Bridging Robotics and Architecture

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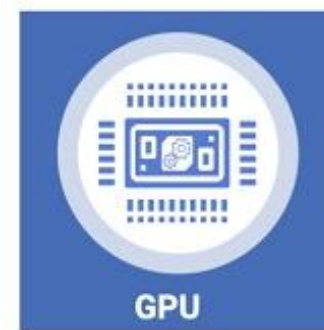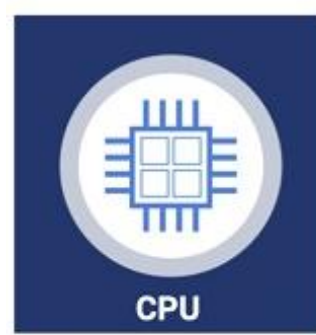
Carnegie Mellon University

RoWild: A Systematic Study of Robotics on Modern Hardware
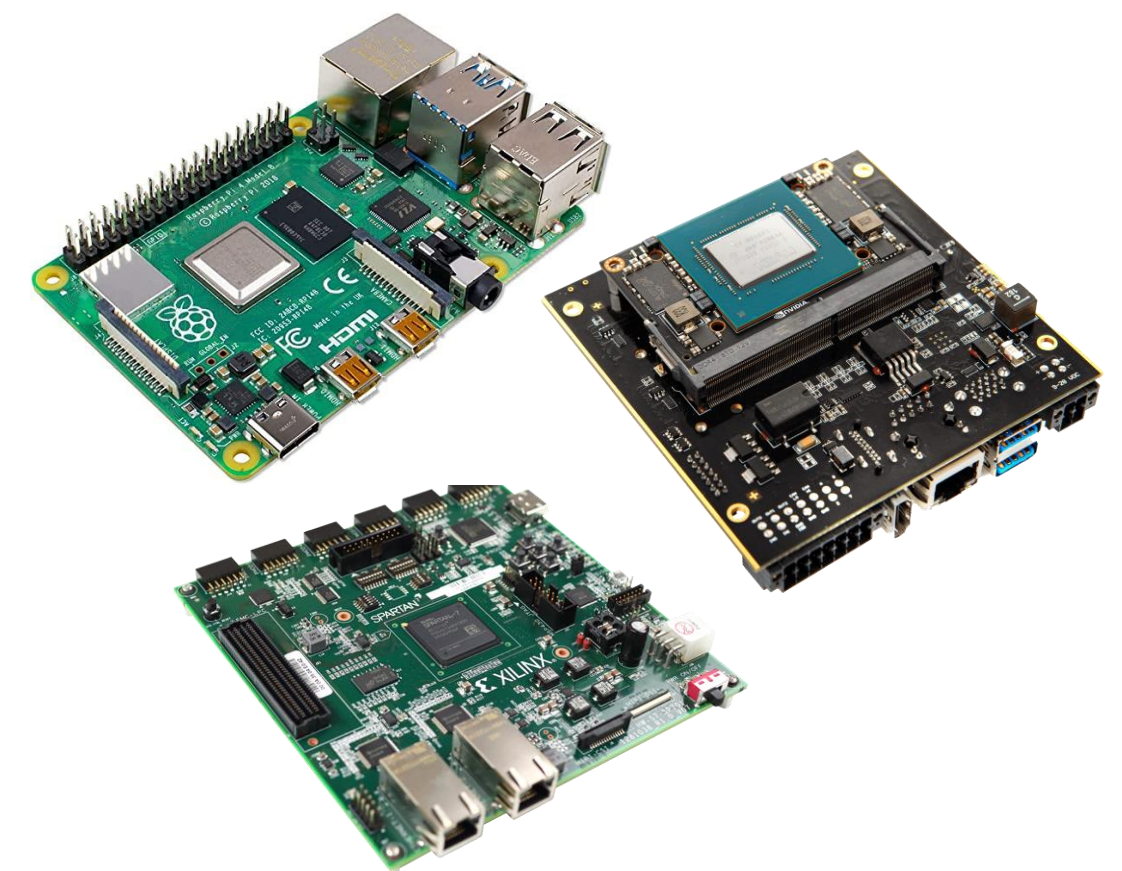
- A comprehensive, open-source benchmark suite for real-time robotics.

