Project Description

34241 - Digital video technology

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Introduction

UVision ApS has developed an underwater stereo-visual photogrammetry system capable of generating high-fidelity 3D models of subsea assets. Their technology employs dual cameras capturing synchronized image pairs, which are then processed through photogrammetry software to create detailed digital reconstructions.

Current Challenges

While effective, the current pipeline faces several optimization challenges:

- Limited frame rate (5 FPS) restricting data capture efficiency

- Substantial scan file sizes exceeding 10GB per hour of operation

- Processing bottlenecks within their cloud-based reconstruction workflow

Proposed Enhancements

We aim to implement two key technological improvements:

1. **Video-Based Photogrammetry Pipeline**

   - Transition from individual JPEG storage to efficient video encoding

   - Maintain stereo synchronization while significantly reducing storage requirements

   - Enable higher frame rates for more comprehensive data capture

2. **Intelligent Frame Selection Algorithm**

   - Optimize the input to photogrammetry software by eliminating redundant images

   - Handle analyzing left and right video pairs, while maintaining synchronization

Tools and materials

We will use the following tools and programming languages for the project for development and version control.

- NVIDIA SDK for hardware integration

- Gstreamer/FFMPEG for encoding and decoding

- Python for development

- MATLAB for development

- C++ for implementation on device

- GitHub for version control

Media

- Part 1 of the proposed enhancements will be run on the company device. This will generate media for Part 2.

- Part 2 will start off using video filmed from own laptop/phone. It will later use media from Part 1 when this becomes available.