

Team 18F06 SumoBot
Final CAD package and BOM

Saud Alabhoul

Mohammad Albaghli

Jasim Albenali

Rashed Alfadhli

Abdulaziz Kandari

2018-2019

**NORTHERN
ARIZONA
UNIVERSITY**

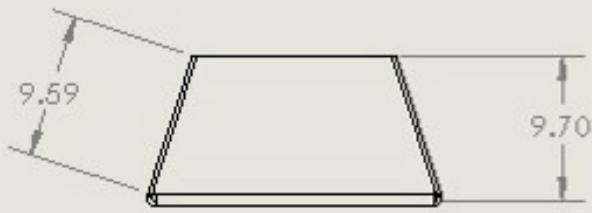
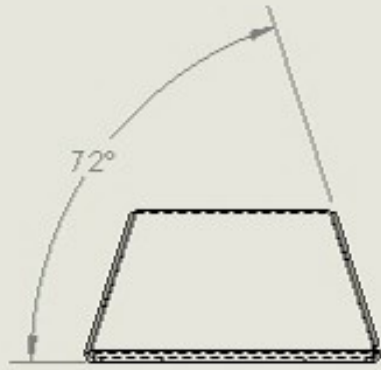
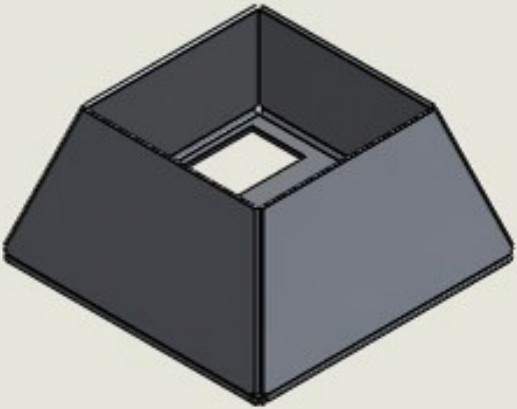
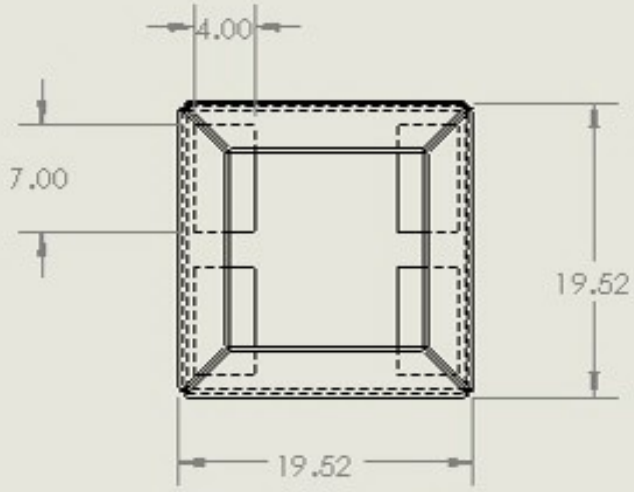
College of Engineering,
Informatics, and Applied Sciences

Project Sponsor: Northern Arizona University

Faculty Advisor: Dr. Sarah Oman

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Saud Alabbhoui		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN CM TOLERANCES: ±0.5 CM FRACTIONAL ± ANGULAR: MACH ± BEND ± TWO PLACE DECIMAL ± THREE PLACE DECIMAL ±	NAME	DATE
Abdullah Alabbouh			DRAWN	
Jasim Albenali			CHECKED	
Rashed Alfadhi			ENG APPR.	
Abdulaziz Kandari			MTC APPR.	
APPROVED		DATE	Q.A.	
APPLICATION		MATERIAL		
		Aluminium 6061		
		FINISH		
		DO NOT SCALE DRAWING		

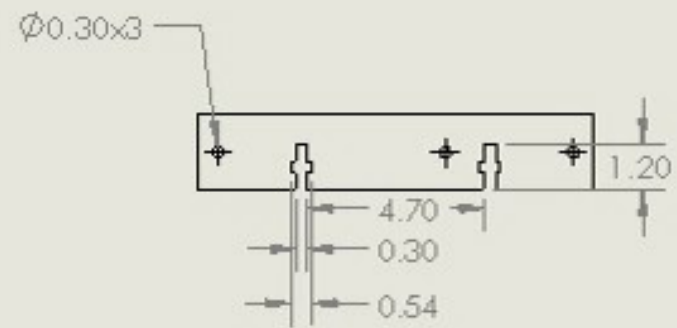
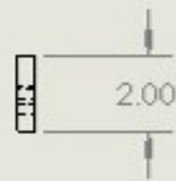
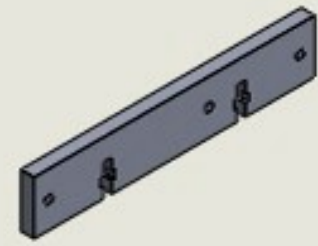
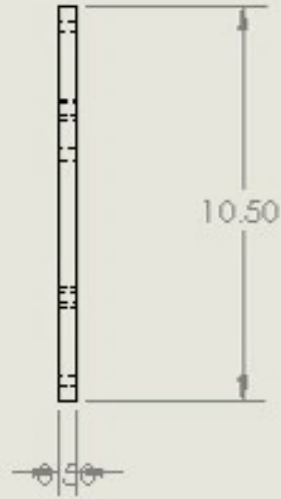
TITLE: ME 486C		
SumoBot		
SIZE	DWG. NO.	REV
A	Aluminium Frame	
SCALE: 1:5	WEIGHT:	SHEET 1 OF 22

