Choose the Right Hardware

Proposal Document

Scenario 1: Manufacturing

Client Requirements and Potential Hardware Solution

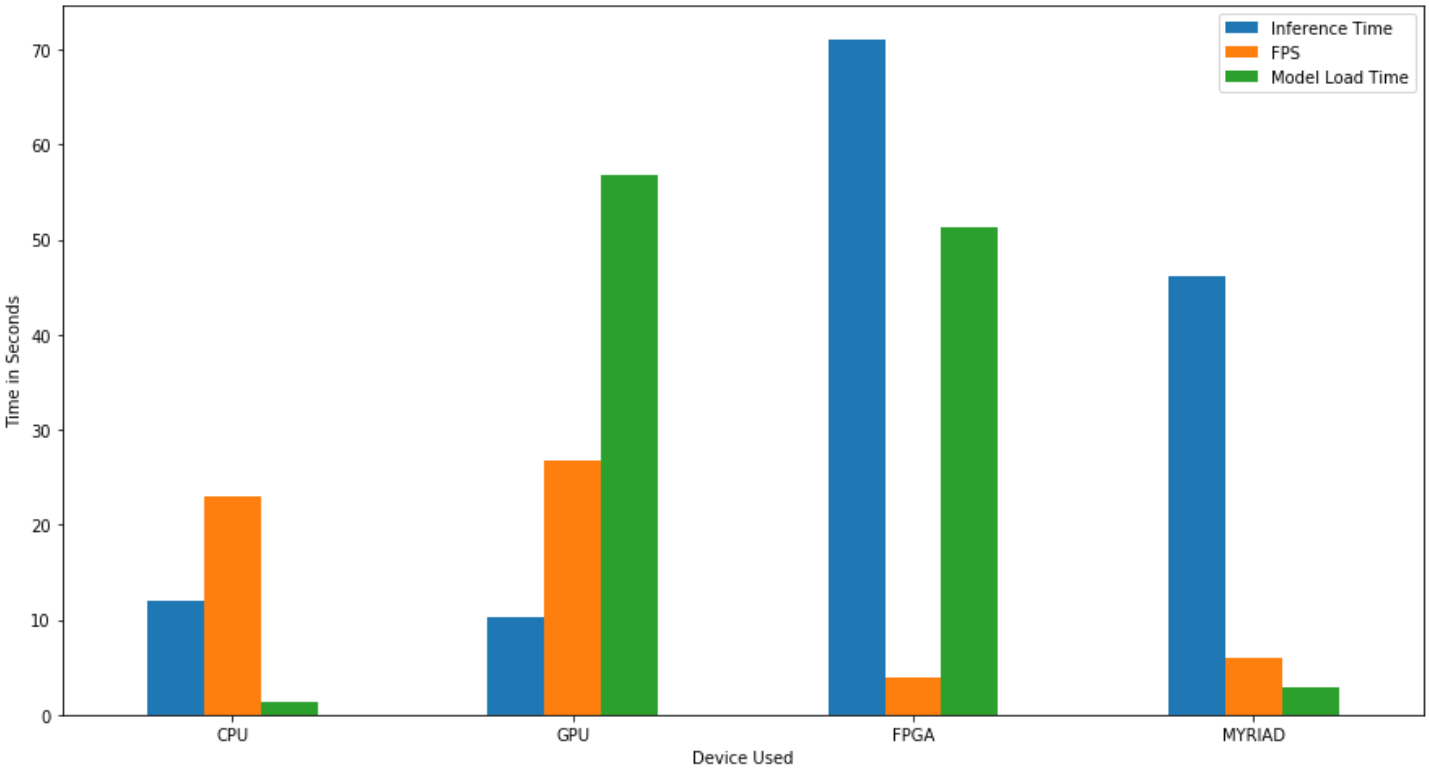
Which hardware might be most appropriate for this scenario? (CPU / IGPU / VPU / FPGA)
FPGA - Intel® Arria® 10 GX1150 FPGA

