

## Meeting Minutes

- 9/6/18-Thursday Meeting 1 11:00-11:25AM
  - Discussion about contact with client
  - Date setting for conference call and trip tour with INL
  - Discussion about state of project
- 9/6/18-Team Contract Construction 11:25AM-12:00PM
- 9/11/18-Conference Call With David Sell 11:00-11:20AM
  - Given information about met box
  - Given Information about project objectives
    - Camera needs radiation shielding if camera is to be put in the cell
    - Camera system needs to be able to be built by manipulators
    - Best way to describe project needs: surveillance system
  - Discussion with client about trip tour
- 9/11/18-Tuesday Meeting 2 11:20-11:30AM
  - Discussion about conference call
  - Discussion about project objective and possible solutions
- 9/11/18-Obtaining Budget Numbers 11:33-11:41
- 9/20/18-Thursday Meeting 3 11:04-11:26
  - Discussion about exact time of leave for INL trip and what we will be doing
  - Discussion about creation of Wiki Page
  - Discussion of creation of project schedule
  - Possible requirements were mentioned: dose readings necessary to determine shielding requirements.
  - Possible lens shielding discussed
- 9/27/18-Thursday Meeting 4 11:00-11:17
  - Requirements draft discussed and how and when we need to complete it, Oct. 2nd
  - Mention of need to email INL for some more specific requirements, i.e. magnet usage.
  - Items to use for Snapshot discussed
  - Discussed the use of 3D printing a model for shielding instead of buying actual expensive equipment. Reduces scope of the project and allows INL to create own shielding.
- 10/4/18-Thursday Meeting 5 11:00-11:50
  - Come up with design concepts by next week
  - Set-up INL Conference call for around Oct. 15th
  - Discussed schedule
    - Break into sub-tasks
    - Allow everyone to take ownership
    - Treat schedule as a living document
  - Discussed meeting on Monday Oct. 8th to set up for snapshot

- 10/11/18-Thursday Meeting 6 11:00-11:45
  - Discussed snapshot recap takeaways
    - Same size fonts
    - Team picture
    - Color photos
  - Decided project learning assignments
    - Nick - Cameras
    - Jack - Material for shielding
    - David - Camera mount
  - Discussed value proposition - due 10/25
- 10/25/18-Thursday Meeting 7 11:00-11:41
  - Discussed work on progressing forward
  - Bring designs together on Tues 10/30
  - Meeting provided a wake up call on our progress thus far
- 10/30/18-Tuesday Meeting 8 11:00-11:35
  - Discussed three distinct designs
    - Design 1
      - Several permanent wall mounts using magnets
      - Shielding including SS and clearview on front
    - Design 2
      - Tripod mount to be moved around cell
      - New requirements include at least 24 inches in height
    - Design 3
      - Moveable mount using magnets to wall
      - Small and light with mechanical magnet switches
- 11/1/18-Thursday Meeting 9 11:00-11:40
  - Went over budget and schedule
  - Project learning update
  - Reviewed info sent by INL
  - Talked about upcoming Design Review
  - Went over wiki page
- 11/6/18-Tuesday Meeting 10 3:00-4:15
  - Discussed design review preparation
  - Reserved conference room
    - ME Conference Room, Thurs. 11/15 at 11:00 AM
  - Finalized write-ups on Wiki-page
  - Updated portfolio
    - Value Proposition
    - Updated Product Requirements
    - Updated schedule
    - Updated budget
  - Planned to send three designs to INL by COB Monday for comments
- 11/29/18-Thursday Meeting 11 11:00-11:35

- Arm design was discussed
  - Octopus Leg
    - With the octopus leg there are worries that it might not be able to withstand the conditions of the Met Box.
    - Octopus leg may not be able to support the camera and shielding, but is cheap and malleable.
  - Metal Arm
    - Wench could be made out of stainless steel to support the camera and shielding
    - Twister would be added on the end to allow for more possible angles
    - Due to weight constraints, this design would have to be specced accordingly.
- Agreed the arm and mount parts should be permanent features
- The design will henceforth be split up into three parts:
  - Camera & Shielding, which will be designed by Nick
  - Arm, which will be designed by David
  - Wall Mount, which will be designed by Jack
- Reminder that snapshot is on 11/30/18 at 8:30
- We will have a get together on 12/3/18 to discuss wiki page and other aspects of our design.
- Jack is to get a quote on the Densetec Material
- David will research dentist light, for design ideas
- Nick will handle purchase request, and order the necessary items:
  - Magnets
  - Octopus Leg
  - Camera
- 12/6/18-Thursday Meeting 12 11:05-11:20
  - Order will go in for magnets, desk lamp, and octopus leg tripod by David.
  - Camera order will be postponed for later, Nick will do some more research.
  - Densetec quote has been completed, and Jack is waiting to hear back for it.
  - 3:30 on Tuesday in the Think Tank Conference rooms time slot will be allotted for next semester.
    - Important to note that this time is during the Capstone Design class and if there is any session commencing, we will have to accomodate.
  - CAD and Solidworks modeling and training will be performed next semester.
  - Reminder that tomorrow the logbooks, portfolio, and wiki page are all to be turned in.
- 1/10/19-Thursday Meeting 13 3:30-4:00
  - Should have prototype built before we leave back to Idaho National Labs in March
  - Along with octopus arms and desk lamp arm, David has designed an arm prototype that involves several pins and single connectors