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Saud Alabhoui

Mohammad Albaghi

Jasim Albenali

Rashed Alfadhi

Abdulaziz Kandari

UNLESS OTHERWISE SPECIFIED:

ALL DIMENSIONS ARE IN CM
 UNLESS OTHERWISE SPECIFIED
 ANGULAR DIMENSIONS ARE IN DEGREES
 UNLESS OTHERWISE SPECIFIED

MATERIAL: Wood

FINISH

BY HAND DRAWING

NAME

DRAWN

CHECKED

PROJECT APPR

MFG APPR

Q.A.

COMMENTS

PART

DATE

ME 486C

TITLE:

SumoBot

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DATE

BY

APPROVED

BY HAND DRAWING

SIZE

DWG. NO.

REV

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ARDUINO BACK_2

SCALE: 1:2

WEIGHT:

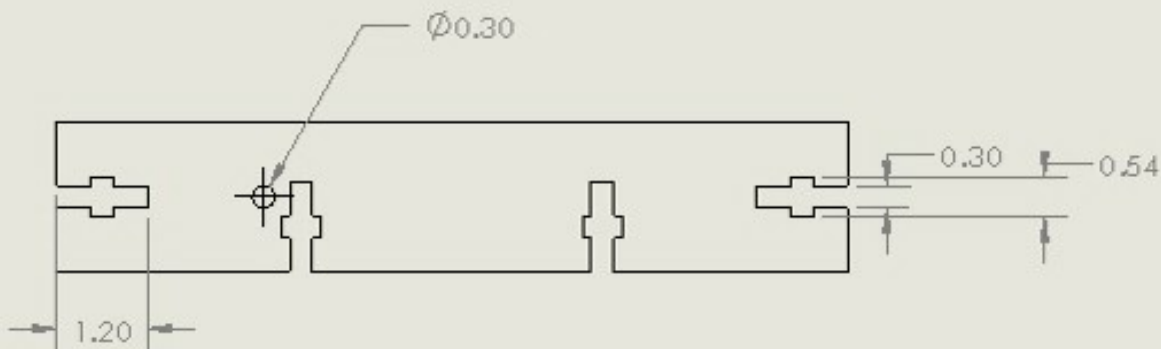
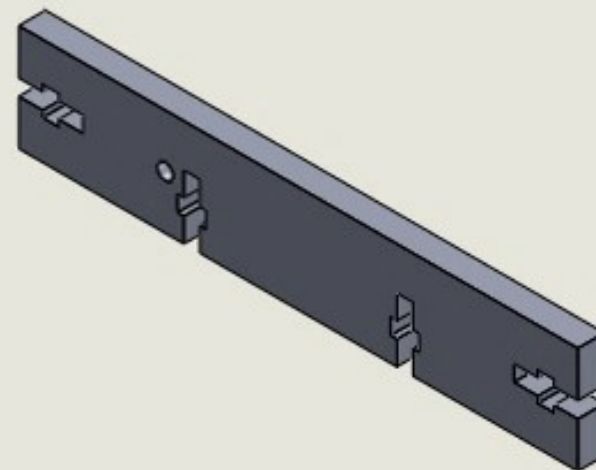
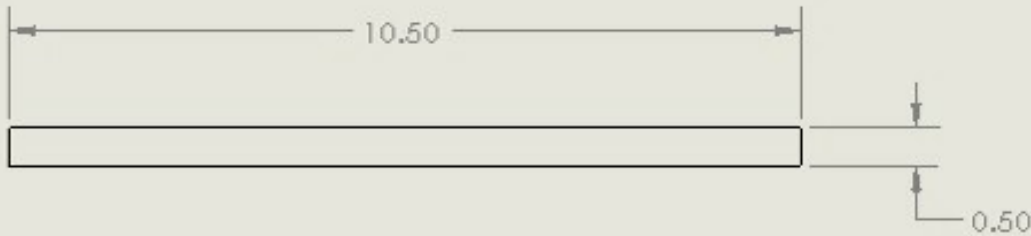
SHEET 2 OF 22

