

Minutes 1

Date: 6/20/18

Venue: GJ Design Suite

Time: 12:30

I. Product Requirements Document

Make the objective be the outcome of your project, not just the completion of this document (probably something similar to the problem statement)

Dramatically expand references. Include the wiki site of the last team, various user manuals, and references from class.

Towards the front of the document, include a map/layout of the current cell for reference throughout.

Add Denso specific terminology related to programming the controller as well as the pendant.

On what the device should do... include some of the specifics about different part manipulations/modifications (i.e. material handling, fastener insertion/removal, optical scanning, acceptance of mixed load of parts, final storage by part type).

Take a look at UL (and Boeing company) recommendations for collaboration between robots and humans. There are probably some principles about safety that we need to follow. Ankit may have addressed some of these.

On the reliability side include something about collision avoidance.

II. Interview Questions

Objective is to integrate two arms in a mini assembly line, illustrating supervisory control

Freedom to change anything from previous projects

Budget of about 1000 dollars

If we use a screwdriver, consider Arduino intervention

Look up: FANUC, DENSO, KUKA, small manufacturing lines

Use the controller to manually get coordinates

Should design different tools to utilize during process

Minutes 2

Date: 6/27/18

Venue: GJ Design Suite

Time: 12:30

I. Product Requirements Document

Elaborate more on objective

Explain what the references are/why they are important

Input more acronyms for the project

Include a spot to explain some of the code used

User-Interface (4.1) vs User-Interface (7.2)

Reliability Requirements (5.7) – Emergency Stop

II. Design Ideas

Idea of Lego/Duplo/Mega Blocks assembly

Build or research products for pushing pieces together

Potentially stacking cups – one robot does one row, the other does next, etc.

III. Gantt Chart

Should have a “lead” for each sub-project

IV. SEL Inspiration

One arm pushed buttons, maybe we are thinking too complex

Screw station seemed to detract from the goal of the project

Minutes 3

Date: 7/3/18

Venue: GJ Design Suite

Time: 12:30

I. Product Requirements Document

Missing from Document:

Process Description

Fixtures to be Designed

Software Operations

Include Goals of the project in object

II. Design Idea

Process essentially:

Incoming Parts queue...Sort by type of part after scanned...loops until all parts are sorted...Pick and Place Bottoms from sorted parts...Pick and Place Tops onto Bottoms...Pusher tool assembles pieces...Pick and Place Assembly into Finished Parts Location.

Use two parts: Male and Female

III. Design Validation Plan

Finish Product Requirements, then look into this more

IV. WikiPage

Include Minutes/Agendas, Team Contract, PRD, Schedule, Budget at bottom

Process Learning

What goals of project are

How this project will benefit future

V. Portfolio

Send layout via email by Monday

Minutes 4

Date: 7/10/18

Venue: GJ Design Suite

Time: 11:45

I. Design Ideas

Parts:

Male and Female Parts are good the way they are. Consider using “Vandal Swag” to make it more interesting for those not in the project.

Get first part prototype made this week!

Once we have the parts, we can start coding.

Pile weights onto the parts to test the weight to push them together.

Barcode scanner will scan the parts no matter the orientation.

Ramp:

Potential Feeder Bowl to dish out the parts? Look into buying a small vibrator.

Gripper:

Good idea, try to 3D print the parts.

Pusher:

For push finger, go to Bill and gather his opinion. See if it is manufacturable; if anything needs to be better designed, revise the design. Try to make it 3D printable, if possible.

Use the same concept as the previous group for the base. This will save time and material.

Fixture:

Andre, Sarah, Sammy – if we need to use laser cutter or 3D printer. Feel free to buy any material necessary.

II. Product Value Proposition

Collaborative manufacturing of an object is what our value proposition is. Imagine it to be a 30 second elevator speech.

III. Concept Design Review

Refine the flowchart:

Say what each part of the process is and what is controlling it.

1. OP – Operator
2. R1 – Robot 1

3. R2 – Robot 2
4. SC – Supervisory Control

Show off parts made, fixtures made – a formal review of what has been accomplished. Give a basic concept of the idea.

