Shadow - Bot

(IEDatron)

Group 32

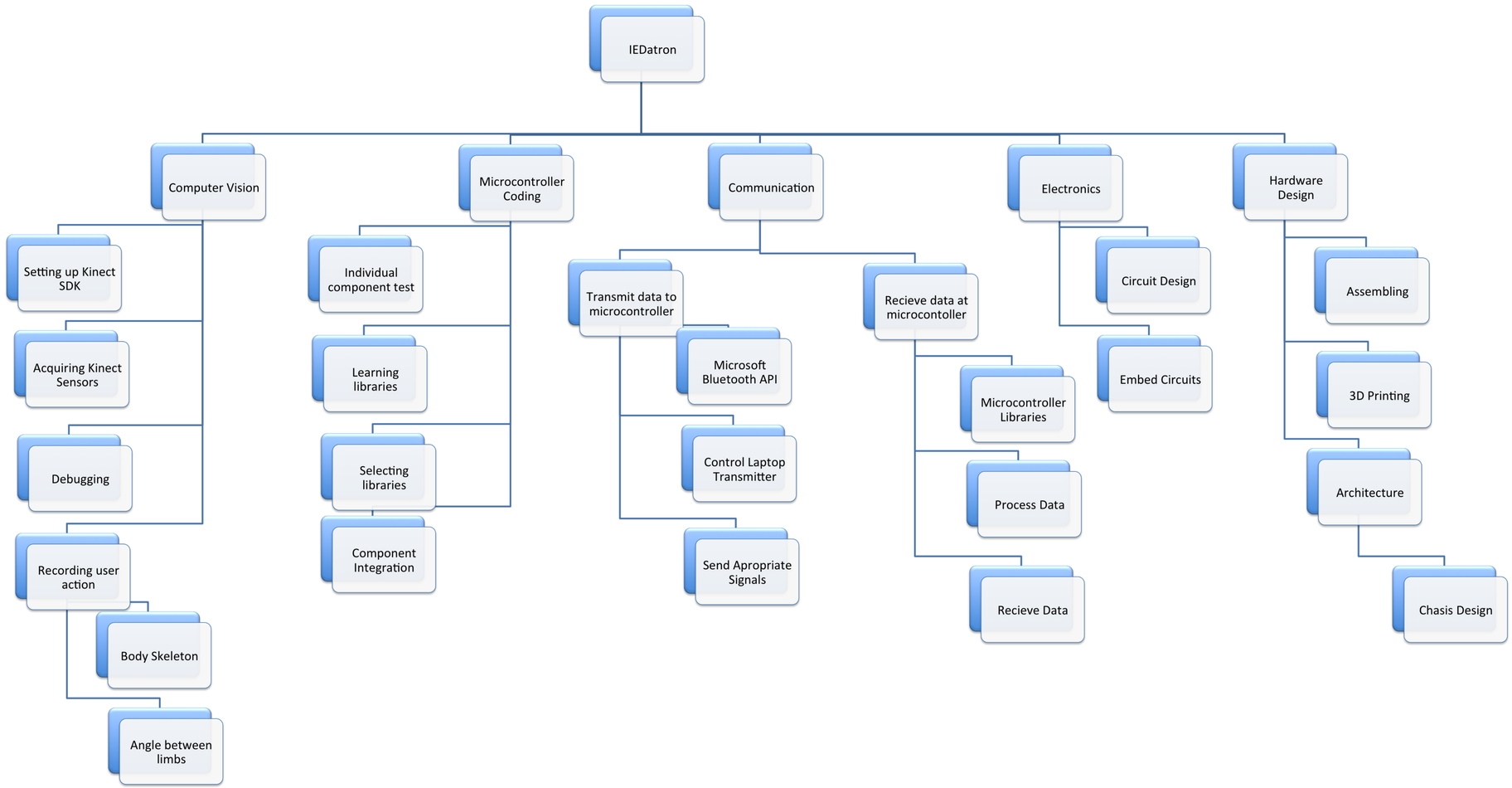
Anant Sharma (2016129)

Aditya Chetan (2016217)

Siddharth Yadav (2016268)

