Registration and Fusion of EVS and SVS Runway Images for Embedded Systems

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Project Overview and Description

Project Description

1. Develop a sequence of novel algorithms to safely land aircrafts by:

(a) Registering enhanced vision system (EVS) and synthetic vision system (SVS) runway images

(b) Fusing the registered images so that the information from both images can be displayed optimally

2. Embed strategy into multi-core processing environments for real-time applications

EVS Image

EVS Processing

SVS Image

SVS Processing

Registration

Fusion

Registered and Fused Image
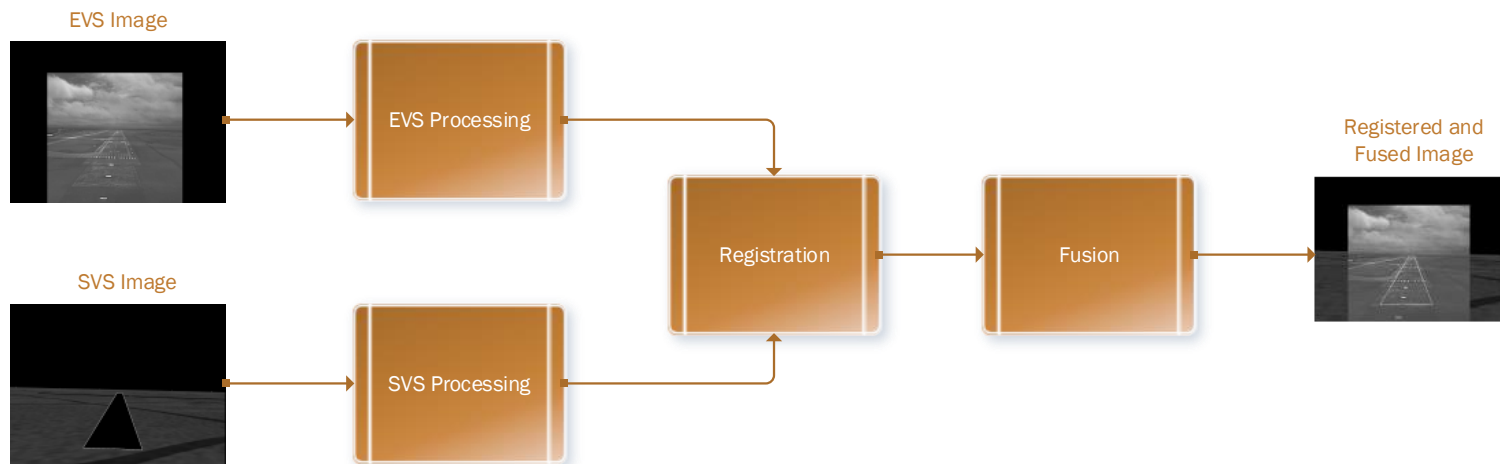
Approach

Novelty

The precise detection of runways is crucial for safely landing manned and unmanned aircrafts. The challenge is to be able to detect the runway accurately in varying weather conditions. A novel approach which involves registering and fusing EVS and SVS images is proposed. A successful completion of this project will have a major impact on improving landing safety.