- RoWild is cross-platform
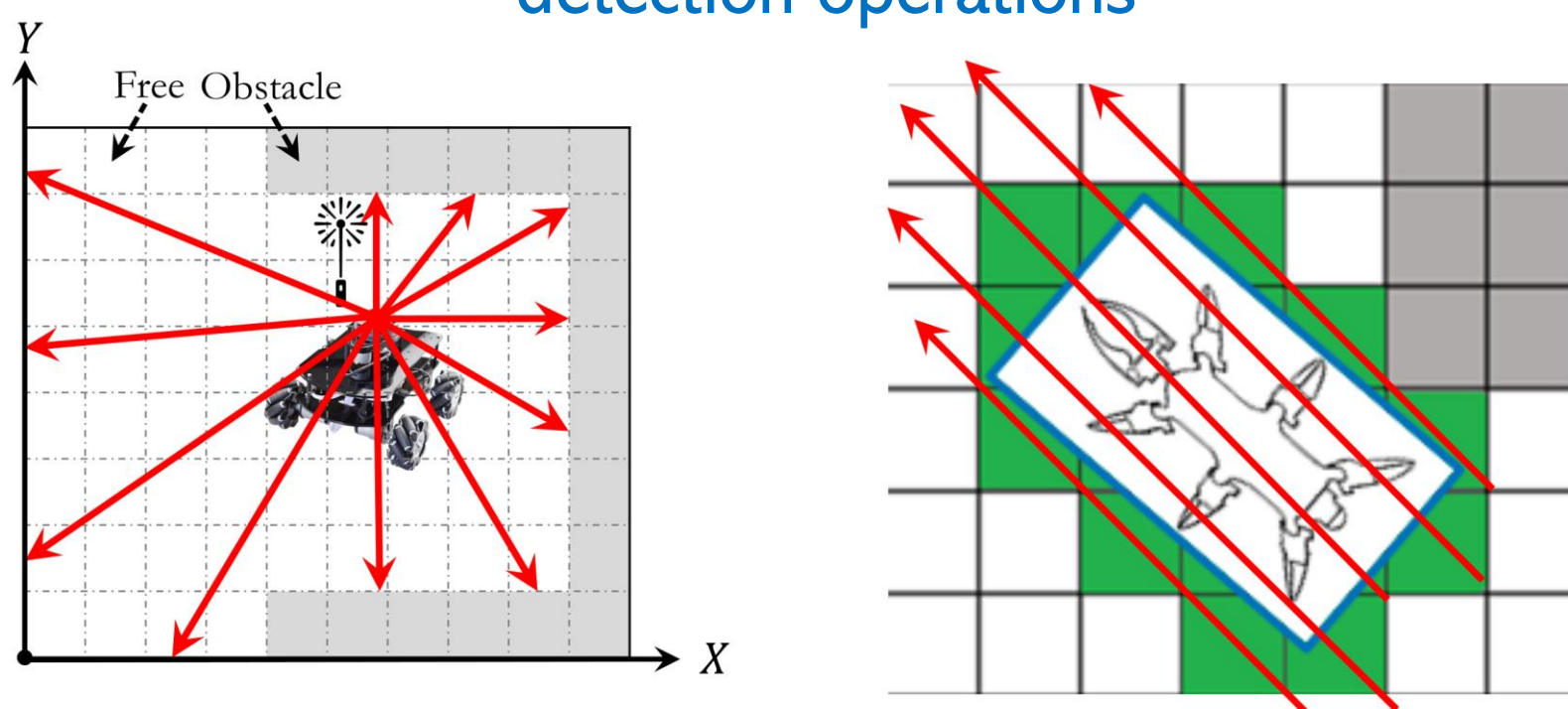 - ❖ RoWild includes CUDA and Verilog kernels

- RoWild studies architectural implications of robotics on modern hardware.

