Problems & Users

sdMay25-01 - "ProJect ELM"

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ABOUT US

MASON [SE]

Semantic Segmentation
Optimization

LINDSEY [SE]

Machine Learning
Eye Detection

JAMES [CPRE]

Hardware Integration

ELI [CPRE]

Embedded Systems

PROJECT OVERVIEW

OBJECTIVE

Develop a fast an accurate pupil-tracking technology to aid our clients mission of identifying real time medical issues.

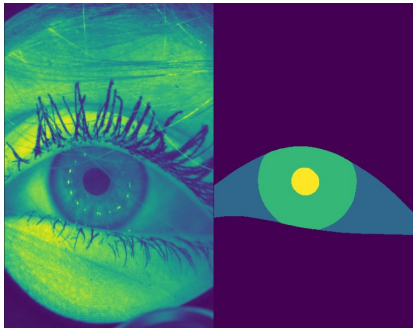
TARGET AUDIENCE

Our client, wheelchair bound individuals with medical conditions such as cerebral palsy, and their caretakers.

FEATURES

- Eye Tracking
- Semantic Segmentation
- FPGA Overlay
- Real-time system

PROJECT OVERVIEW



Step 1

Obtain Baseline Metrics

Obtain baseline metrics for latency, accuracy, and FPS from open-sourced model.

Step 2

Optimize

Train the ML model and gather more metrics

Step 3

Port to FPGA

Use Tensil.ai framework to run the ML model on FPGA

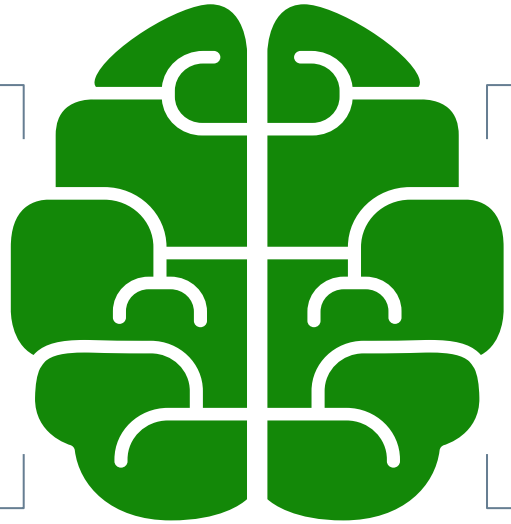
Step 4

Run Real-Time System

Camera detects pupil with live video feed.

PROJECT OVERVIEW

Optimise an FPGA board & software, improving performance and accuracy, in order to help our client make life saving decisions on a real time basis.



USER PERSONAS

WHEELCHAIR BOUND INDIVIDUALS

INTERESTS & GOALS

- Want independence
- Social inclusion
- Life enjoyment
- Affordable treatment

NEEDS

- Assistance with daily tasks
- Medical support
- Mobility assistance
- Affordable care

CHALLENGES

- Limited mobility
- Restricted communication
- Physical & Emotional Pain
- Lack of accessibility
- Discrimination

HEALTHCARE WORKERS

INTERESTS & GOALS

- Support patients mentally and physically
- Improve patient comfort and independence
- Healthcare advancements

NEEDS

- User friendly tools
- Safe & secure technology
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CHALLENGES

- Limited resources
- Healthcare standards: patient logs & charts
- Time constraints
- Patient overload

CLIENT

A successful software engineer who formerly volunteered to help individuals with cerebral palsy. Very analytical.

INTERESTS & GOALS

- Helping people with cerebral palsy
- Helping college students
- Software & Hardware engineering

NEEDS

- Decrease latency in detecting health problems
- Slow iterative development of overall project
- Provide college students with real project experience

CHALLENGES

- Lacks abundant free time

CONCLUSION

As a result

of our given problem, users, and their needs,

We will

Increase the performance of an existing FPGA system

To achieve

Throughput high enough to make real-time decisions.

Linking to Our Client's Problem

This increase in data throughput will supplement our client's system, unlocking the ability to predict when end-users might have health-affecting events such as a seizure.