



Photos courtesy of the Dept. of Defense

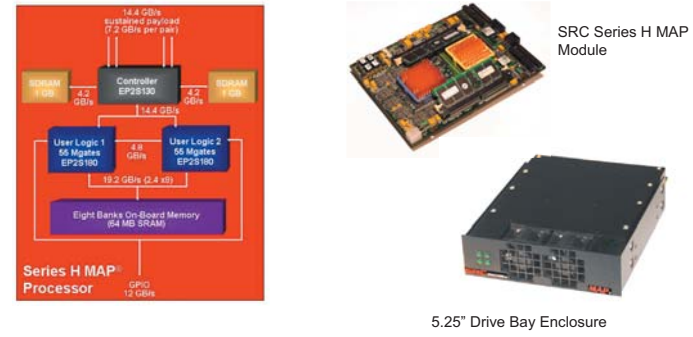
Video Stabilization Processing on the SRC® Series H MAP® Processor

86x Performance* @ 60 Watts
Video frames: 2816x2112 (6 MP) 8bpp

Nehalem i7 920 Quad Processor	SRC Series H MAP Processor
CPU clock: 2.67 MHz Level 2 cache: 4x 256 KB Level 3 cache: 8 MB	2x Altera EP2S180 FPGAs FPGA clock: 150 MHz On-Board Memory: 64 MB Global Common Memory: 2x 1 G
82.238 seconds/frame (0.01 fps)	0.948 seconds/frame (1.06 fps)
11,180 Watts (86 processors)	60 Watts (1 processor)

* Single MAP processor, includes all data movement

SRC Computers' Series H MAP Processor



SRC Computers' System Packaging

Lightweight Portable MAPstation™ System



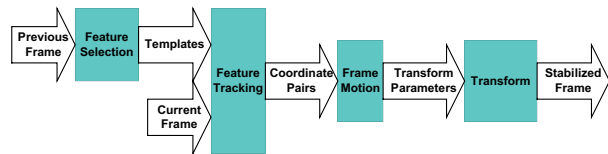
1 CPU Module, 1 MAP module
SIZE: 6" w x 2" h x 12" d
WEIGHT: Less than 4 pounds
POWER: 60 watts typ.

ATLAS™ System



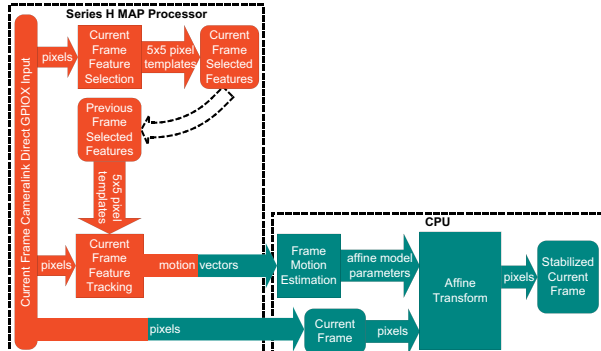
1 CPU Module, up to 10 MAP modules
SIZE: 19" w x 11" h x 13" d
WEIGHT: 60 pounds
POWER: <1000 watts typ.

Airborne Video Stabilization Processing Overview

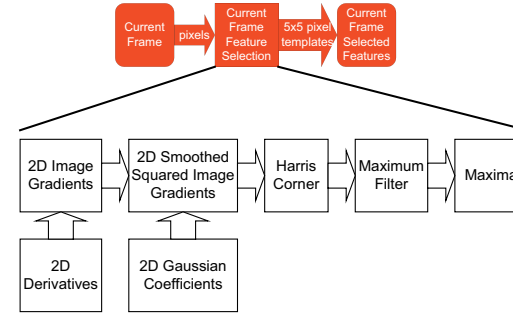


© Johnson, "Video Stabilization and Target Localization Using Feature Tracking with Small UAV Video," Master's Thesis, Electrical and Computer Engineering, Brigham Young University, Dec 2006.