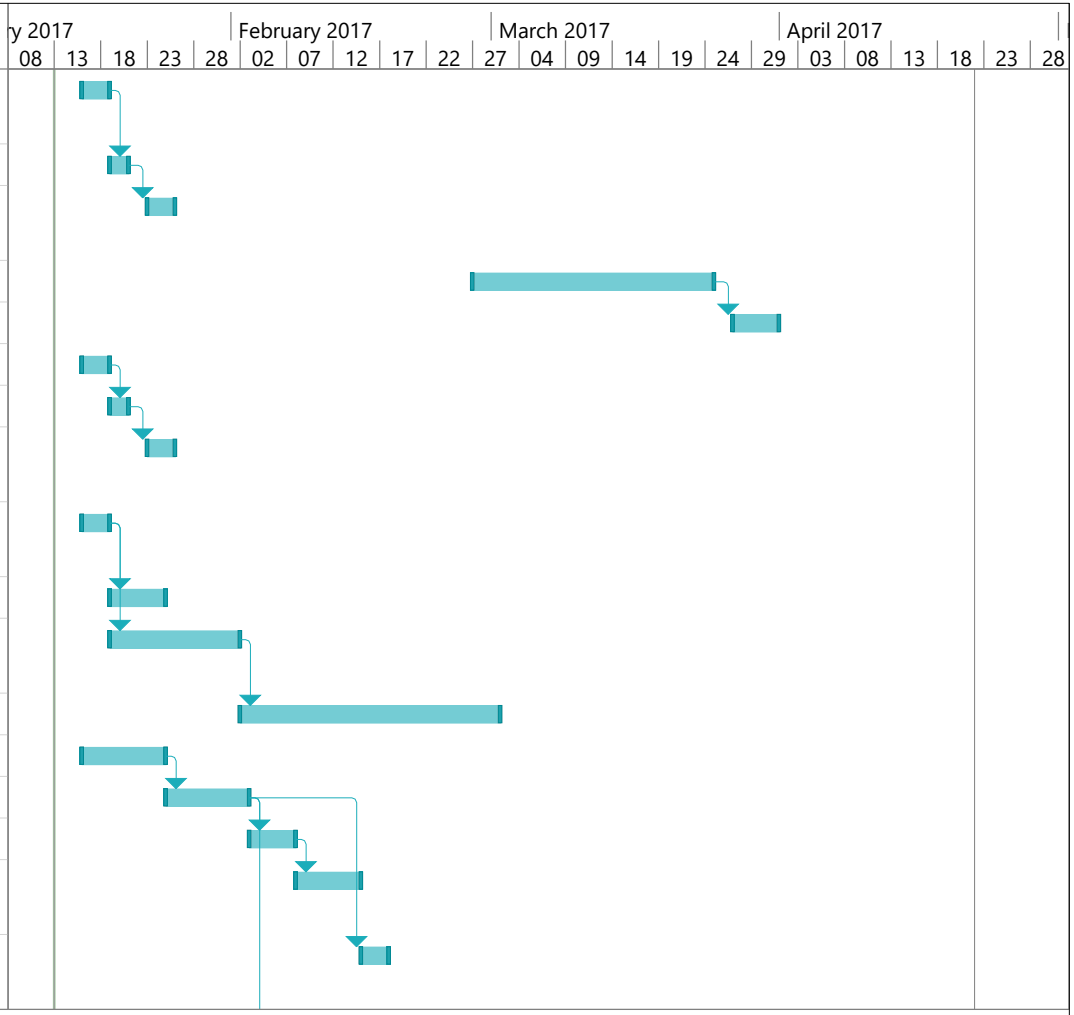
Shwetank Shrey (2016095)

Work Breakdown Structure (WBS)


IEDatron
Computer Vision
Microcontroller Coding
Communication
Electronics
Hardware Design
Setting up Kinect SDK
Acquiring Kinect Sensors
Debugging
Recording user action
Body Skeleton
Angle between limbs
Individual component test
Learning libraries
Selecting libraries
Component Integration
Transmit data to microcontroller
Microsoft Bluetooth API
Control Laptop Transmitter
Send Apropriate Signals
Recieve data at microcontoller
Microcontroller Libraries
Process Data
Recieve Data
Circuit Design
Embed Circuits
Assembling
3D Printing
Architecture
Chasis Design

