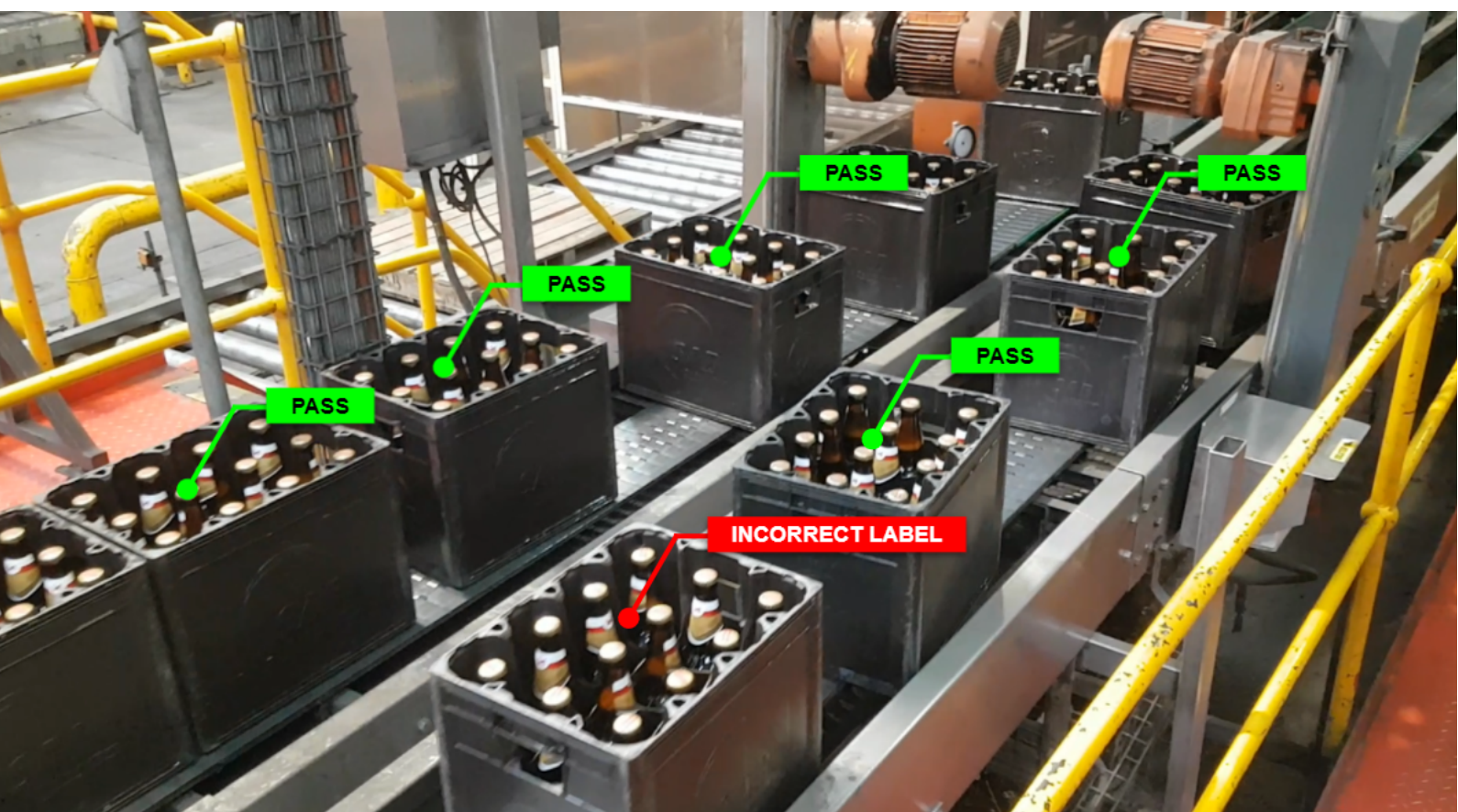# FirstStep.ai
AI Inspection Application
for Production Lines

