

# Ball Clamp Monopod

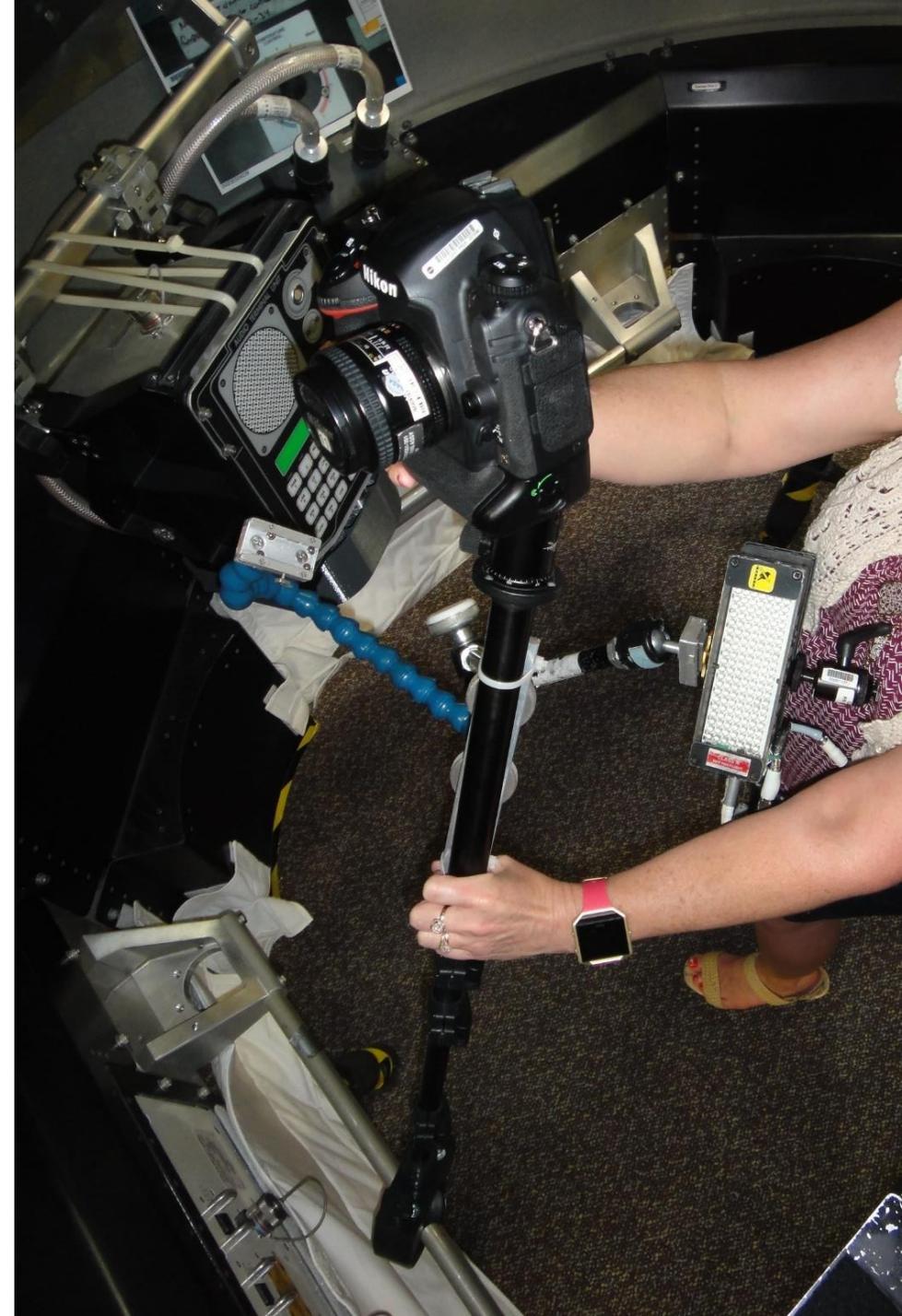
A variable friction based platform for stabilizing cameras and other ISS equipment for temporary video and photographic activities.