Benefits to member companies

This problem is of interest to Rockwell Collins. The techniques developed in this project will not only lead to the development of novel landing heads-up display systems but will also be applicable to a vast range of problems at Rockwell Collins involving image registration and image fusion.
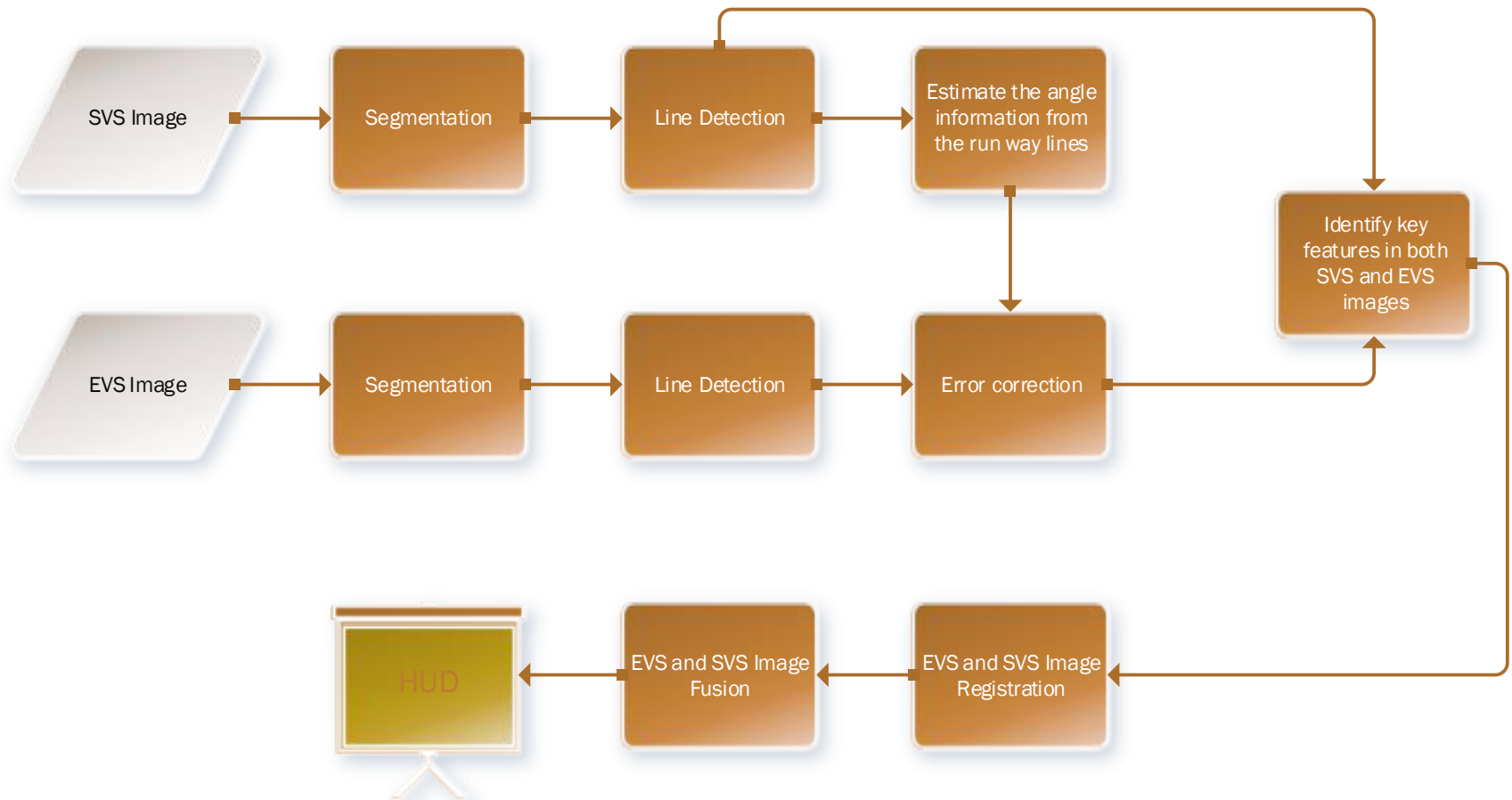
Project Tasks/ Deliverables

	Description	Date	Status
1	Preliminary EVS images processing and runway feature detection	Year 1	Completed
2	Preliminary SVS images processing and runway feature detection	Year 1	Completed
3	Preliminary EVS and SVS registration	Year 1	Completed
4	Preliminary EVS and SVS fusion	Year 1	Completed
5	Final EVS and SVS registration and fusion	Year 2	ongoing
6	Embed strategy into multi-core processing environments for real-time applications	Year 3	

Deliverables

- **Technical background into image fusion and registration**
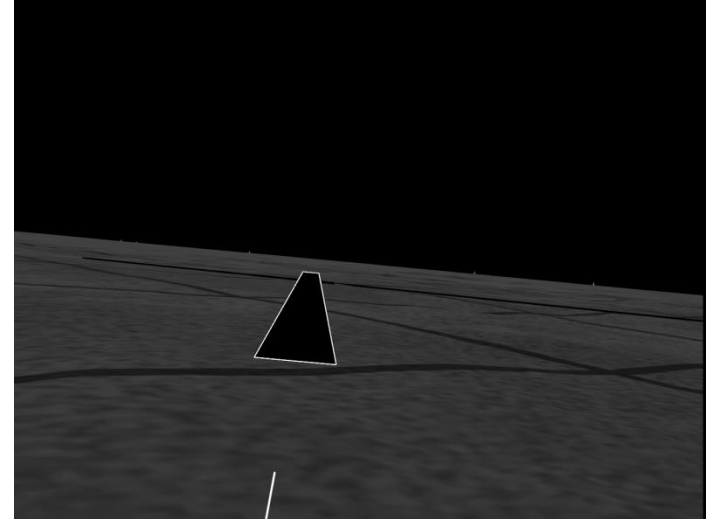- **Algorithms to register and fuse EVS and SVS images**
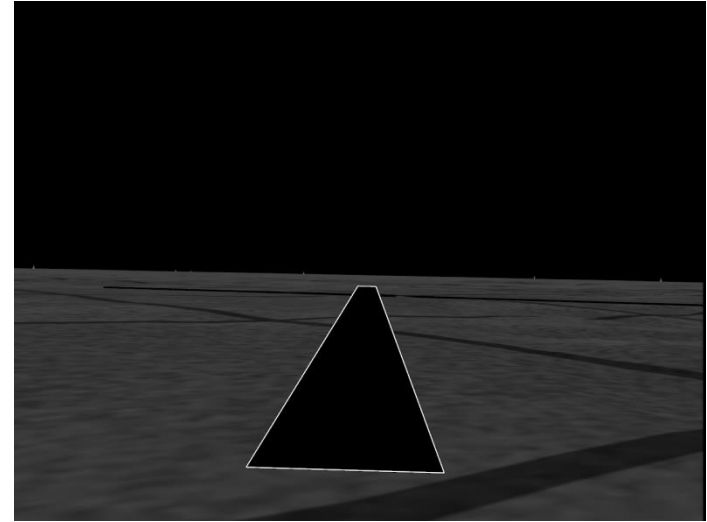
Technical Detail

```
SVS Image → Segmentation → Line Detection → Estimate the angle information from the run way lines
                                                        ↓
EVS Image → Segmentation → Line Detection → Error correction → Identify key features in both SVS and EVS images
                                                        ↓
HUD ← EVS and SVS Image Fusion ← EVS and SVS Image Registration ←
```

