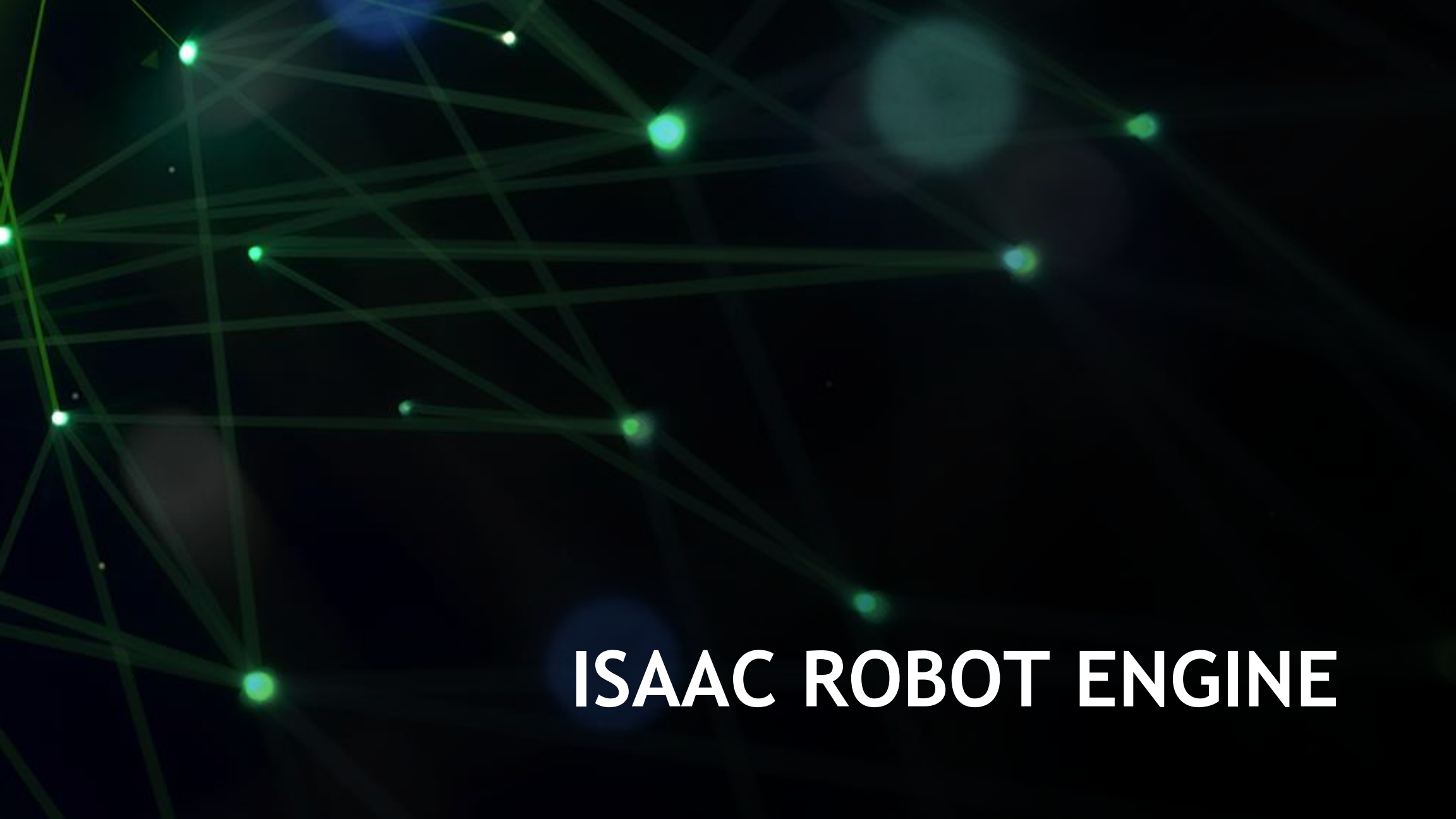


Simulate in our Isaac Sim platform.



Deliver latest software to the Isaac users using continuous integration.