School: Cypress Woods

Teacher: Mike Bennett

Mentor: Glenn Johnson

NASA Engineers: Bruce Blazine, Paul Reichert, Paulo Nespoli, Don Pettit

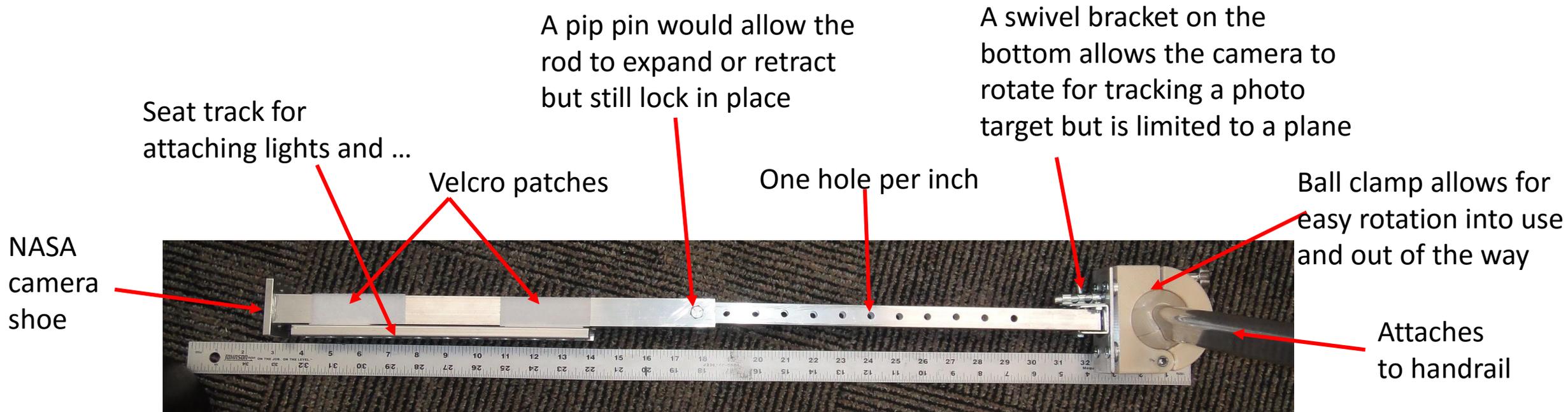


# Problem:

- For a number of years, returning astronauts have made comments on how it is difficult to position a video or still camera in the middle of a module for video interviews and communications with the world leaders. It often takes several different devices to get it close to the middle so everyone is visible in the camera and the view of the inside of the station can be seen by the people at home. It can also be difficult to reposition this chain of restraints or if it has to be put away and used again later, it can be a larger difficulty to do the rebuild.
- Astronauts requested that some kind of restraint that could hold a camera in the middle of a module and be repositioned easily. It would also be nice if it could hold an iPad close to the camera to act as a teleprompter.