Application Overview

"AI has unprecedented potential" - Rich Karlgaard, Forbes Media

Product Version: **2021**

Document Revision: **2021-08-03**

Product Name

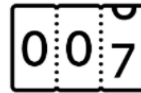FirstStep.ai AI Inspection Application for Production Lines

Industry Applications

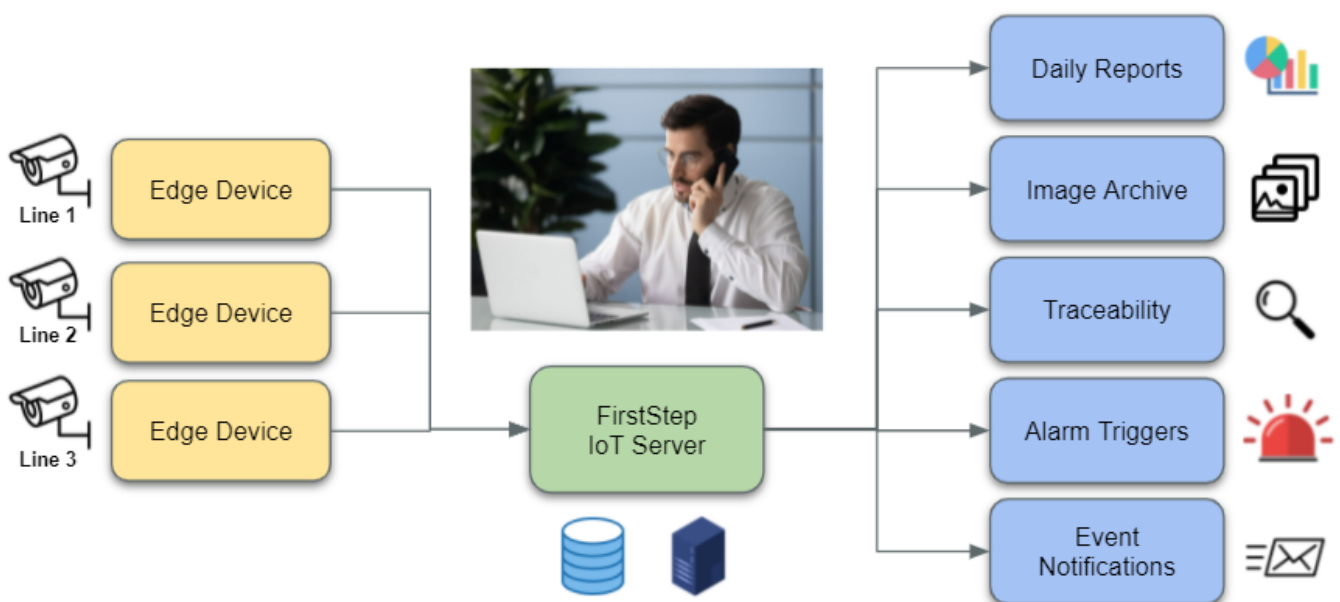| Crate / Box Counters | Product Inspection | Product Counters | Label Inspection |

Product Overview

The FirstStep.ai Production Line AI Inspection application allows multiple IoT Edge devices (clients), connected on the same LAN network, to send Inspection data to the central FirstStep IoT server. This server stores data and images, and serves this to the end user in the form of Daily reports. The FirstStep IoT server keeps an archive of images to offer the user traceability, the ability to search and review any past product. Alarms triggers and event notifications can also be configured.

Edge Devices

FirstStep.ai IoT Client software is compatible with a range of Edge devices, including the NVIDIA Jetson Nano. The NVIDIA Jetson Nano offers: 4-core CPU, 128-core GPU, 4GB memory, Linux Operating System (Ubuntu 18.10), and dual stereo cameras (8MP, 30FPS, 3264 x 1848 px) capable of depth perception.