- Octopus leg arms reach 9 inches in length, meaning it fits the length requirements for arm prototype.
- Nick has found a camera worth \$599
  - Speculated camera is a Marshall CV350-10XB that weighs 375g and has a 10X zoom
  - If necessary, we could buy the camera and return it if it doesn't meet our requirements
- Discussed how the prototype we are building will not be entered into the Met Box itself, due to the lack of actual radiation resistant shielding for camera.
  - Prototype will contain mock shielding not meant to permanently be held in the met box, mostly used as a representation
- **Action Items:**
  - Jack
    - Determine Resilience of polymer and plastic of the octopus arm
    - Design shielding for camera in CAD or Solidworks
    - Call clearview to find more details about acquiring the Clearview panels
  - Nick
    - Ask technical questions to supplier of the Marshall camera
    - Decide where to purchase the camera
  - David
    - Work on CAD designs for arm and mount pieces
- 1/17/19 Meeting 14 3:30-4:00
  - New camera problem: possible overheating if kept on too long
    - Simple solution is to have an easy off switch to the camera which can be performed with \$30 wiring.
  - Filament for 3D printing needs to be purchased
  - Base design for the contraption now includes a higher placement for the magnet so that there is room for an off switch for such magnet
  - In base design there needs to be an additional leg/magnet in order to keep the system steady
  - Joints for original arm may be difficult to craft as it is hard to create sticky screw joints
  - David had shower idea of creating a single ball joint arm design
    - Consider a shower head system or even a single ball joint or the previously outlined octopus arm idea.
    - Need to know the material of the ball joint contraption for radiation resistance
    - Ball joint would be attached to the base, not the camera
    - This idea seems to be the one that the team wants to move forward with.
  - Some plastics do have radiation resistance, making the octopus leg a possible design for our contraption

- The make of the octopus arm material can be found, however registering and using the equipment needed, Raman or IR spectroscopy, will take a lot of time
- Plan on leaving to INL on dead week of spring semester
- Model will be 3D printed for the engineering release
- Plan for shop use in late February or early March
- **Action Items:**
  - Jack
    - Using CAD, design shielding for the camera
  - Nick
    - Order and obtain camera
  - David
    - Work on ball joint arm design
  - All
    - Prepare for INL conference call on the 24th of January
- 1/24/19 Meeting 15/INL Conference Call 3:30-4:00
  - Camera had been order and specs are known
    - Weight is only a single pound
    - Camera has overheating problem, but can be simply fixed with easy off switch
  - Need to figure out wiring system for zoom and regular application
    - Regular application uses USB2 port
    - Zoom uses HDMI or 3G/HD-SDI port
    - Will be impossible to find HDMI wiring with insulation
    - Wiring and ports needs to be considered for computer as there may be signal loss due to long length of wires and multiple connections
    - Coax port is preferred by INL, may be able to use a transition port to make this work
  - Camera cording does not need to be insulated for the Met Box
  - Secondary visit date to INL needs to be determined
  - Hard Plastic radiation resistance and wiring schematics are to be sent to us from INL to help with design
    - Elimination of octopus leg design will depend on data
  - Ball joint idea is accepted by INL
  - Prepare for second design review on Feb 15th
  - **Action Items:**
    - Nick
      - Design CAD elements for camera
    - Jack
      - Design shielding with CAD
      - Give David specs on Clearview Panels
    - David
      - Order 3D printing filament
      - Work on ball joint design in CAD

- 2/7/19 Meeting 16 3:25-3:40
  - Idea of press fitting the nipple in the center of the arm onto the two ball joints, then securing the bar with an external screw.
  - Center nipple may be able to be found with the correct threads
    - Might be able to be found online or at Clearwater Hydraulics in Lewiston
      - Here we can find more pieces that just the simple nipple piece
    - Nipple piece could be created for a rather inexpensive price.
  - Ball joints are made of chrome plated brass, threads are G 1/2
    - The soft metal may make it hard to perform certain techniques
      - Heavy machining and/or loads could cause it to collapse
      - Welding the materials with stainless steel or other unfamiliar metals could cause problems.
  - Idea to weld the post to the first ball joint
    - Could be problematic considering brass is the materials needing to be welded
  - Possibility to find a ball joint piece that doesn't use G 1/2 threads
    - Ball joint was found that uses universal 1/2 threads
  - We will use a certain amount of foil, low weight, for protection of the electronics in the back of the camera.
  - Possible time for Engineering release is Wednesday the 20th at 1:00
    - This gives INL and us time to prepare
  - A metal piece will be inserted in the back of the post, by welding or bolting, in order to keep it stable
  - **Action Items:**
    - All
      - Create bill of materials
      - Finish on final proofed design
      - Start working on presentation and slides
- 2/14/19 Meeting 17 3:30-3:52
  - Machineable nipple can be found by Clearwater
    - This allows us to screw into the G 1/2 threads found in the ball joints with ease rather than press fitting any pieces
    - MSC has 6 inch long nipple that costs \$18
      - This is great compared to a rethreaded nipple that could cost \$400
  - CableCreation has cable boosters that may help with signal distortion
  - Use a scrap piece in the shop for post balance
  - Idea to use two press-fit pieces for the male side of the ball joint in order to attach to the post convert to camera and shielding threads
  - Idea to make a pin that fits the inside diameter of the male end of the ball joint, the use a set screw to keep it in place.
  - Idea to attack ball joint by turning down the male end and press fitting a piece into it.

- Due to the piece being brass and the action of turning down the threads causing the thickness of the piece to be too thin, this procedure was vetoed
- Idea to find a cup link with the correct threads for the male end of the ball joint.
  - This piece was found and know will fit into the final design of our project.
- It is necessary to 3D print the knob piece to attach to the magnet
- Provide all the details for the system for the engineering release, including specific materials, costs, and measurements.
- **Action Items:**
  - Jack
    - Work on presentation and slides
  - David
    - Finish the look of final design and provide measurements
  - Nick
    - Finish the Bill of Materials
  - All
    - Prepare for engineering release