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Saudi Alabhouli		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
Mohammad Albaghli		DIMENSIONS ARE IN CM	DRAWN		
Jasim Albenali		TOLERANCES: 3D DECIMAL	CHECKED		
Rashed Alfadhi		FRACTIONAL ±	ENG APPR.		
Abdulaziz Kandari		ANGULAR: MATCH BEND ±	MTC APPR.		
		TWO PLACE DECIMAL ±	Q.A.		
		THREE PLACE DECIMAL ±	COMMENTS:		
		INTERPRET DIMENSIONS TO NEAREST 0.01			
		MATERIAL	Wood		
		FINISH			
		APPLICATION	DO NOT SCALE DRAWING		

486 C

TITLE:

SumoBot

SIZE	DWG. NO.	REV
A	ARDUINO SIDE_3	

SCALE: 1:1	WEIGHT:	SHEET 3 OF 22
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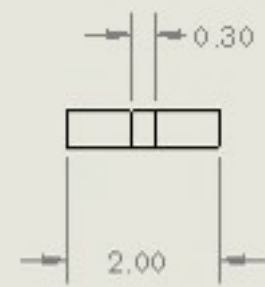
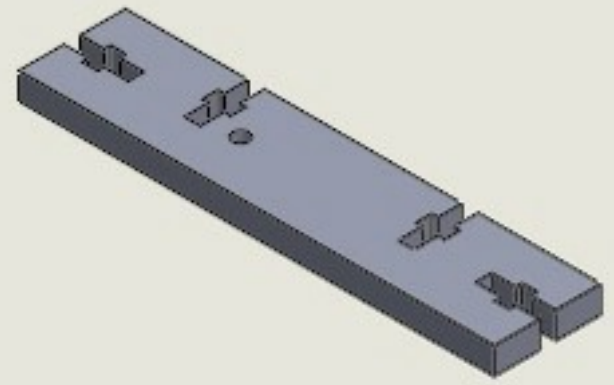
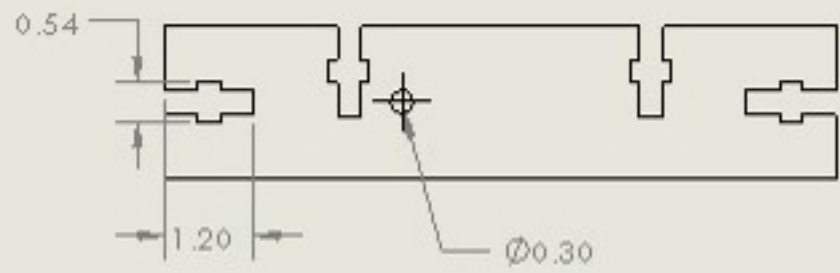
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Saad Alabhouf		UNLESS OTHERWISE SPECIFIED:		DATE	DATE
Mohammed Albaghi		DIMENSIONS ARE IN CM	DRAWN		
Jasim Alabouf		FOR FINISHES TO 5 CM	CHECKED		
Rashed Alabouf		FRACTIONAL 1/2	PROJECT APPR		
Abdulaziz Kanaad		APPROXIMATE 1/8 INCH 2	MFG APPR		
		TWO PLACE DECIMAL 1/32	QA		
		THREE PLACE DECIMAL 1/64	COMMENTS		
		MATERIAL			
		Wood			
		FINISH			
		APPROXIMATE			
		GOOD OF SCALE DRAWING			

