DESIGN AND DEVELOPMENT OF AN ASTROPHOTOGRAPHY IMAGING MODULE FOR IDENTIFICATION OF LEO SATELLITES

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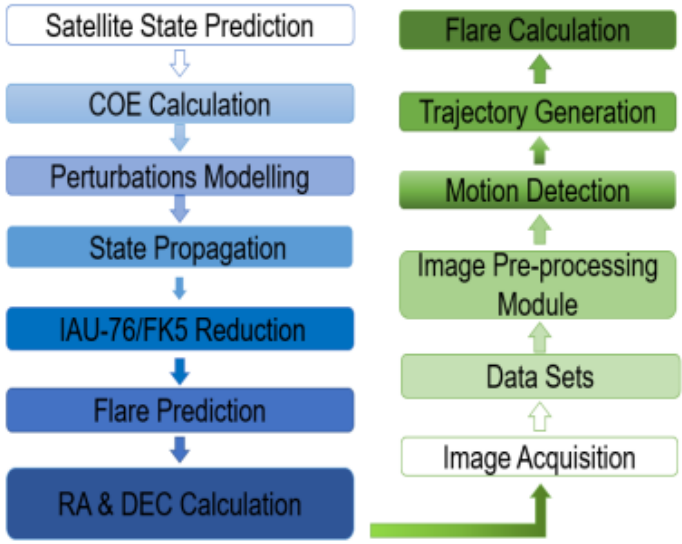
AIM

To develop an algorithm for active satellite tracking using optical sensors to capture, process and identify LEO satellites

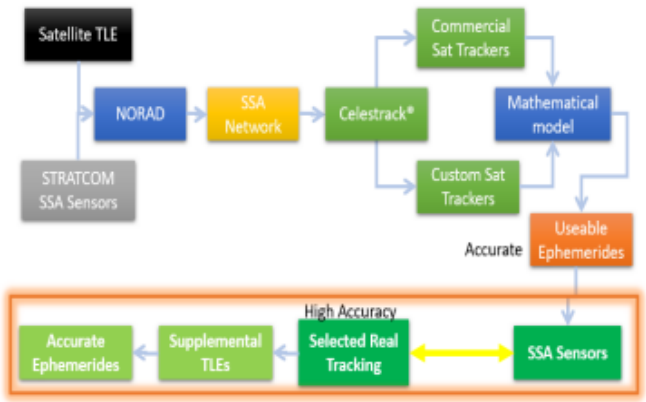
SCOPE

- Understanding image processing of satellite flares
- Understanding orbital geometry of satellites
- Simplified General Perturbations model (SGP4)
- Flare prediction module
- Image processing module
- Flare calculation module
- Optical Sensor based Prediction & Correction of Satellite Tracks

TASKS ACCOMPLISHED



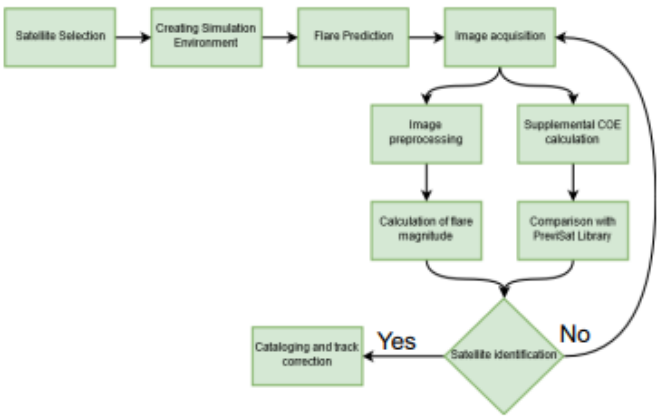
SSA ARCHITECTURE



RESULTS

- Backward propagation results for Iridium-20 were verified
- Forward propagation results for Iridium-96 were verified
- SNR of processed image increased from 25.9654 dBs to 32.4248 dBs as compared to RAW image
- Satellite's trajectory was generated successfully
- Flare magnitude of satellite was calculated to be -3.42 with 2.4% error

METHODOLOGY



FUTURE WORK

- Techniques for generation of supplemental TLE data for satellite propagation
- Integration with large aperture deep-space sensor
- Detection of multiple satellite flares for results verification
- Acquisition of complete image repository for image pre-processing