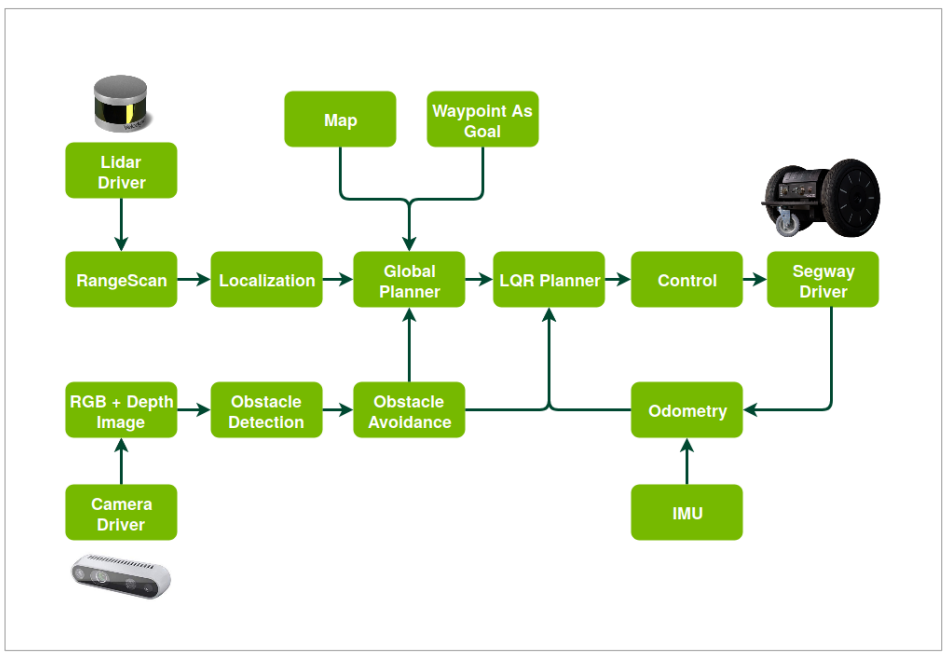



ISAAC ROBOT ENGINE

ISAAC ROBOT ENGINE

Component-Based Design

- Framework to build modular robotics applications
- The power to drive high-perf image processing/DL applications
- Computational graphs and entity component system
- Behavior tree
- Seamless compatibility with NVIDIA®Jetson AGX™/TX2/Nano and NVIDIA dGPU



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ISAAC ROBOT ENGINE

Visualization

- ISAAC SIGHT:
  API to create variable plots and visualize data in 2D or 3D renderings
- ISAAC WEBSIGHT:
  Web-based front end to look at data provided by the Sight API

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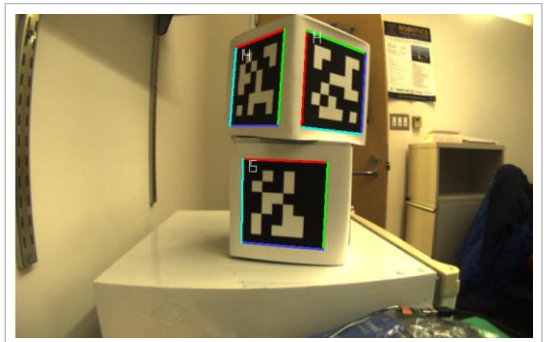
ISAAC GEMS

PERCEPTION CAPABILITIES

- Fiducial detection system using AprilTag detection
- Path perception using DNN-based path segmentation*
- Obstacle perception using DNN-based object detection
- Superpixels