ME 48 6C		
TITLE: SumoBot		
SIZE	DWG. NO.	REV
A	BATTERY BACK_4	
SCALE: 1:1	WEIGHT:	SHEET 4 OF 22

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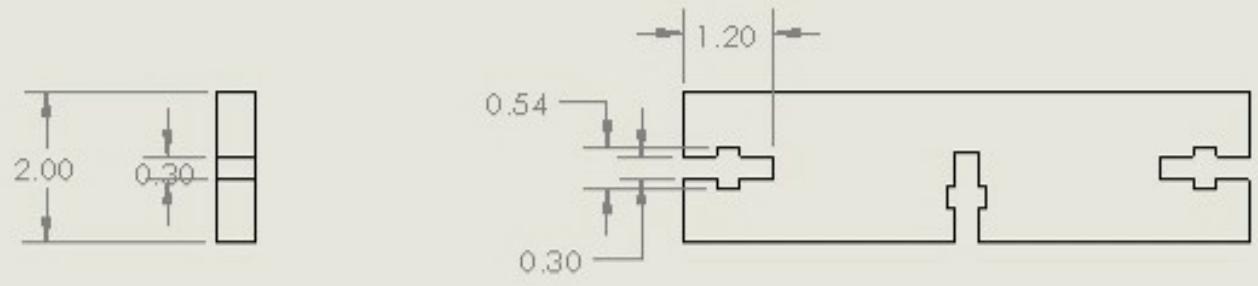
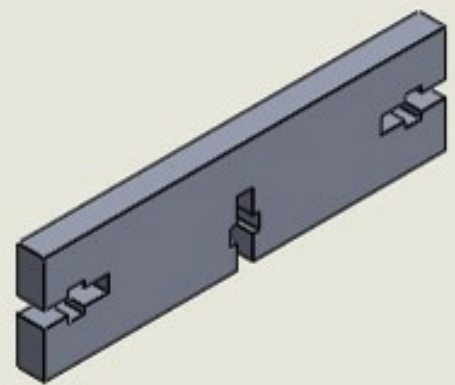
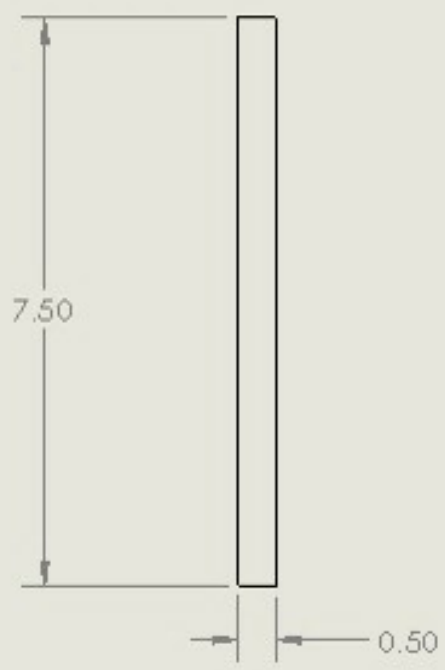
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Saud Alabhoul		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN CM TOLERANCES: ±0.50 CM FRACTIONAL ± ANGULAR: MACH ± BEND ± TWO PLACE DECIMAL ± THREE PLACE DECIMAL ±	NAME	DATE
Mohammad Albaght			DRAWN	
Jasim Albenali			CHECKED	
Rashed Alfadhli			ENG. APPR.	
Abdulaziz Kandari			MFG. APPR.	
			Q.A.	
			COMMENTS:	
		MATERIAL	Wood	
		FINISH		
NEXT ASSY	ASSEMBLY			
APPLICATION		DO NOT SCALE DRAWING		