Gantt Diagram

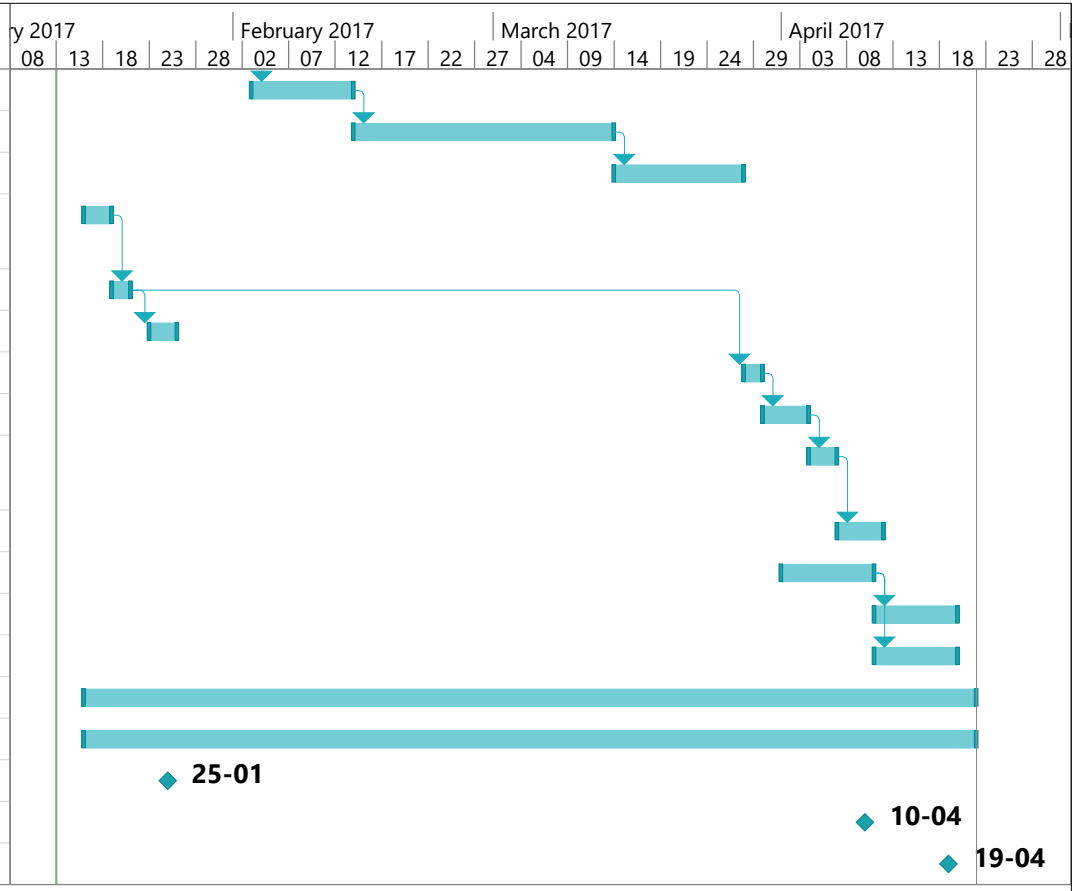
ID	Task Name	Start	Finish
1	Making a Hardware Sketch	Mon 16-01-17	Wed 18-01-17
2	Identify Hardware Components	Thu 19-01-17	Fri 20-01-17
3	Acquiring Hardware Components	Mon 23-01-17	Wed 25-01-17
4	Creating STL for the Bot	Mon 27-02-17	Fri 24-03-17
5	3D Printing the Bot	Mon 27-03-17	Fri 31-03-17
6	Designing the Circuits	Mon 16-01-17	Wed 18-01-17
7	Identifying Servos to be used	Thu 19-01-17	Fri 20-01-17
8	Acquiring Servos	Mon 23-01-17	Wed 25-01-17
9	Identifying Microcontroller Components	Mon 16-01-17	Wed 18-01-17
10	Individual Component Test	Thu 19-01-17	Tue 24-01-17
11	Selecting Servos' Libraries	Thu 19-01-17	Wed 01-02-17
12	Arduino Coding	Thu 02-02-17	Wed 01-03-17
13	Acquiring Kinect Sensor	Mon 16-01-17	Tue 24-01-17
14	Setting up Kinect SDK	Wed 25-01-17	Thu 02-02-17
15	Mapping Body Skeleton	Fri 03-02-17	Tue 07-02-17
16	Finding Angle between Limbs	Wed 08-02-17	Tue 14-02-17
17	Recording User Interaction	Wed 15-02-17	Fri 17-02-17



Project: Project1
Date: Fri 13-01-17

Task		Inactive Summary		External Tasks	
Split		Manual Task		External Milestone	
Milestone		Duration-only		Deadline	
Summary		Manual Summary Rollup		Progress	
Project Summary		Manual Summary		Manual Progress	
Inactive Task		Start-only			
Inactive Milestone		Finish-only			