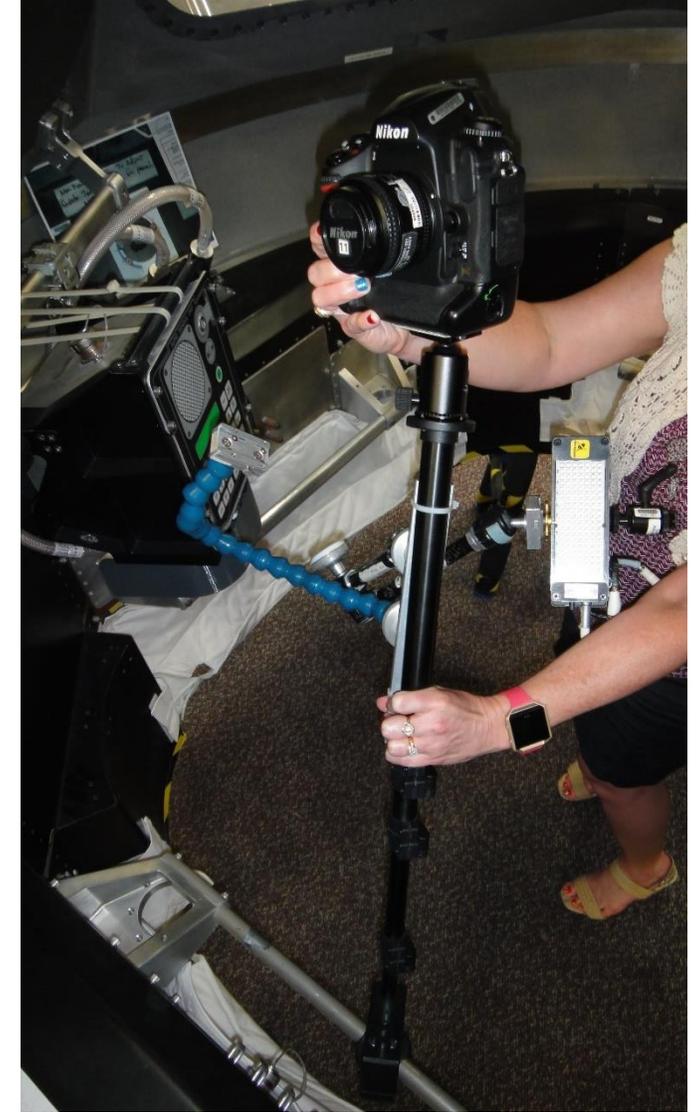
# Initial Design Concepts

- Bruce Blazine brought the astronaut comments to the HUNCH team where we tried to work out a general idea of the needs. We started off looking at concepts that were something similar to a Galley Table Strut since it was rigid and telescoping but used the Ball Clamp as an attachment point that could be made more or less rigid
- We showed some of these ideas around where it showed some promise because it met the need of extending to the center of the module, repositionable and could hold other equipment but we also received comments that it was “too clunky”. One astronaut suggested that instead of using a pip pin to lock it into a position, it should be friction based so it could be any length, not increments of 1” or so.



# Ball Clamp Monopod

- In the same way that a monopod helps steady a camera on the ground but still allows for mobility and pivoting, the Ball Clamp Monopod will help the astronauts position and steady cameras in places and methods that were previously difficult or impossible on the ISS.
- The Ball Clamp Monopod utilizes an off the shelf monopod with friction based clamps for extension and retraction.
- Adding seat track to the side of the monopod allows the addition of lights, multiple cameras, iPads or Tablets to act as a teleprompter.
- The ball clamp acts as a variable friction pivot point for the monopod. When attached to a handrail, the ball clamp allows for 180 degrees of rotation or more depending on the location of the handrail. Side to side rotation is around 30 degrees.
- Placing a camera in the center of a module
- Placing a camera into the hatch window.
- Allow steady tracking of ground sites from a window



Ball Clamp Monopod on Cupola handrail with Flex bracket and Multi Use Bracket for holding Work Light or other support equipment.

# Ball Clamp Monopod in the ISS mock up



Positioned out of the way



In use at a hatch window with work light



In use for the middle of a module

This version extends from 25" to 61"



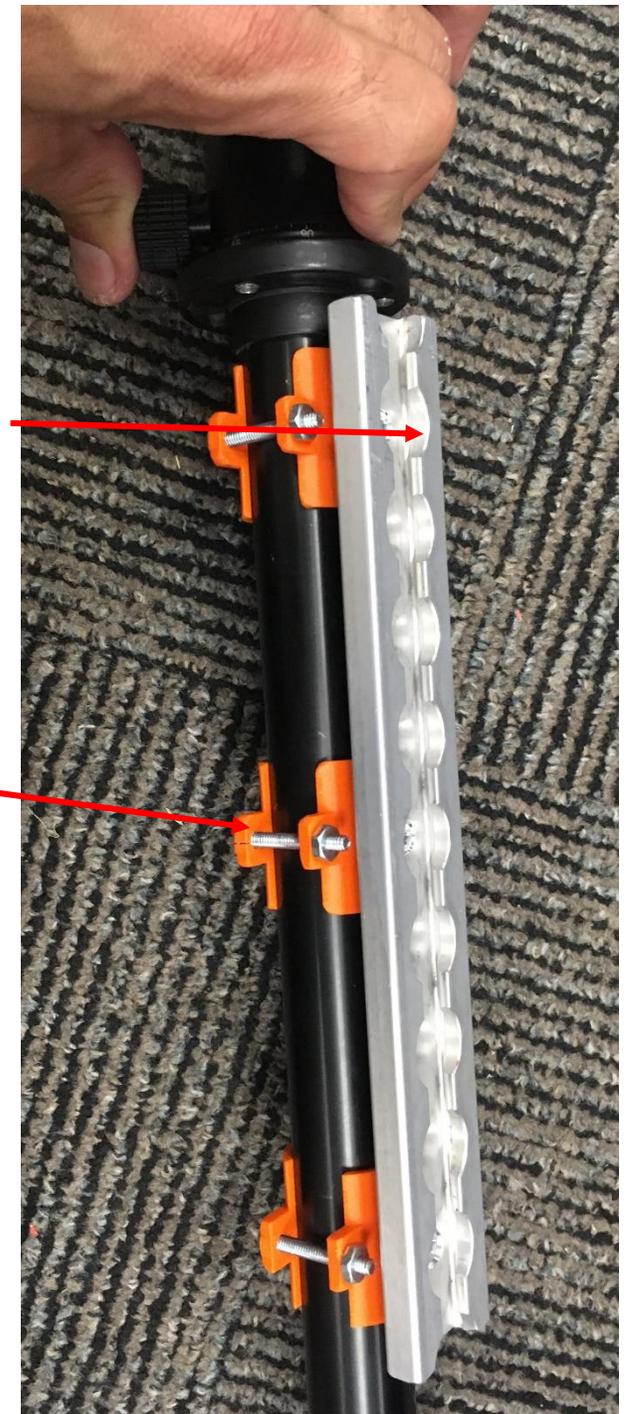
This camera attachment will be replaced with a NASA camera shoe