Requirement Observed	How does the chosen hardware meet this requirement?
Need industrial grade system that last for at least 5 -10 Years	*FPGA are made to last long in industrial conditions. typically can last at least 10 years. Have an ambient operating temperature of 5°C~60°C which is suited for factory line needs*
The system should have the ability to be used for other issues	*FPGA can be reprogrammed and is highly flexible. It can run on linux and windows systems. It can also be optimised for different deep learning tasks.*
The system should able to process at least 5times image processing per second	*The FPGA has 1.5GHz dual core ARM based CPU. It has a DSP performance of 1.5 TFLOPS. It supports multiple float-points and inference workloads.*

Queue Monitoring Requirements

Maximum number of people in the queue	*2*
Model precision chosen (FP32, FP16, or Int8)	*FP16*

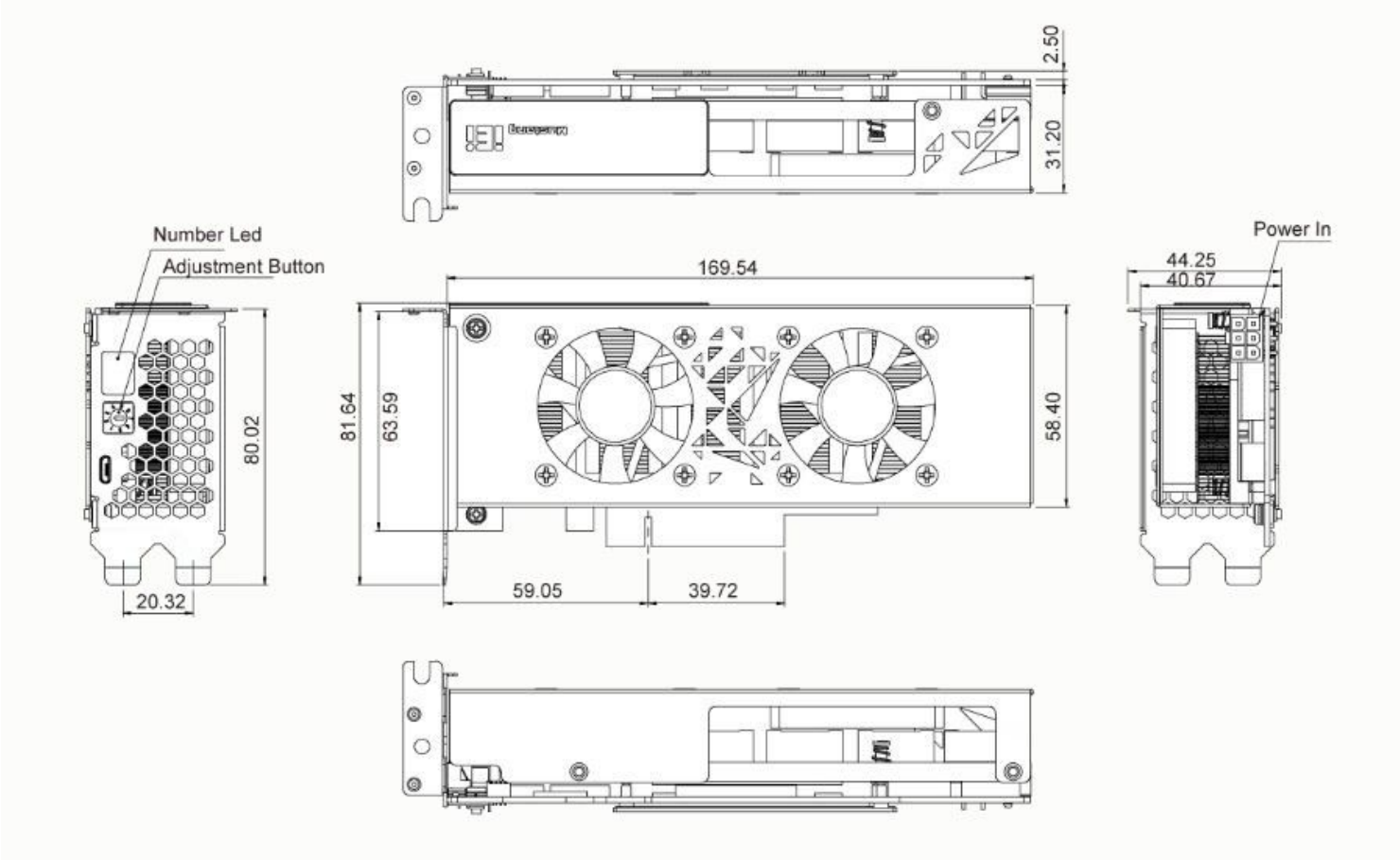
Test Results of Model Performance on Different Hardwares