ID	Task Name	Start	Finish
18	Creating Databases	Fri 03-02-17	Mon 13-02-17
19	Kinect Module Coding	Tue 14-02-17	Mon 13-03-17
20	Debugging	Tue 14-03-17	Mon 27-03-17
21	Identifying Communication Components	Mon 16-01-17	Wed 18-01-17
22	Acquiring Components	Thu 19-01-17	Fri 20-01-17
23	Individual Component Test	Mon 23-01-17	Wed 25-01-17
24	Using Microsoft Bluetooth API	Tue 28-03-17	Wed 29-03-17
25	Controlling Laptop Transmitter	Thu 30-03-17	Mon 03-04-17
26	Configuring Arduino for Receiving Data	Tue 04-04-17	Thu 06-04-17
27	Processing Data	Fri 07-04-17	Tue 11-04-17
28	Assembling Components	Sat 01-04-17	Mon 10-04-17
29	Trial Runs	Tue 11-04-17	Wed 19-04-17
30	Debugging	Tue 11-04-17	Wed 19-04-17
31	Blog	Mon 16-01-17	Fri 21-04-17
32	Documentation	Mon 16-01-17	Fri 21-04-17
33	All components acquired	Wed 25-01-17	Wed 25-01-17
34	Bot Assembled	Mon 10-04-17	Mon 10-04-17
35	Bot Finished	Wed 19-04-17	Wed 19-04-17

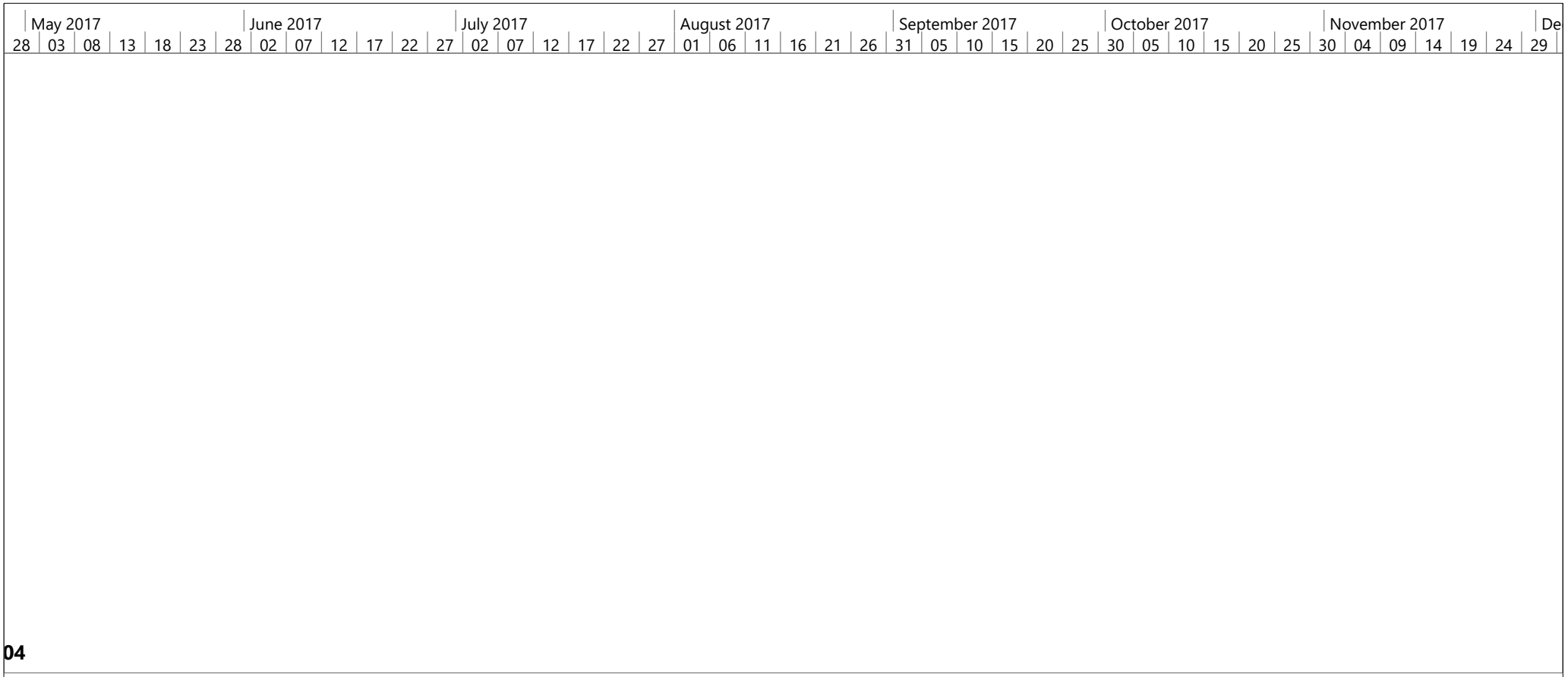


Project: Project1
Date: Fri 13-01-17

Task	Inactive Summary	External Tasks
Split	Manual Task	External Milestone
Milestone	Duration-only	Deadline
Summary	Manual Summary Rollup	Progress
Project Summary	Manual Summary	Manual Progress
Inactive Task	Start-only	
Inactive Milestone	Finish-only	