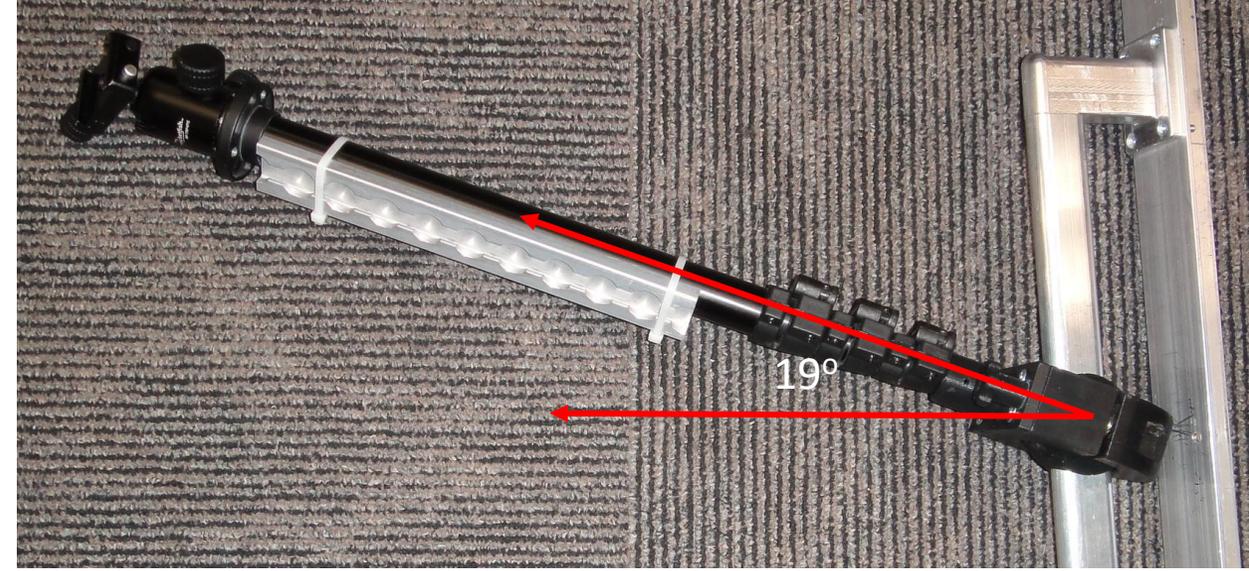
This is a commercially produced ball joint for cameras. The variable friction ball joint allows the camera to rotate without changing the position of the monopod. This would aid in following a photo target on the ground.

Seat track allows for attaching work lights, iPads or any other ISS equipment to accompany the camera. The seat track could also swivel around the monopod.