Final Hardware Recommendation

Final Hardware Recommendation
FPGA are built to work in factory conditions and can last for long years. It also has the flexibility to reprogramed for other purposes. With reduced frame rate from camera. It provides enough processing power to provide good results. In the long run it is most cost effective and highly flexible.

FPGA - Mustang-F100-A10 Dimensions (Unit: mm)



Scenario 2: Retail

Client Requirements and Potential Hardware Solution

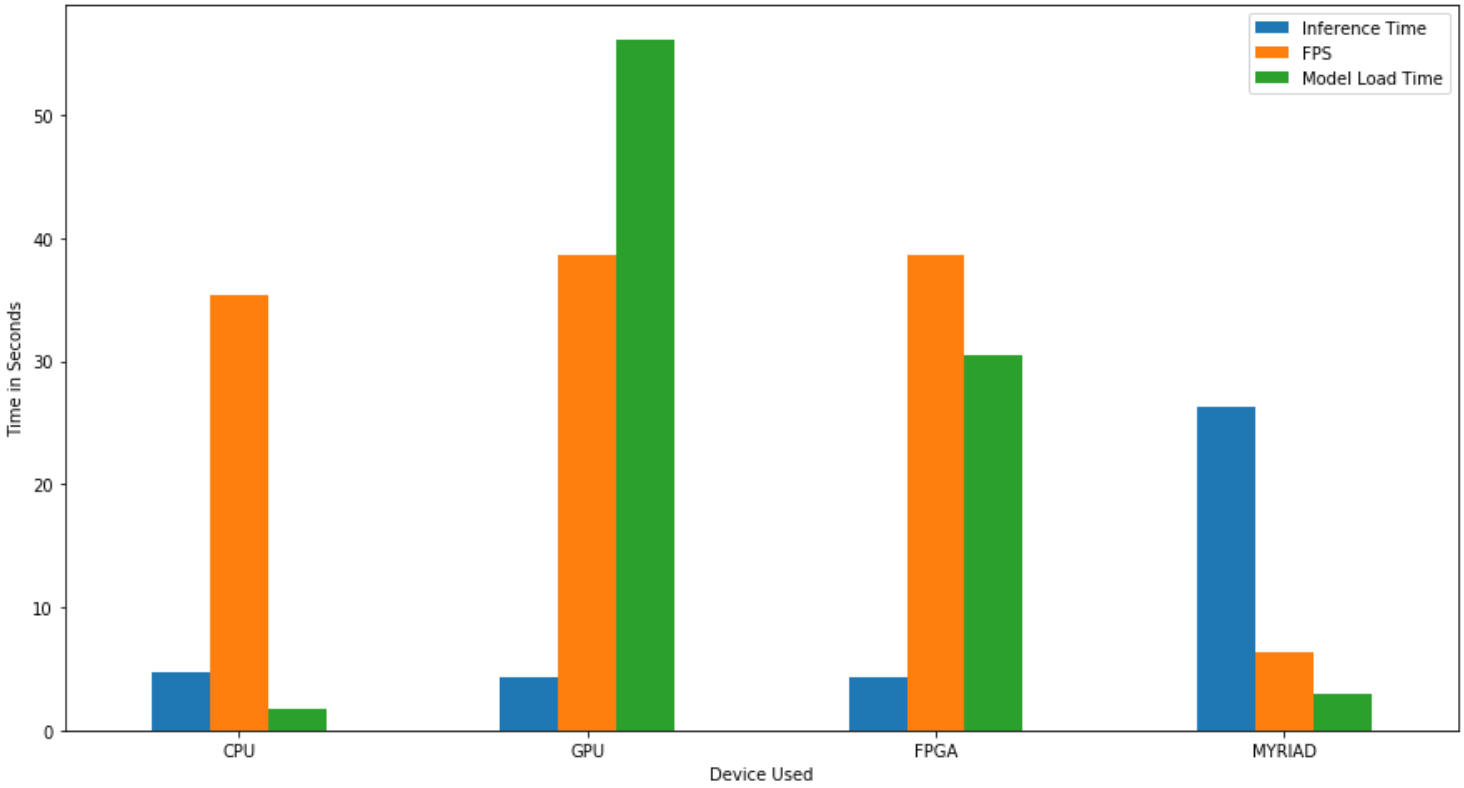
Which hardware might be most appropriate for this scenario? (CPU / IGPU / VPU / FPGA)
IGPU