ME 486C		
TITLE: SumoBot		
SIZE A	DWG. NO. BATTERY SIDE_5	REV
SCALE: 1:1		WEIGHT:
SHEET 5 OF 22		

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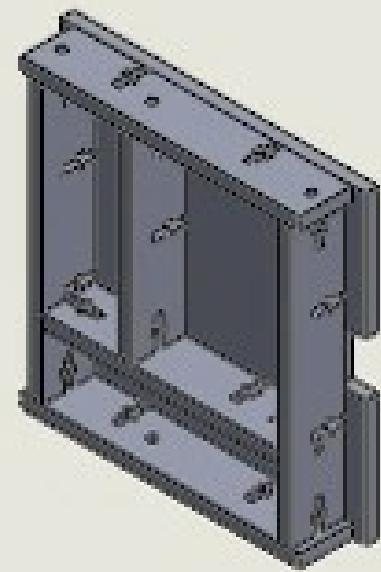
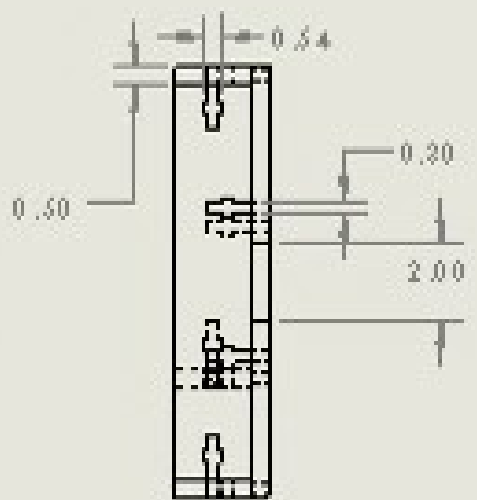
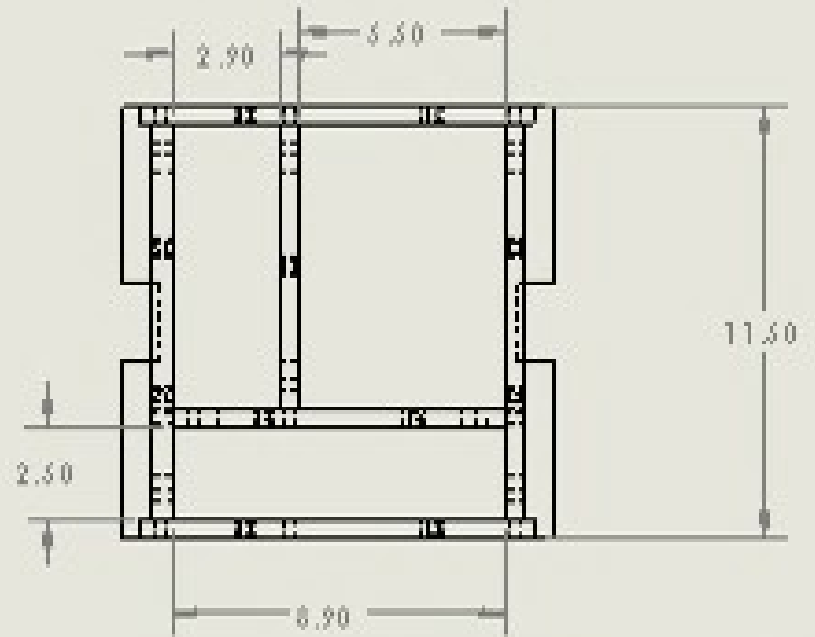
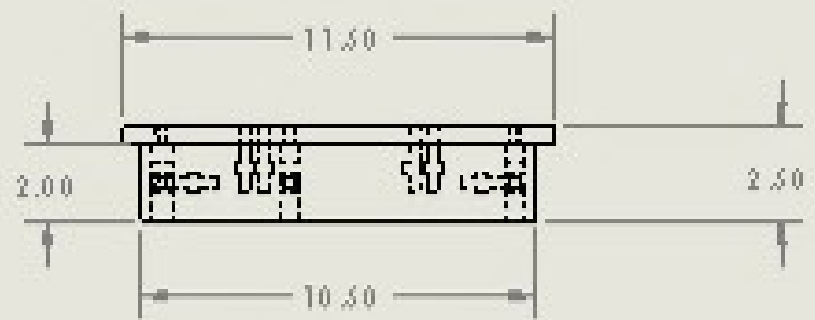
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Abandonment Control		DO NOT USE IN DRAWING	DATE		
		VERSION	DATE		
		ISSUE	DATE		
REVISION	ISSUE	DATE			
APPLICATION		DO NOT USE IN DRAWING			

ME 486C		
TITLE: SumoBot		
SEE DWG. NO.	REV	
A	Top Layer	
SCALE: 1:2	WEIGHT:	SHEET 7 OF 22