Target Date: 12:00 pm July 26.

IV. Design Validation Plan

Refine operations. What can be done to ensure everything operates correctly?

Add more to the PRD in order to verify all of the requirements.

V. Available Materials

Check with mentors, there should be material available – aluminum, wood, brass, potentially 3D printer material.

Check with Bill for any scrap material.

New printer is available for use – need to speak with Andre or Dr. Perry to use.

VI. Misc.

Training to use robots with Ankit at 12:00 pm Thursday 7/12.

We will need several iterations of each part, so do not worry too much about whether they work the first time vs. what you can learn from it. Can always make them better. Prototype this week, if possible.

Minutes 5

Date: 7/17/18

Venue: GJ Design Suite

Time: 11:45

I. Concept Design Review

Shoot for July 26 at 11:30 pm

Slides to offer:

Problem Definition

Problem Statement

History of UI Robotic Cell

Evolution to Current State

Future State Potential

Specs/Reqs.

Process Needs

Constraints

Process Description (Initial/Final)

Component Design Development

Delivery System

End Effector

Scanner

Assembly Fixtures

Storage Area

Product

Robot Programming

Schedule

Budget

Unresolved Questions

(More detail than the Wikipage presentation)

II. Product Value Proposition

Format up to us. Can do written, verbal, video format if desired.

III. Parts Design

Should be low friction and able to push together.

Make the slot larger in the male part to push easier together

IV. Pusher Design

Can create a large, flat end piece on the tool to cover more surface area.

V. Fixture/Storage

Have both fixture and storage in a set location, so it does not move when inserting the parts.

VI. Code Testing

Tested code, did not work. Changed settings in the controller from CRLF to CR as well as commented out code that seemed unnecessary. Able to achieve TCP/IP protocols.

Minutes 6

Date: 7/23/18

Venue: GJ Design Suite

Time: 11:45

I. Concept Design Review

Send powerpoint to Dr. Beyerlein for review before the target date.

II. Code Testing

Ankit will send code for gripper.

Goal: Create a sample code for the robots to show them working together, might need to calibrate points

Need to calibrate robots so they stop completely before the other starts its task.

III. Misc.

Find current limits for each axis – depends on the position, but you can find the torque limit from this.

Takes a .2 kg load to fit the parts together.

Shigley use is perfect for guessing the material and coming up with data to prove a point.

To find the spring constant, we should stack weight onto the compression spring to see how far it has moved. Using $F=-kx$, this gets the spring constant.

IV. Snapshot

Show how efficient the code is. How many lines are there? Can it loop? Show goals, progress, metrics of the code.

Come up with a list of items with what we have done and progress so far.

Show how many different designs have been created for each part.

Minutes 7

Date: 7/31/18

Venue: GJ Design Suite

Time: 11:45

I. Snapshot

We can show a demonstration of the robots working together, as well as a video. Don't spend too much time to initiate the program though.

We can have a continuous cycle of the manufacturing process as long as it does not take too much time. What we want to show is up to us.

Audience will include mostly the class, but some outsiders may join.

Part of our team can stay to explain the project while others mingle about. Take turns doing this so we can understand others' work.

Have features, fixtures, and process available for audience to see.

We can show code in the snapshot, but make sure it is dumbed down so people can follow.

II. Wikipage

Can upload a GIF file to Wikipage, however a video is not possible. We should put this in the Design Concept section to demonstrate our progress.

Final Design section should be changed to Design Concept for now. Once our Final Design is complete, we should revert it back to its original heading.

If people can understand the code during the snapshot, we can use this for our Wikipage.

III. Portfolio

Keep the same organization we have already established, update the documents and insert into the portfolio, as well as new ones such as the Design Validation plan, Design Review, etc.

For the Design Validation, show what has been tested, what still needs to be done.

Turn in with Logbooks on Thursday.

IV. Logbooks

Turn in on Thursday, will get them back on Friday.