Tartan: Microarchitecting a Robotics Processor

- A processor designed in response to inefficiencies discovered in modern architectures in the RoWild study
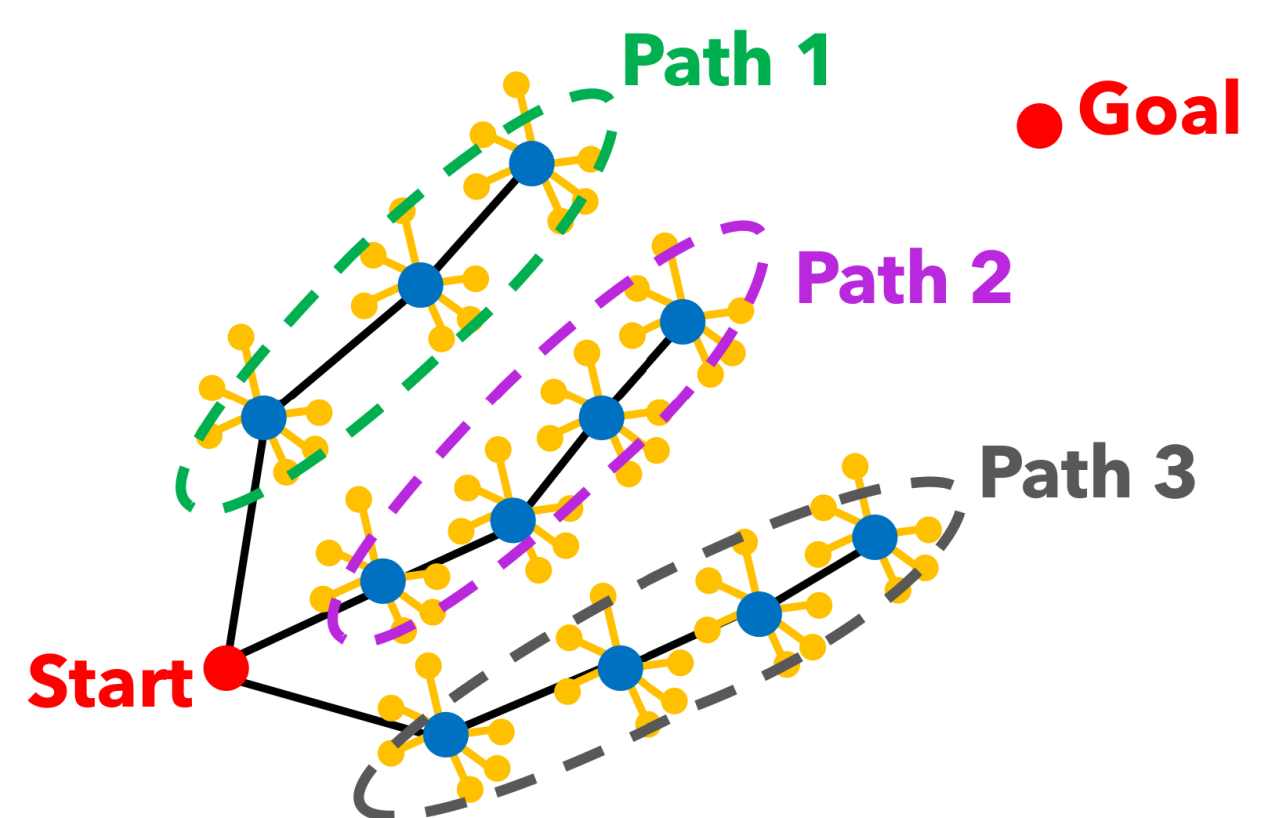
Oriented traversals throughout ray-casting and collision detection operations

Large graph search & cache thrashing

Path 1
Path 2
Path 3
● Goal
Start

Intra-application cache partitioning

Oriented vectorization

```
vload %addr, %orientation, %size
```

Approximate-acceleration of heuristic function calculations

f(a)=1.5 + 4
f(d)=2 + 4.5

h(d)=4.5
h(a)=4
h(e)=2
h(b)=2
h(c)=4

Last Value   Stride₁   Stride₂   FP

{PC}

Hash → + → Prediction