FirstStep.ai IoT Client Features

Object Detection features include:

- Detection objects in a production line
- Counting objects (totals)
- Saving images of objects
- Tracking objects (speed, movement, position, orientation on conveyor)
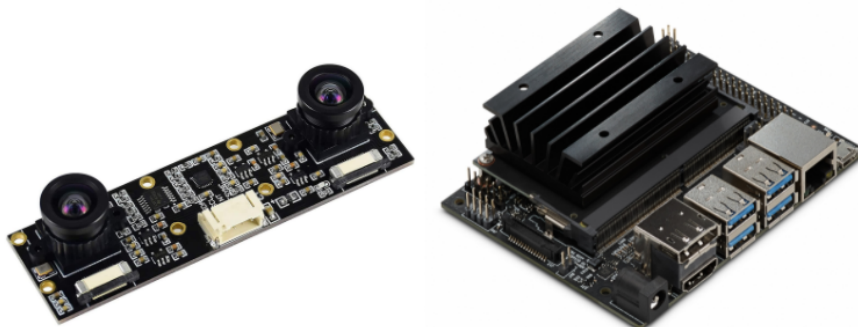
Client Application features include:

- Base inference application (capable of 20 FPS)
- Custom Object Detection (ONNX) model
- TensorRT (UFF) model compilation
- Object Detection model download from remote server

OS-level features include:

- Device-specific configuration file
- Auto-start of main script (45 seconds start-up time)
- LAN connection to FirstStep.ai server
- Allows configuration of static ethernet IP Address
- Records inference time (performance) and CPU temperature (stats)
- Sends periodic heartbeats (performance & stats) to central server
- Inference data sent to message queue (local database)
- Robust messaging service (ensuring no messages are dropped on reboot / lost server connection)
- Custom wifi configuration & wifi auto-connect
- Remote SSH access
- Remote system monitoring (CPU, Memory, HDD, temperature)
- Remote Desktop (NoMachine) & Xfce4 Desktop
- Custom Desktop Background Image
- Unique SSH Key Generation
- NTP Server Setup (ensuring device time synchronization)

FirstStep.ai

FirstStep.ai IoT Server Features

- Server runs on same LAN as FirstStep.ai IoT Client
- Server creates local database (SQLite3) but can connect to other databases
- Server receives processed data and images from clients
- Server stored metadata in database, and uses file storage for image data
- Server receives heartbeats requests from clients
- Web server hosts:
    - End User interface (high-level production analysis)
    - Device Health Check (for each connected client device)
    - Configuration & alignment screen (for installation)
    - Dashboard available to end users / operators around the plant.

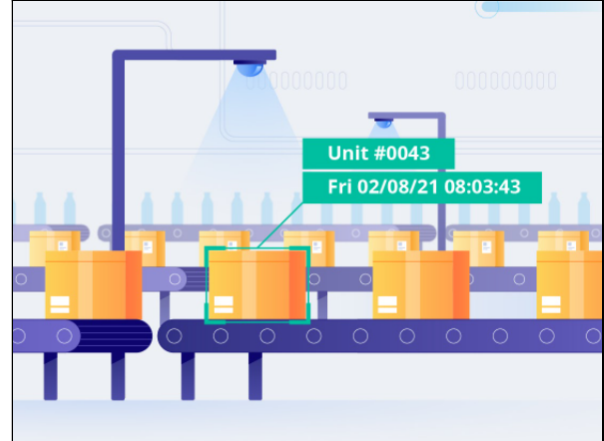|	
Device Id	4401bb8b50d1
Min Heartbeat Date	2021-07-13 00:35:06.287629
Max Heartbeat Date	2021-07-13 00:41:02.282587
Min Inference Time Taken Ms	28.503
Max Inference Time Taken Ms	31.445
Min Temp Cpu	30.0
Max Temp Cpu	32.0

Feature Comparison of Traditional Systems

Traditional sensors usually consist of individual proximity sensors aligned with precision, measuring the presence of bottles as they pass. By comparison, the FirstStep.ai AI inspector uses high-resolution RGB cameras, and Machine Learning to analyze video footage in real-time.