Requirement Observed	How does the chosen hardware meet this requirement?
Space constraints	*There won't be a need for additional space as Integrated GPU is already exist in their i7 checkout computers*
No budget for additional hardware	*As the integrated GPU is already present in the checkout computer. There won't be a need for additional hardware.*
Less power consumption	*There won't be a notable increase in power consumption while using IGPU. An Intel i7 has a typical TDP(average power) of 95 W.*
Needed an Edge AI system	*The system doesn't need an internet connection or need to connect to a datacenter. The model loading and inference all can be done in the edge itself.*

Queue Monitoring Requirements

Maximum number of people in the queue	*2*
Model precision chosen (FP32, FP16, or Int8)	*FP16*

Test Results of Model Performance on Different Hardwares



Final Hardware Recommendation

Final Hardware Recommendation
The use of integrated graphics in the existing processor solves the problem of space, budget and power consumption. The IGPU has good inference time and it doesn't affect the normal operations of the checkout computer. The tested IGPU has the ability to process 38 Frames per Second. That is well enough for the provided application.

Scenario 3: Transportation

Client Requirements and Potential Hardware Solution

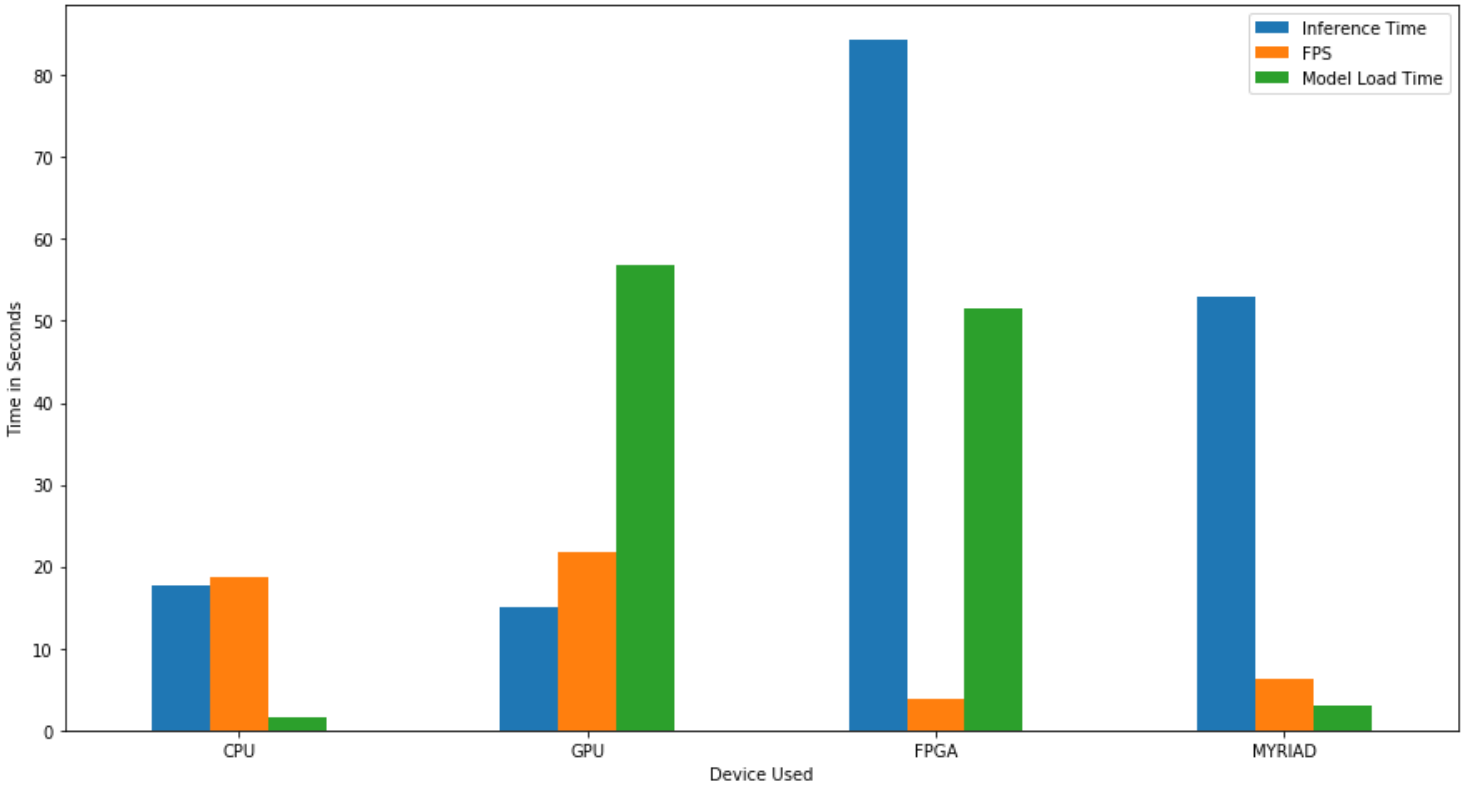
Which hardware might be most appropriate for this scenario? (CPU / IGPU / VPU / FPGA)
VPU - ***Intel Neural Compute Stick 2***

Requirement Observed	How does the chosen hardware meet this requirement?
Need to monitor 7 CCTV cameras	*The Intel® NCS2 has Intel Movidius X VPU which delivers 4 trillion operations per second and it supports 16 video stream per device*
The cameras connected to PC doesn't have any additional processing power	*The NCS2 is available in USB 3 plug and play form factor. The inference load can be dedicated to run only on VPU without additional CPU load*
Maximum budget of $300 per machine is allowed	NCS2 cost USD 70 as on 20th May 2020. It comes well under budget
Power requirements	*The NCS2 is low power consuming device consuming only 1W*

Queue Monitoring Requirements

Maximum number of people in the queue	*7*
Model precision chosen (FP32, FP16, or Int8)	*FP16*

Test Results of Model Performance on Different Hardwares



Final Hardware Recommendation

Final Hardware Recommendation
The NCS2 is plug and play device it can be attached with the existing security room computer and all the inference load can be dedicated to the VPU. With a lower camera frame stream it is able to handle the inference request. It is a good budget edge solution. It also consumes very less power at 1W.