Deploying Robotic Applications Using Machine Learning with Nvidia JetBot and AWS RoboMaker

Jeremy Wallace
Sr. Specialist Solutions Architect, Robotics

July 25th, 2019

What we will build today.

Using **AWS RoboMaker**, we will build a **ROS1 Melodic Application** that uses a **Amazon SageMaker-**trained model to detect dinosaurs on an **NVidia JetBot Starter Kit**

Preview Demo!

What we will cover:

- An introduction to **NVidia Jetson Nano Developer** Kit.
- Using **AWS RoboMaker** to build and bundle your ROS1 Melodic applications.
- How to configure the **NVidia JetBot** for **AWS RoboMaker**.
- How to deploy ML models to your **Nvidia JetBot**
- How to buy your own from **SparkFun**

aws

NVidia Jetson Nano Developer Kit

An inexpensive yet powerful board to use with your robot projects

- Costs only $99.
- Runs on as low as 5W.

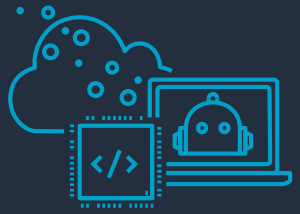
GPU	128-core Maxwell
CPU	Quad-core ARM A57 @ 1.43 GHz
Memory	4 GB 64-bit LPDDR4 25.6 GB/s
Storage	microSD (not included)
Video Encode	4K @ 30 | 4x 1080p @ 30 | 9x 720p @ 30 (H.264/H.265)
Video Decode	4K @ 60 | 2x 4K @ 30 | 8x 1080p @ 30 | 18x 720p @ 30 (H.264/H.265)
Camera	1x MIPI CSI-2 DPHY lanes
Connectivity	Gigabit Ethernet, M.2 Key E
Display	HDMI 2.0 and eDP 1.4
USB	4x USB 3.0, USB 2.0 Micro-B
Others	GPIO, I^2C, I^2S, SPI, UART
Mechanical	100 mm x 80 mm x 29 mm

aws

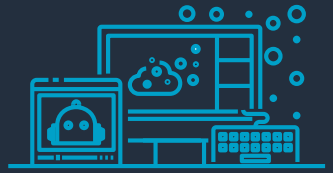
AWS RoboMaker Overview

Develop, test, and deploy intelligent robotic applications with AWS

Core Capabilities of AWS RoboMaker



Development Environment



Simulation

Fleet Management

Cloud Extensions for ROS

aws

Our Application Architecture.

NVidia JetBot

ROS Application

ROS Node with ML Libraries

Fleet management

AWS Greengrass
Core Device

AWS RoboMaker
ROS Extensions

Download New Models

AWS SageMaker

Tagged New Dinosaurs

Amazon SageMaker Ground Truth

Amazon S3
Dinosaur Images
Training Data

Training

Sagemaker Trained ML Model

AWS RoboMaker
Development Environment

AWS RoboMaker
Simulation Environment

Iterative, Test-driven Development

Status Updates AWS IoT

AWS IoT

Device Shadow

IoT Topic Rules

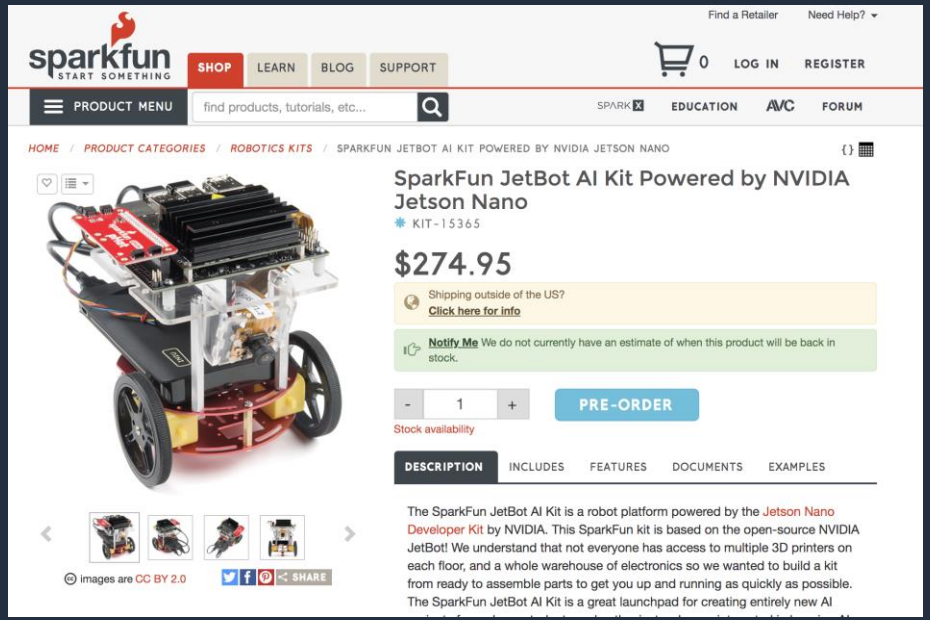
AWS Amplify React Website

Let’s Build!

Next Steps: Build Your Own with Spark Fun!

The “JetBot” Robot Starter Kit from SparkFun

- Easiest way to get started building a robot with the Nvidia Jetson Nano.
- Ready-to-assemble parts.
- No 3D printing required!



Useful Links

- **AWS RoboMaker GitHub Repositories**
  - https://github.com/aws-robotics
- **AWS RoboMaker Workshops**
  - https://www.robomakerworkshops.com/
- **Spark Fun AI JetBot Kit**
  - https://www.sparkfun.com/products/15365
- **JetBot ROS Application**
  - https://github.com/dusty-nv/jetbot_ros
- **NVidia JetBot Getting Started Guide**
  - https://github.com/NVIDIA-AI-IOT/jetbot/wiki

Look for our code coming soon: ***http://github.com/awslabs***

aws