zant

October 4-5

TINY_HACK

Turin

The first Embedded AI Vision hackathon

Focus AI

git fetch belayer

Team 12

Ashley Andrea Squarcio
Michele Missiroli
Corrado Di Vita

with the support of:

ARDUINO TOOLBOX Datapizza

1. Project Overview

👀 **Goal**: to enhance climber safety by monitoring a belayer's attention during lead climbing.

🎯 **Use case in brief**: a belayer's brief distraction can lead to severe consequences for the climber. "git fetch belayer" provides a real-time alert system to ensure the belayer's focus remains on the climber, especially during critical moments of the climb.

2. Dataset & Model

📊 **Dataset**: we built a custom dataset by combining various image sources to ensure diversity. The dataset is categorized into two classes: ‘climber_present’ and ‘climber_absent’.

🧠 **Model architecture**: we fine-tuned a pre-trained fai-cls-n-coco model for binary classification and quantized it for Arduino.

⚖️ **Trade-offs**: by converting the problem to binary classification we achieved an F1 score of 97% while retaining the efficiency required for the resource-constrained Nicla Vision.

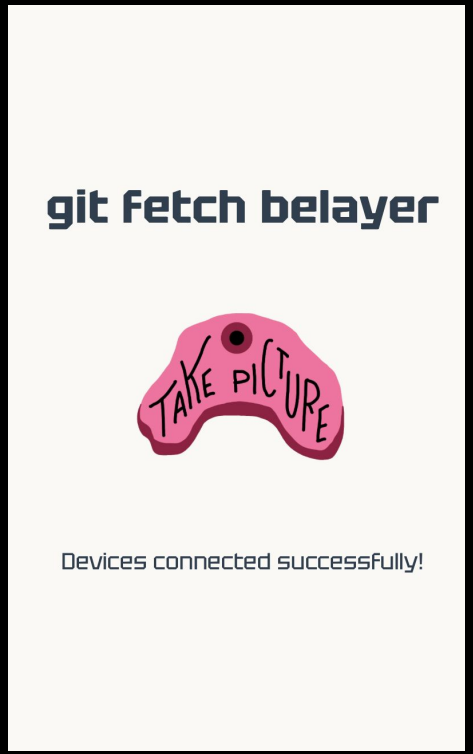
💡 **Reasoning**: the quantized classification model is small and fast, perfect for real-time inference on the edge in a context where every second matters

3. Deployment Pipeline

🔧 Pipeline steps:

- initialization
- capture & inference
- IMU tracking
- attention check
- distance calculation via Bluetooth RSSI
- alert

4. Demo & User Experience



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5. Impact & Next Steps

🌟 **Innovation** & **originality**: it's a novel application of embedded AI in sports safety

🚀 **Future potential**:

- integration into smart climbing gyms, expansion to affine domains like attention tracking while driving
- expanding the dataset to include more diverse environments
- incorporating an accelerometer to detect falls

That’s a wrap! 🌮

Thanks