Project: Project1
Date: Fri 13-01-17

Task		Inactive Summary		External Tasks	
Split		Manual Task		External Milestone	
Milestone		Duration-only		Deadline	
Summary		Manual Summary Rollup		Progress	
Project Summary		Manual Summary		Manual Progress	
Inactive Task		Start-only			
Inactive Milestone		Finish-only			



Project: Project1
Date: Fri 13-01-17

Task		Inactive Summary		External Tasks	
Split		Manual Task		External Milestone	
Milestone		Duration-only		Deadline	
Summary		Manual Summary Rollup		Progress	
Project Summary		Manual Summary		Manual Progress	
Inactive Task		Start-only			
Inactive Milestone		Finish-only			

Procurement Strategies

No.	Item	Order of sources for procurement
1.	Kinect Sensors	1. We have borrowed it from a senior.
2.	Servo Motors (torque will be decided after acquiring chassis)	1. College Inventory 2. Purchase them from the local electronics market 3. Purchase them online.
3.	Robot Chassis	1. College 3-D printer 2. External 3-D printing vendor 3. Purchase a readymade chassis
4.	Arduino Mega Microcontroller	1. College Inventory 2. Purchase from local market 3. Purchase online.
5.	H-Bridge (L293)	1. College Inventory 2. Purchase from local market 3. Purchase online
6.	Bluetooth Module for Arduino (HC-05)	1. College Inventory 2. Purchase from local market 3. Purchase online
7.	Jumper wires, resistors and other electronics	1. College Inventory 2. Purchase from local market 3. Purchase online
8.	Lipo Batteries for power supply	1. College Inventory 2. Purchase from local market 3. Purchase online
9.	Solder Board	1. Purchase from local market
10.	Solder wire	1. College Inventory

Project Costs

Sr. No.	Item	Price	Quantity	Total Price (in Rs.)
1.	Servo Motors (torque will be decided after acquiring chassis)	500-800	10	5000-8000
2.	Robot Chassis	1000	1	1000
3.	Arduino Mega Microcontroller	750	1	750
4.	H-Bridge (L293)	100	6	600
5.	Bluetooth Module for Arduino (HC-05)	180	1	180
6.	Jumper wires, resistors and other electronics	300	1	300
7.	Lipo Batteries for power supply	1500	1	1500
8.	Solder Board	40	2	80
9.	Solder wire	50	1	50
			Total Cost	**8,860-11,860**

Risk Management Strategies

Sr. No.	Risks	Likelihood Of occurrence	Degree of Importance	Precautionary Strategies (in order of priority)
1.	The price of the appropriate Servos (having adequate torque) might lead to an overpriced budget.	Very High	Very High	1. Reduce the torque of the motors for arms. 2. Reduce the degree of freedom of the leg-joints. 3. Completely remove the movement of leg-joints.
2.	It might not be possible to print the chassis using the college 3-D printers either due to unavailability of the 3-D printers or due to the complexity of the task.	Moderate	Very High	1. Approaching an external vendor for getting out chassis 3-D printed in case this happens. 2. In case this leads to increase in our budget then we will buy a readymade cheaper chassis.
3.	The Bluetooth module that we purchase may malfunction.	Moderate	High	1. If this happens, then we will abandon wireless communication and resort to using USB cables to communicate between Laptop and Robot.
4.	Power Supply using Lipo battery may not be possible due to high costs of the project and if it is not available in the College Inventory.	High	Moderate	1. In case it is not possible to acquire Lipo batteries cheaply,we will resort to using external power adapter.

5.	The costs of each of the items that we require is pretty high and in case any of these items malfunction it could lead to a big problem.	High	Very High	1. We will of course be as vigilant as possible. 2. We are trying to borrow as much of college equipment as possible. 3. We will also reduce the degree of freedom of the legs to reduce the cost.
6.	Proper documentation of the project is of utmost necessity and if it goes wrong then it would cost the group a lost of time.	Low	High	1. We will ensure that proper documentation is done at all stages of the project. 2. A proper blog will be maintained to document the process.

Outcomes and Deliverables

- ➔We will finally have a humanoid robot which will copy and shadow everything the user does. We plan to call our robot IEDatron to give it it's own identity.
- ➔IEDatron will be able to pick up small light-weight objects of any shape.
- ➔IEDatron will be able to shadow the human at the least possible delay in communication
- ➔IEDatron will be wire free and would look presentable
- ➔IEDatron will have the maximum feasible degree of freedom.