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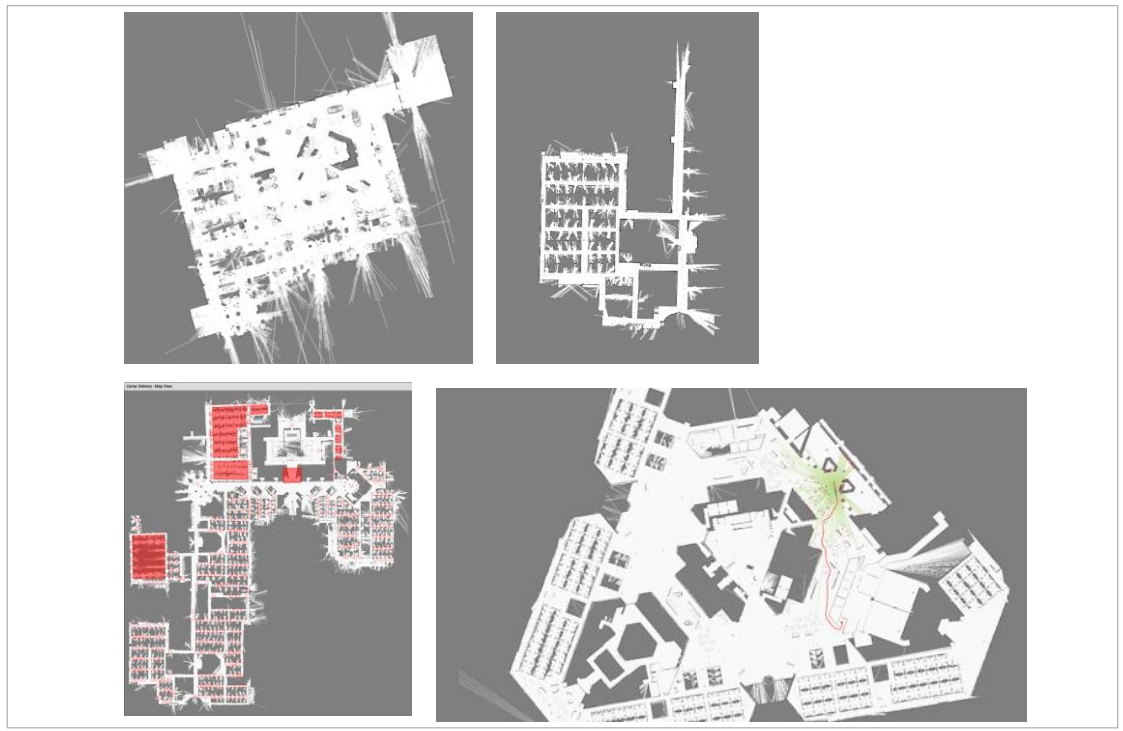
MAPPING

- LIDAR-based map creation
  - Map annotation
  - Map editor
    - Accurate modification
- gmapping and Cartographer



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NAVIGATION

- LIDAR-based localization
- LIDAR-based global localization
- Global path planning
- Trajectory planning (LQR)

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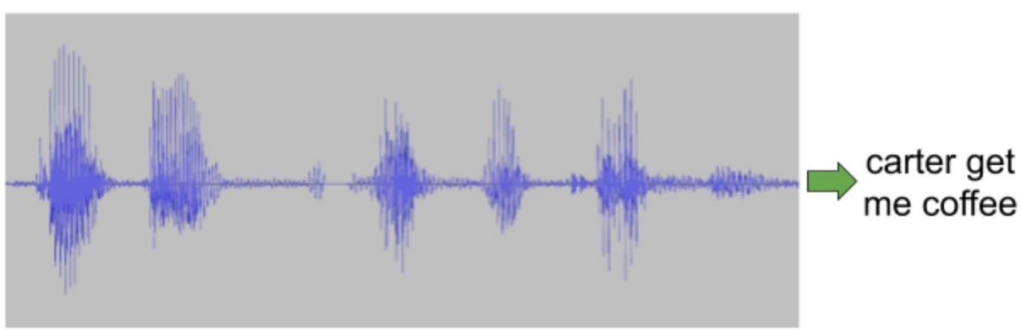
IX

Human Machine Interaction

- ListeNet: Detection to recognize a trained set of voice commands
- Gesture recognition
- Face detection/recognition
- and more



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ISAAC REFERENCE DESIGNS

For Indoor Logistics (Carter) and Getting Started (Kaya)

- CARTER:

  Carter is an Isaac SDK reference robot platform for autonomous indoor delivery and logistics based on the Jetson AGX Xavier platform.

- KAYA:

  Kaya is a small robot reference platform to get started with the Isaac SDK; based on Jetson Nano.

