

JSC Senior Design Project and or Intern Request Form

Project Title:	Live Video Stitching Panorama		
Project Description:	NASA/JSC desires a general purpose software based solution for stitching live video from multiple cameras together to create a large field of view.		
Choose most appropriate area of research:	<input checked="" type="checkbox"/> Planetary Surface Systems <input checked="" type="checkbox"/> Ground Operations <input type="checkbox"/> Propulsion <input checked="" type="checkbox"/> Spacecraft <input checked="" type="checkbox"/> Human Health Program		
Program Applicability	<input checked="" type="checkbox"/> ISS <input checked="" type="checkbox"/> CEV/SLS <input type="checkbox"/> Commercial Crew <input checked="" type="checkbox"/> Asteroid <input checked="" type="checkbox"/> Adv. Technology (AES/STMD)		
Choose one project:	Roles and Responsibilities of Senior Design POC/Mentor		
<input type="checkbox"/> Senior Design	I have coordinated with my management and I am able to support at least three (3) teleconferences (kick-off, mid-term, and final) with a Senior Design Project Team at a university that chooses my project. I understand that I shall not provide any sensitive or classified information to the Senior Design Project students of faculty. I will provide feedback to the project team if requested.		
<input checked="" type="checkbox"/> Internship	I have coordinated with my management and I am able to support an intern. If an intern is selected for my project, I will provide an environment where an intern can grow and we may have a mutually beneficial and successful internship. My project will be able to provide a desk space, work area, and computer for an intern. I will review any final report or presentation that the intern generates during his/her internship and submit it to Export Control (DAA) for approval. This project opportunity will be posted in OSSI, through the office of Education (use exact same title). OSSI website: : https://intern.nasa.gov		
Check desired Timeframe for Internship:	<input checked="" type="checkbox"/> Year long <input checked="" type="checkbox"/> Summer <input checked="" type="checkbox"/> Fall <input checked="" type="checkbox"/> Spring		
Check desired Major/Minor(s) for Internship:	<input checked="" type="checkbox"/> Aerospace Engineering <input checked="" type="checkbox"/> Aeronautical Engineering <input type="checkbox"/> Astronautical Engineering <input type="checkbox"/> Biomedical Engineering <input type="checkbox"/> Chemical Engineering <input type="checkbox"/> Civil Environmental <input type="checkbox"/> Health Engineering <input checked="" type="checkbox"/> Electrical, Electronic Engineering <input checked="" type="checkbox"/> Computer Engineering <input checked="" type="checkbox"/> Engineering Physics <input type="checkbox"/> Industrial Manufacturing Engineering <input type="checkbox"/> Materials, Metallurgical Engineering <input type="checkbox"/> Mechanical Engineering, Mechanics <input type="checkbox"/> Nuclear Engineering <input type="checkbox"/> Astronomy, Astrophysics <input type="checkbox"/> Chemistry <input type="checkbox"/> Optics <input checked="" type="checkbox"/> Physics <input type="checkbox"/> Atmospheric Sciences <input type="checkbox"/> Geography <input type="checkbox"/> Geosciences <input type="checkbox"/> Oceanography <input type="checkbox"/> Natural Resource Management <input checked="" type="checkbox"/> Mathematics, Applied Mathematics <input checked="" type="checkbox"/> Computer Science <input type="checkbox"/> Astrobiology <input type="checkbox"/> Biology <input type="checkbox"/> Biochemistry/Biophysics <input type="checkbox"/> Microbiology Bacteriology <input type="checkbox"/> Chemical Engineering <input type="checkbox"/> Other, please specify:		
Mentor Name:	Maxell Haddock	Mentor's E-mail:	Maxwell.d.haddock@nasa.gov
Title & Organization:	Engineer EV6	Phone #:	281 483-7241
Alternate POC/Mentor Name:		Alternate's E-mail:	
Education Office Signature and Date:		Intern Mentor's Signature & Date:	
As supervisor/manager, I approve of the above named individual as Senior Design Project POC of Intern Mentor.		Supervisor/Manager's Signature & Date:	
(For Intern Request Only) As Administrative Officer, I am aware that the above named Intern Mentor has submitted a request for an Intern.		Administrative Officer's Signature & Date:	

Senior Capstone Project

Project Title: Live Video Stitching Panorama

Description:

NASA/JSC desires a general purpose software based solution for stitching live video from multiple cameras together to create a large field of view. This would enable crews and mission control to see panoramic/landscape views outside the spacecraft for situational awareness and psychological well being.

Requirements/Constraints:

The solution should:

- initially address stitching 3 camera streams together but also be extensible to more cameras
- minimum camera resolution and frame rates should be 720p and 30FPS, respectively.
- require minimal overlap in individual camera field of views (FOV) such that the overall solution FOV is $> 1.6 * \text{FOV}/\text{camera} * \text{number of cameras in solution}$
- the solution should work for near field and far field viewing situations; near field being ~ 10 meters
- the solution should work for reasonable alternatives in camera mounting positions (examples: cameras may not be mounted on exactly the same plane, camera spacing may vary, etc..)
- the resulting imagery should have low/no distortion and the blending from one camera stream to the next should not preclude object and feature identification in the near field case
- end-to-end latency of < 0.5 seconds for the lab demonstration

Desired/Expected Outcome:

Desire a working prototype and demonstration. If successful we will want to replicate and build upon it at JSC. Resulting code and system specifications should be available for NASA to perform continued experimentation with no licensing fees. Cameras and computer can be loaned to the university as needed to keep cost down and ease the level of effort to replicate the solution at JSC.

Project Lead Contact Info:

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EV/Avionic Systems Division, Johnson Space Center, NASA

Preferred contact mode and times – telephone M-F reasonable hours; email anytime