3D printed clips for attaching seat track to monopod



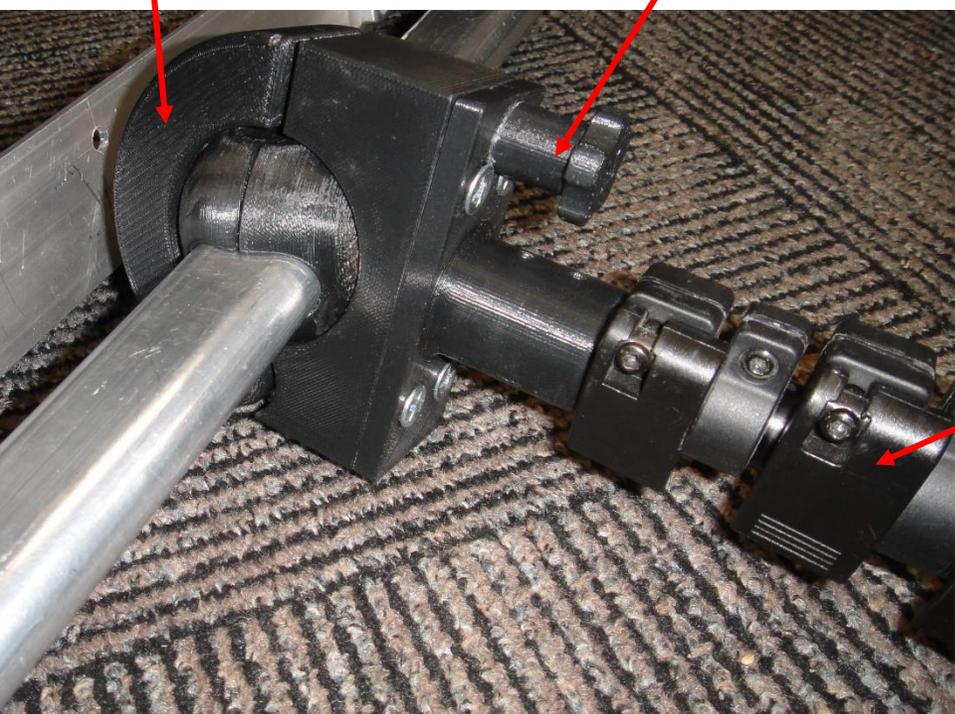
The variable friction ball clamp allows shifting of the whole monopod to position the camera for the right location. Depending on the location of the handrail it is attached to, it can rotate up to 270 degrees (handrail on a corner).



This angle increases depending on the handrail position

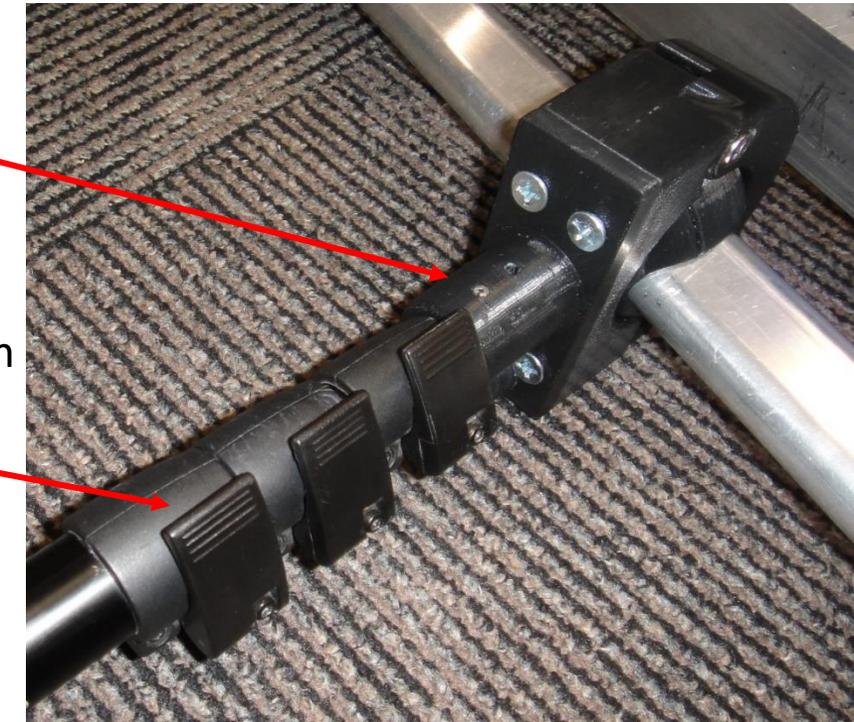
Ball Clamp

Thumb screw on the top of the ball clamp for easier access  
-302



2 Roll pins for attaching ball clamp to the monopod

Friction stops allows for any length between maximum and minimum length



# Future plan

- Comments from astronauts seem very positive so HUNCH is purchasing a monopod and ball head that are available new (as opposed to the used monopod and ball head) to build the final version that would fly.
- If the new prototype satisfies the astronauts, HUNCH will suggest building 3: one for flight, one for training and one for backup to fly.