

JSC Senior Design Project and or Intern Request Form

Project Title:	Live Video Stitching - Point of View Change		
Project Description:	NASA/JSC desires a general purpose software based solution for stitching live video from multiple cameras together to allow the user to achieve point of view changes when a change in the user's relative position is sensed (assume modest shift in head position as if you lean to see something out of a window). This would enable crewmembers to seamlessly inspect their spacecraft and objects near the craft without having to perform actions to switch cameras to see around occlusions and better enable them to identify feature/object position relative to other spacecraft features or landmarks.		
Choose most appropriate area of research:	<input checked="" type="checkbox"/> Planetary Surface Systems <input type="checkbox"/> Ground Operations <input type="checkbox"/> Propulsion <input checked="" type="checkbox"/> Spacecraft <input type="checkbox"/> Human Health Program		
Program Applicability	<input type="checkbox"/> ISS <input type="checkbox"/> CEV/SLS <input type="checkbox"/> Commercial Crew <input type="checkbox"/> Asteroid <input checked="" type="checkbox"/> Adv. Technology (AES/STMD)		
Choose one project:	Roles and Responsibilities of Senior Design POC/Mentor		
<input checked="" 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 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 type="checkbox"/> Year long <input type="checkbox"/> Summer <input type="checkbox"/> Fall <input type="checkbox"/> Spring		
Check desired Major/Minor(s) for Internship:	<input type="checkbox"/> Aerospace Engineering <input 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 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 checked="" type="checkbox"/> Optics <input 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 type="checkbox"/> Mathematics, Applied Mathematics <input 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:	Max Haddock	Mentor's E-mail:	Maxwell.d.haddock@nasa.gov
Title & Organization:	Engineer - NASA/JSC Engineering Human Interfaces Branch (EV3)	Phone #:	281-483-7241
Alternate POC/Mentor Name:	Helen Neighbors	Alternate's E-mail:	Helen.neighbors-1@nasa.gov
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:	
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Texas Space Grant Consortium

Senior Capstone Project

Project Title: Live Video Stitching – Point of View Change

Description:

NASA/JSC desires a general purpose software based solution for stitching live video from multiple cameras together to allow the user to achieve perspective changes when a change in their relative position is sensed. This would enable crews to seamlessly inspect their spacecraft and objects near the craft without having to perform actions to switch cameras and better enable them to identify feature/object position relative to other spacecraft features or landmarks.

Requirements/Constraints:

The solution should:

- initially address stitching 2 camera streams together but also be extensible to more cameras
- minimum camera resolution and frame rates will be 720p and 30FPS, respectively
- a solution using 3D cameras and display is encouraged but not required
- the solution should work for a field of interest ranging from 5 - 20 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
- the relative position sensing to generate user view angle can be achieved via keystroke or mouse inputs but should be easily modified to allow for an external device and concurrent software (such as a Kinect sensor) to generate a relative position input so that the user can change their perspective 'hands-free'
- 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