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ML/DL ACCELERATION

Reference DNNs

- StereoDNN (stereo depth)
- UNet (path segmentation)
- ListeNet (voice)
- Yolo (object detection)
- Support for TensorFlow, Keras, Python bindings and NVIDIA TensorRT for DNN inference

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ISAAC REFERENCE DESIGNS

Sample Applications

- CARTER APPS:
  - Use a given waypoint as a goal to travel to (Map Waypoint)
  - Use a specific place in the building as a goal to travel to (Pose)
  - Travel a predetermined route (Patrol mode)
  - Travel from one waypoint to another randomly chosen waypoint (Random)

- KAYA APPS:
  - Detect and follow an AprilTag (Follow-me)
  - Map Kaya's environment using stereo camera and a joystick (Mapping)
  - Detect the objects using DNN and classify objects

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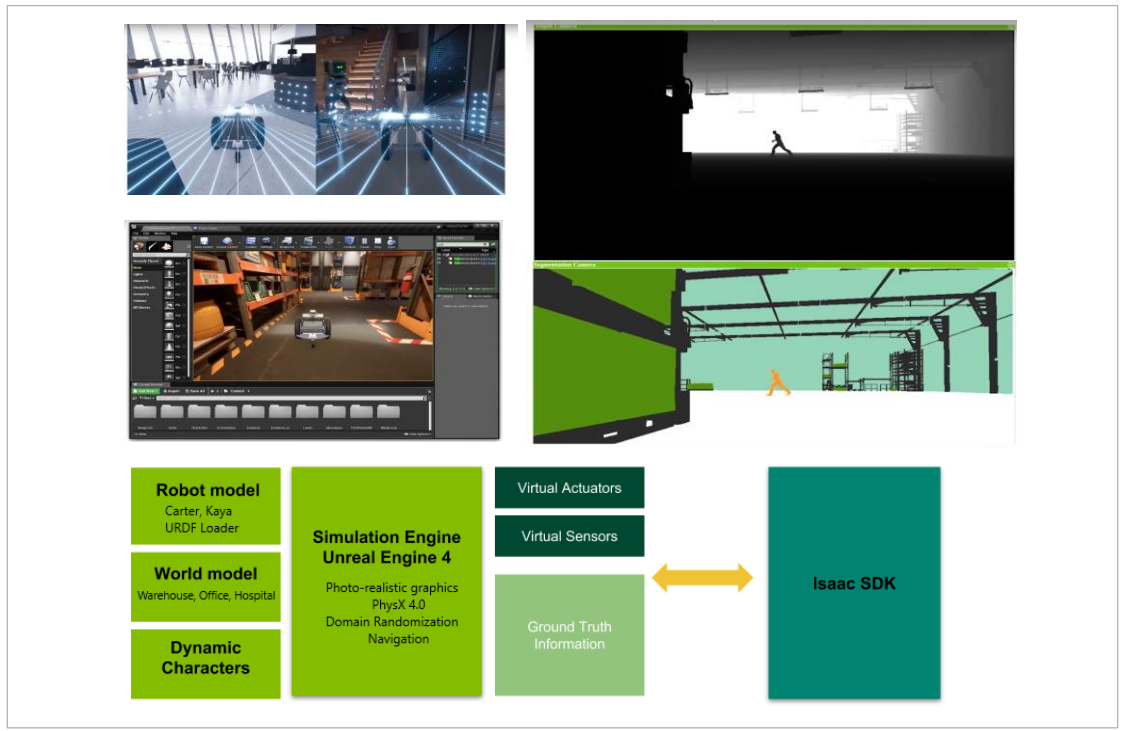
SIMULATION

Robot Simulation to Test Navigation, Manipulation, and Perception

- Domain randomization
- Support for Unity and UnReal game engines
- Simulation of
  - Robot dynamics
  - Sensors (camera, LIDAR, IMU)
  - Different environments
  - Agents around robots (dynamic environment)



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ISAAC

Where to get it from and Product Support

- DEVZONE

https://developer.nvidia.com/isaac-sdk

- FORUMS

https://devtalk.nvidia.com/default/board/374/isaac/

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