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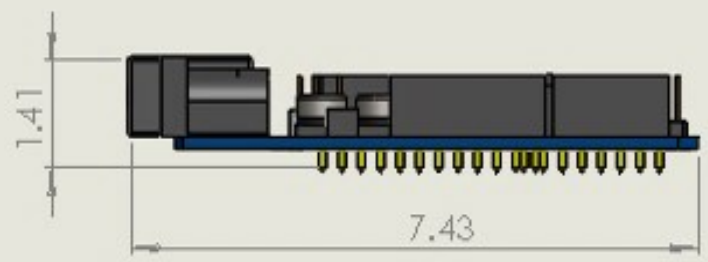
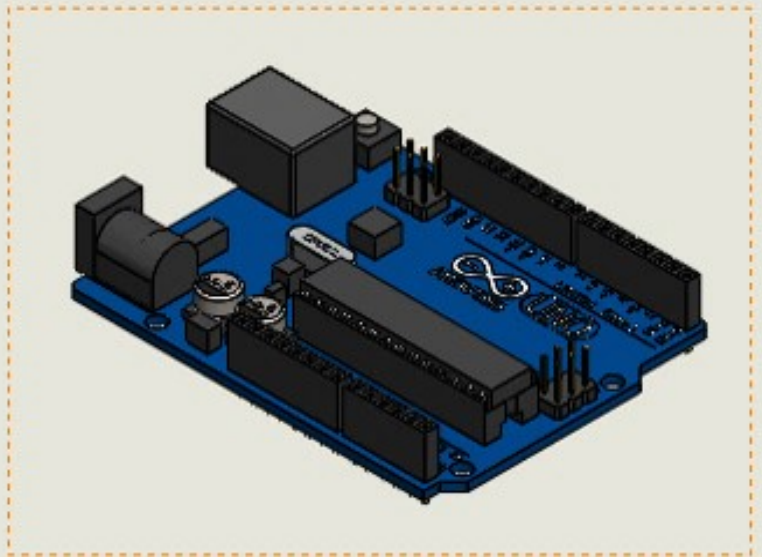
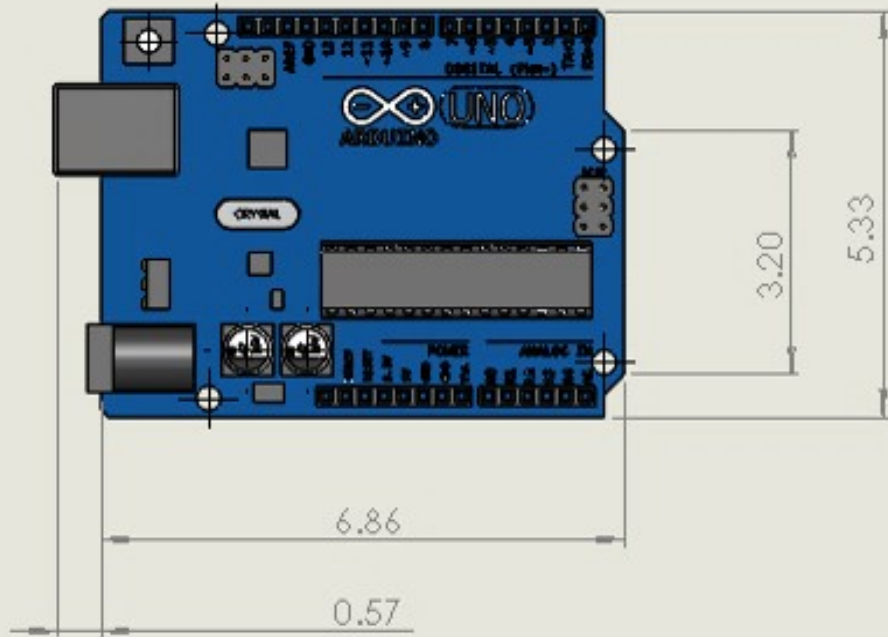
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Saud Alabhouf		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± ANGULAR: MACH ± BEND ± TWO PLACE DECIMAL ± THREE PLACE DECIMAL ± INTERPRET GEOMETRIC CONTROLLING PER- MATERIAL FINISH	NAME	DATE
Mohammad Albaghill			DRAWN	
Jasim Albenali			CHECKED	
Rashed Alfadhil			ENG APPR.	
Abdulaziz Kandari			MFG APPR.	
			QA.	
			COMMENTS:	
			Arduino UNO from	
			https://grabcad.com/library/arduino-uno-18	
REV A	ISSUE 04			
APPLICATION		DO NOT SCALE DRAWING		

ME 486C		
TITLE		
SumoBot		
SIZE	DWG. NO.	REV
A	Arduino UNO_8	
SCALE: 1:1		WEGHT:
		SHEET 8 OF 22

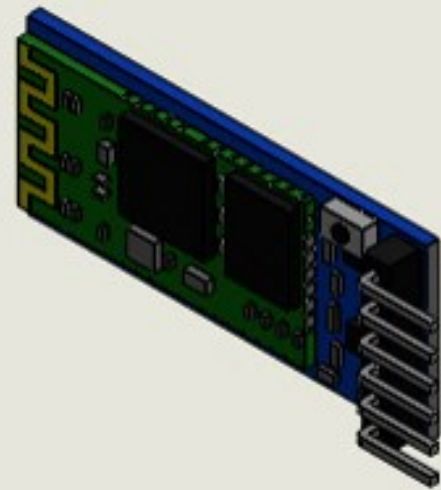
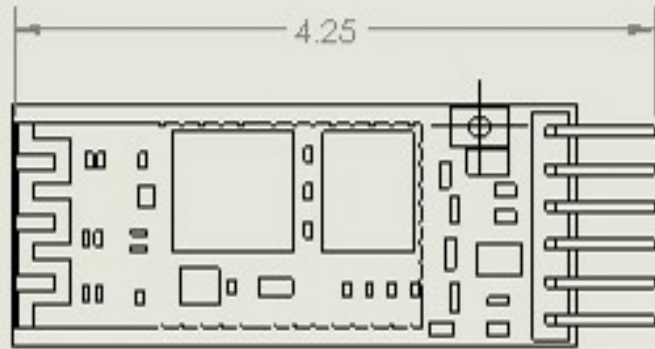
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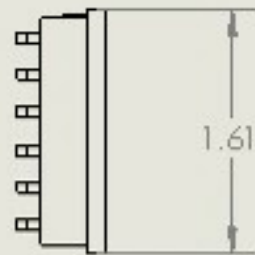
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Saud Alabhouli		UNLESS OTHERWISE SPECIFIED:		DATE
Mohammad Albaghli		DRY FILLS ARE TO BE COMPLETED BY THE DESIGNER	DRAWN	
Jasim Albenali		FRAC TIONAL 2	CHECKED	
Rashed Alfadhi		ANGULAR MATCH 8 TO 1	ENG APPR	
		ROUND PLACED DECIMAL 2	MFG APPR	
		VERT PLACED DECIMAL 2	D.A.	
Abdulaziz Kandari		MATERIAL	COMMENTS:	
		Electronic Part		
		FINISH	https://grabcad.com/library/hc-05-bluetooth-module-1	

