

Meeting Minutes

- 9/6/18-Thursday Meeting 1 11:00-11:25 AM
 - 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 11:25 AM-12:00 PM
- 9/11/18-Conference Call With David Sell 11:00-11:20 AM
 - 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 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 unifilar 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
- 2/21/19 Meeting 18 3:30-3:45
 - Need information on Clearview Panel
 - Density?
 - Price?
 - Frame Material?
 - Custom Options?
 - How thick can we get the actual material?
 - Weight of the clearview panel with the frame?
 - Once we have information on clearview panel, need to come to decision on shielding design and how to implement the Clearview panel.
 - `Should we use it for the entirety of the shielding or simply for the front?
 - From engineering release, we need to buy nipple and then test the loading capability of the actual nipple.
 - **Action Items:**
 - Jack:
 - Talk with radium, determine the exact characteristics of the clearview panel
 - Work on Solidworks design rework, pending clearview panel information
 - David
 - Order nipple piece
 - Nick
 - Work on Solidworks design rework, pending clearview panel information
- 2/28/19 Meeting 19 3:32-4:00

- Nipple has been received, need to do load testing on the on the arm piece with the given part
- Need to design a post plate with a defined bend part
- Note to not send in drawings without being 100% certain on the final design, also would want to confer with INL before moving forward.
- Instead of sending in parts for shielding to be tapped and cut at some company, there is an idea to do the machining ourselves to prevent problems with laser hardening.
- Holes to safen magnet are not to be through holes, but instead to be tapped
- Actual magnet holes need to be oversized to make sure that they will allow the magnets to fit.
- Ordered BSPT male, so the parts can go tapered to female.
- Decision was made to only use the clearview panel for the front of the shielding design due to the clumsiness of having to use it for the entire design
 - 2.5*2.5*2.5 in block will be used for the front coming to weight of around 2lbs
 - Was advised to use 3.5 in wide block to allow for more radiation resistance, but due to weight constraints 2.5in block will be used giving around 80% radiation reduction
 - The clearview block can have a polycarbonate casing, of about ¼ of an inch, allowing for the metal casing to be eliminated
 - Will use stand-in for clearview piece as it will cost around \$2000 on its own
- Need to find a way to make sure that screws used will stay in tightly,
 - Possibly lockwash
- Need to order camera to start interfacing with the system, using multiple chords together
- **Action Items:**
 - Jack
 - Help Nick with Solidworks design for shielding with new clearview piece
 - David
 - Work on design for post plate, giving the bend
 - Edit solidworks design to account for oversize magnet holes and screw safety
 - Nick
 - Work on solidworks design with clearview panel piece
 - Order camera
 - All
 - Test loading of arm piece with new nipple
- 3/7/19 Meeting 20 3:30-4:02
 - Arm piece can not even remotely handle the load of the camera with shielding, ball joints simply can not handle the moment created

- Moment diagram used in presentation needs updating and is integral for determining total load that the system might have
- INL is happy with new design, especially the quality of requiring less manufacturing and having more mobility
- Stainless Steel pieces will be machined by a separate company instead of here at the university of Idaho
- 3/21/19 Meeting 22 3:31-3:55
 - Top piece of the stainless steel shielding has a protruding tab so that manipulators can easily grab the box
 - Screwed on tab was removed from the design
 - Moment diagram was fixed
 - For a 30 degree angle, a specific hydraulic strut is needed to keep up the force
 - Calculated a minimum of 24 degrees before strut will no longer hold the box
 - Gas may need to be released to allow for the manipulators to maneuver the cameras
 - The small details designed on the basket are to be bent with pliers into place
 - Need to round down the top edges of the shielding
 - Add lockwashes and weld nuts to the design
 - Need to create flat patterns in completely accurate form
 - Example: change hole in the bracket to just a through-hole
 - Plan to have these done by tomorrow
 - Idea to go above $\frac{1}{8}$ inch for shielding through-holes
 - Allows to go from 0.25 to 0.15 tolerance
 - **Action Items:**
 - Nick
 - Work on flat patterns so that stainless steel and aluminum pieces can be cut
 - Send patterns to INL
 - David
 - Work on flat patterns so that stainless steel and aluminum pieces can be cut
 - Order given metal pieces
 - Jack
 - Work on documentation: wikipedia, final report, design poster
- 4/4/19 Meeting 23 3:30-4:30
 - Received the following parts
 - Stainless steel and aluminum parts from CEA
 - HDMI cables and converters
 - Acrylic piece for Clearview stand-in
 - Wire pins
 - April 12th is the next lab book report

- Post has been manufactured, through-holes cut and others tapped.
- Magnets were heated with a heat gun and then the know was removed off the top
- Acrylic needs to be cut down to size
- **Action Items:**
 - Nick
 - Communicate with Brandon about shop time
 - David
 - Update budget, validation, and timesheet
 - Jack
 - Work on wiki page, final report, and poster
 - All
 - Work on manufacturing process