Results

EVS Image
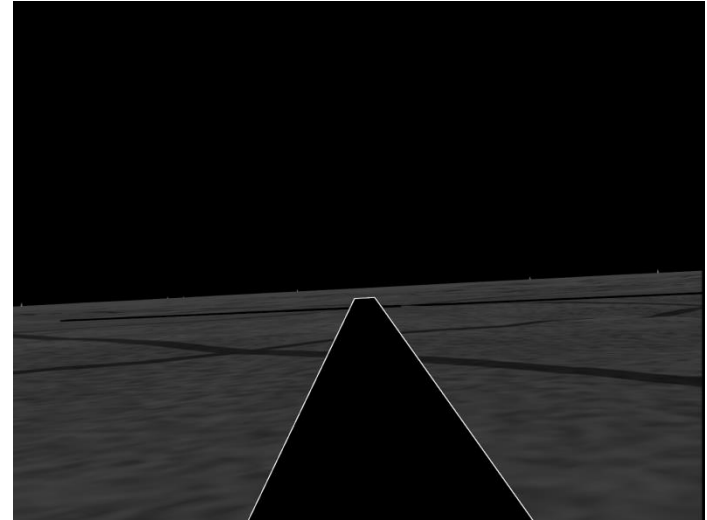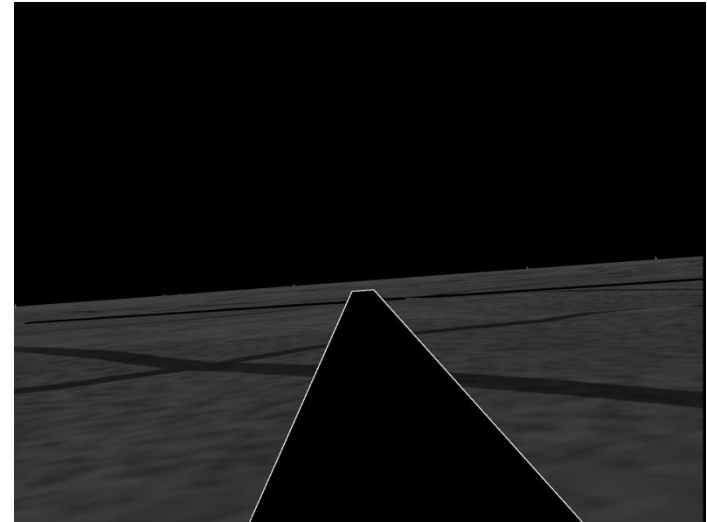