ME 486C		
TITLE:		
SumoBot		
SIZE	DWG. NO.	REV
A	Bluetooth Module	
SCALE: 2:1	WEIGHT:	SHEET 9 OF 22

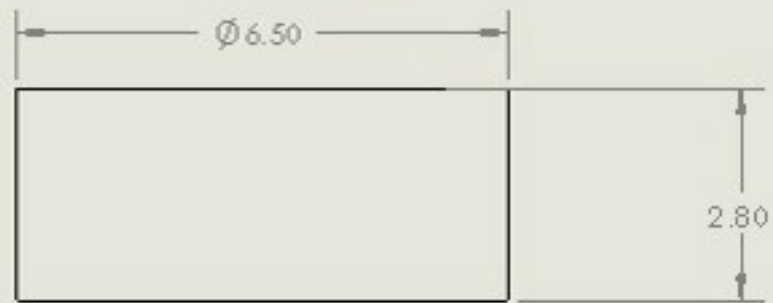
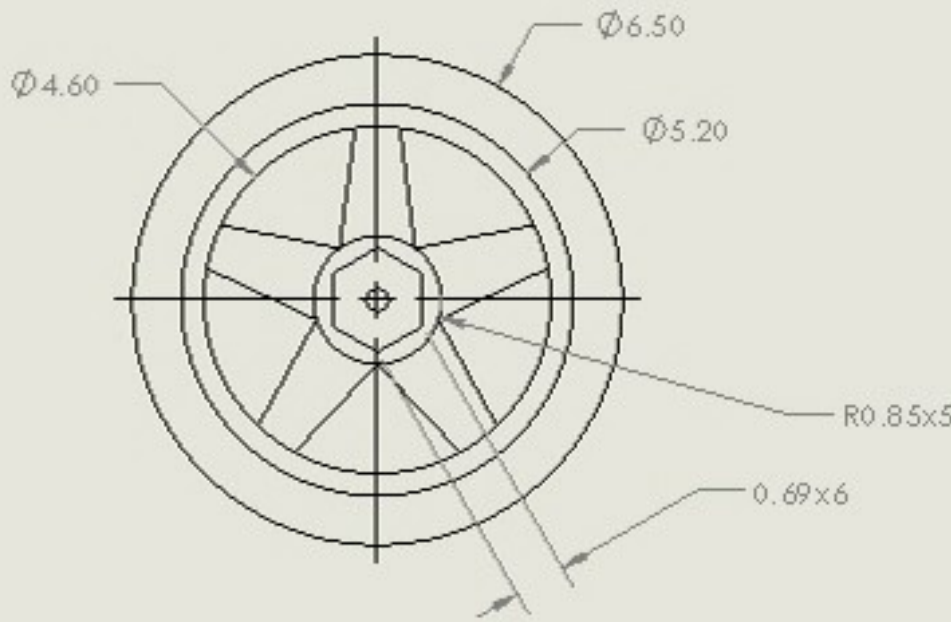
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Saud Alabhouli		UNLESS OTHERWISE SPECIFIED:		DATE	DATE
Mohammed Albaghit		DIMENSIONS ARE IN CM		DRAWN	
Justin Alabouli		TOLERANCES: ±0.5 CM		CHECKED	
Fahmed Alabouli		ANGULAR: MACH 1 ±1.0 °		PRO APPR	
Abdulaziz Alabouli		FIT: FREE FIT		MTC APPR	
MTC APPR		MATERIAL		Q.A	
USED ON		Rubber and Plastic		COMMENTS	
APPLICATION		PAPER			
		DO NOT SCALE DRAWING			

ME 486C		
TITLE: SumoBot		
SIZE A	DWG. NO. Tires and Wheels	REV
SCALE: 1:1	WEIGHT:	SHEET 12 OF 23