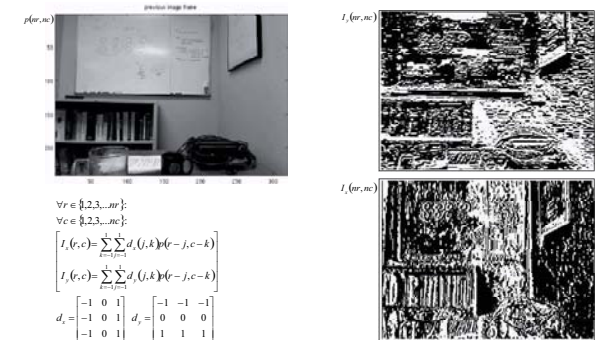
Airborne Video Stabilization Heterogeneous Computing Data Flow



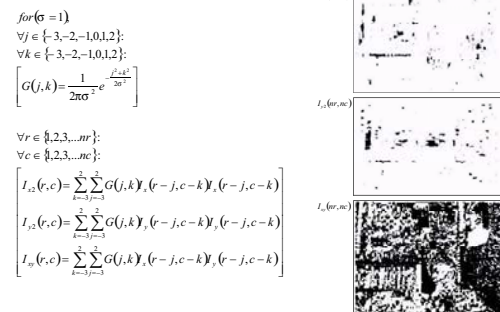
Current Frame Feature Selection



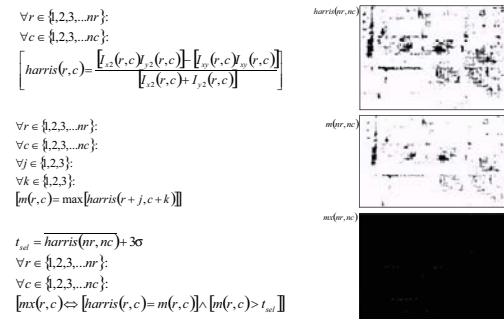
Current Frame Feature Selection: 2D Image Gradients



Current Frame Feature Selection: 2D Squared Smoothed Image Gradients



Current Frame Feature Selection: Harris Corner, Maximum Filter and Maxima



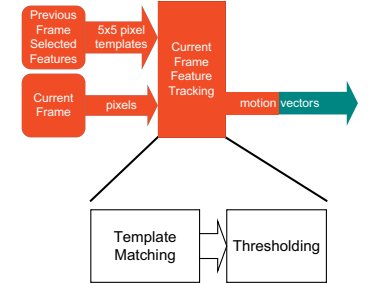
Current Frame Feature Selection: Selected Feature 5x5 Pixel Templates

mx(nr,nc) contains the set of row, column coordinates of the center of each 5x5 selected feature pixel template

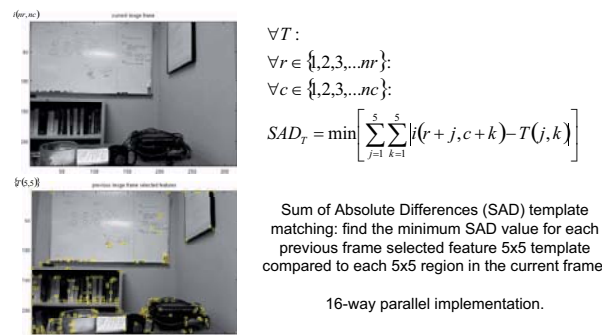
The set of selected feature row, column coordinates and each selected feature 5x5 pixel template become the "previous frame selected features" used for tracking features in the next current image.



Current Frame Feature Tracking

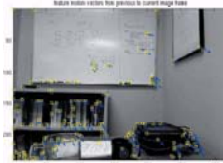


Feature Tracking: Template Matching

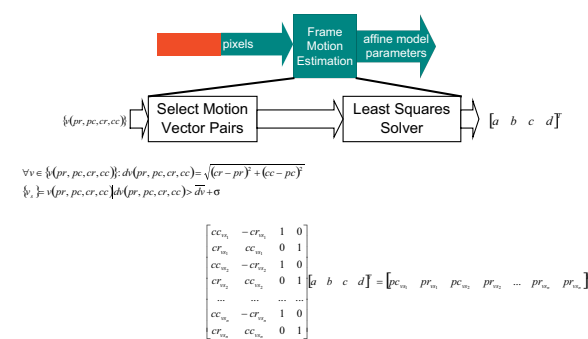


Feature Tracking: Thresholding

If the minimum SAD value for a given tracked template is less than the tracking threshold value, store the previous and current frame's tracked feature coordinate pairs. Each set of coordinate pairs represents a motion vector.



Frame Motion Estimation



Affine Transform