SVS Image

Only Fusion

Registration and Fusion

Results

EVS Image

SVS Image

Only Fusion

Registration and Fusion
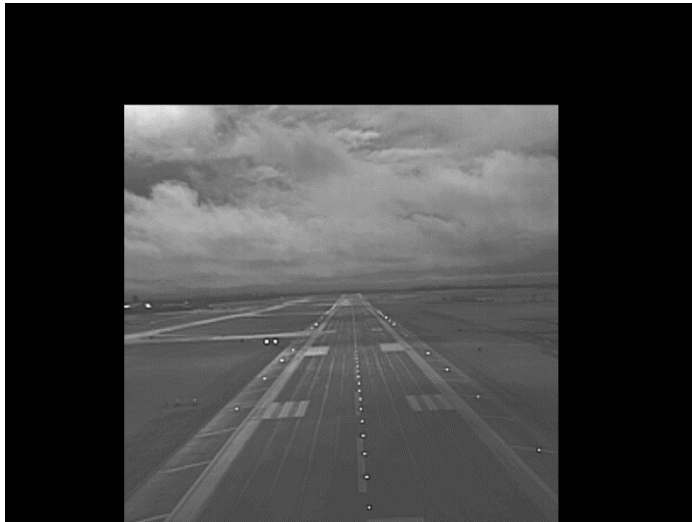
Results

EVS Image

SVS Image

Only Fusion

Registration and Fusion
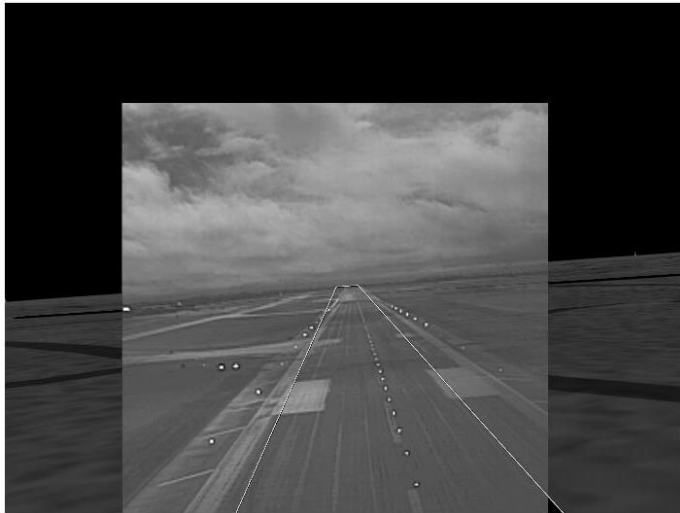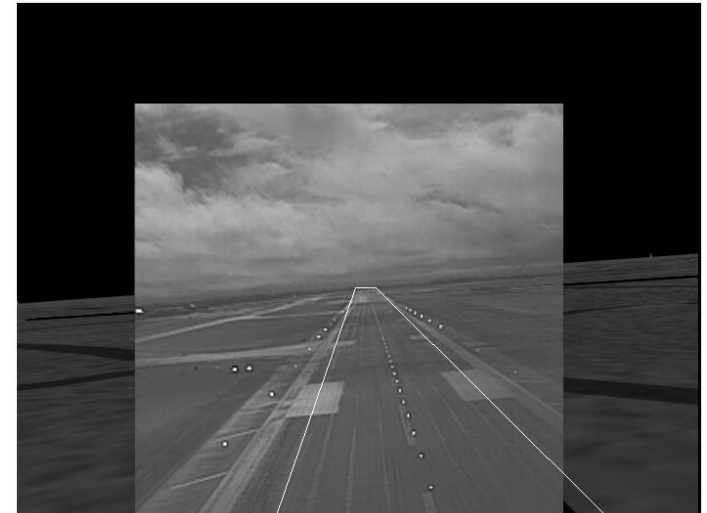
Results

EVS Image

SVS Image
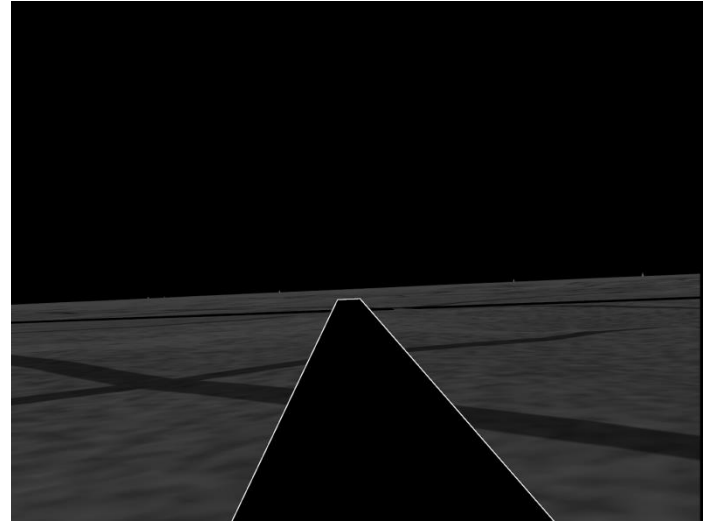

Only Fusion

Registration and Fusion

Results

EVS Image

SVS Image

Only Fusion

Registration and Fusion

QUESTIONS ??