Traditional Systems

FirstStep.ai AI Inspector
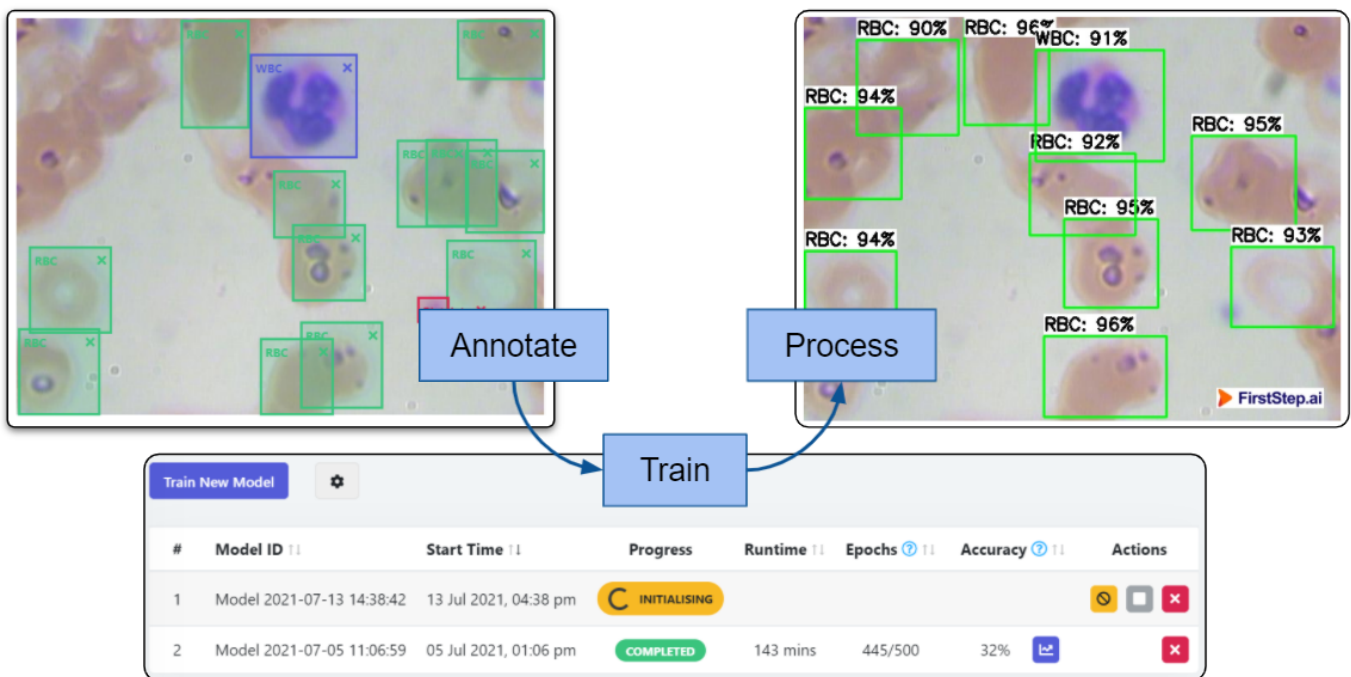
Application features comparison:

	Traditional Systems	FirstStep.ai AI Inspector
Hardware	• Proximity Sensor • Multiple sensors required	• 2 x High Resolution Camera • Edge Computing Device
Installation	• In-line • Requires precision installation	• Overhead camera (1.5 meters) • Robust to movements
Bottle Counting	✅	✅
Crate Counting	❌	✅
Crate Speed and Position	❌	✅
Bottle Brand Detection	❌	✅
Full Crate Inspector	❌	✅
Label Inspection	❌	✅
Image Capture & Store	❌	✅
Event & Alarm Triggers	❌	✅
Historical Defect lookup	❌	✅
Scalable Architecture	❌	✅
Detection Zone	**1D** Line of detection	**2D** Plane of detection **and** tracking

FirstStep.ai Designer

License includes access to the web-based FirstStep.ai Designer. This tool allows the users to train and deploy new AI models to client devices.

Features include:

- Collaborate with your team
- Upload datasets
- Label Images using the FirstStep.ai Annotation tool
- Automatic base model selection & image preprocessing
- One-click training AI models
- Deploy trained models to your edge devices
- Offline model deployment
- Process image and video files
- Dedicated customer support

More Information

For more information visit firststep.ai or contact: sales@firststep.ai