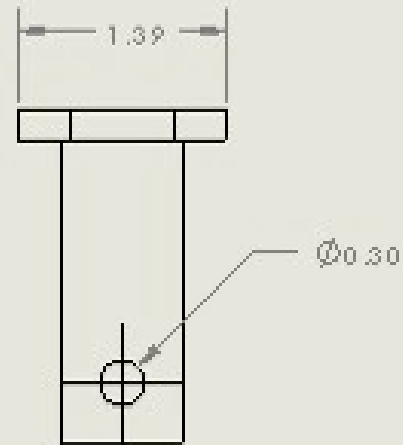
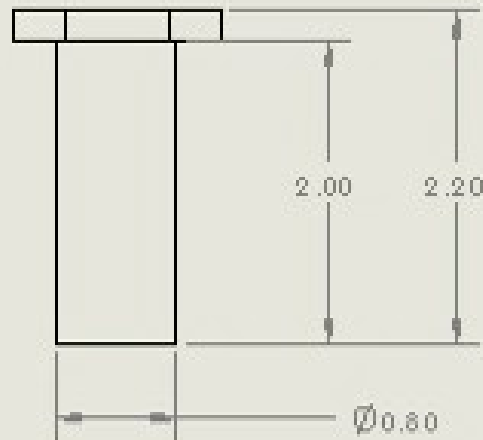
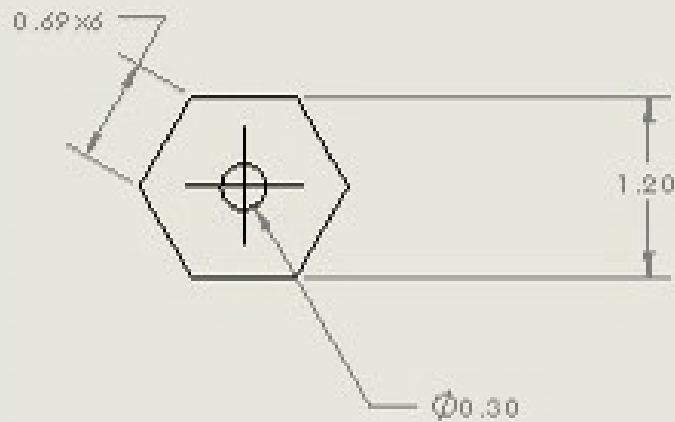
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Solid Aluminum		UNITS OR DIMENSIONS SPECIFIED:		RAWF	DAF
Nominal Strength		DIMENSIONS APPROXIMATE FOR MANUFACTURING		DRAWN	
Joint Allowance		FRACTIONAL 1/8 ANGULAR MATCHES 30° TO 45° TWO PLACE DECIMAL 1/16		CHECKED	
Fastened Allowance		DIMENSIONS EXCEPT DIMENSIONS FOR MATERIAL		ENG APPR	
Absolute Tolerance		MATERIAL Metal		MFG APPR	
FINISH		FINISH		QA	
APPLICATION		DO NOT SCALE DRAWING		COMMENTS:	

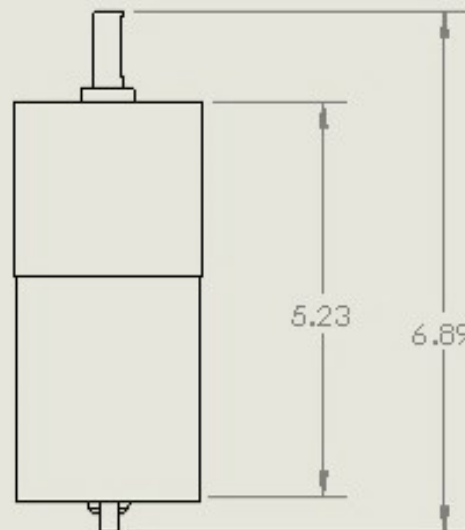
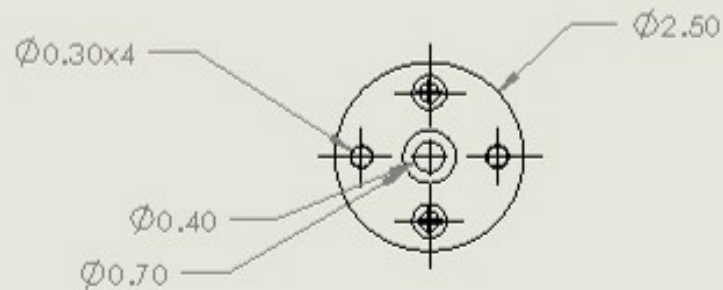
ME 486C		
TITLE: SumoBot		
SEE DWG. NO.	REV	
A Coupler_13		
SCALE: 2:1	WEIGHT:	SHEET 13 OF 22

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Saud Alabhaul		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN CM TOLERANCES: ±0.50 CM FRACTIONAL: ANGULAR: MACH ± BEND ± TWO PLACE DECIMAL THREE PLACE DECIMAL	NAME	DATE	TITLE: ME 486C SumoBot		
Mohammad Albaghli			DRAWN				
Jasim Albenali			CHECKED				
Rashed Alfadhli			ENG. APPR.				
Abdulaziz Kandari			MTC APPR.				
NEXT ASSY		ASSEMBLY	Q.A.		SIZE	DWG. NO.	REV
APPLICATION		BO NOT SCALE DRAWING	COMMENTS:		A	Motor_15	
					SCALE: 1:1	WEIGHT:	SHEET 15 OF 22

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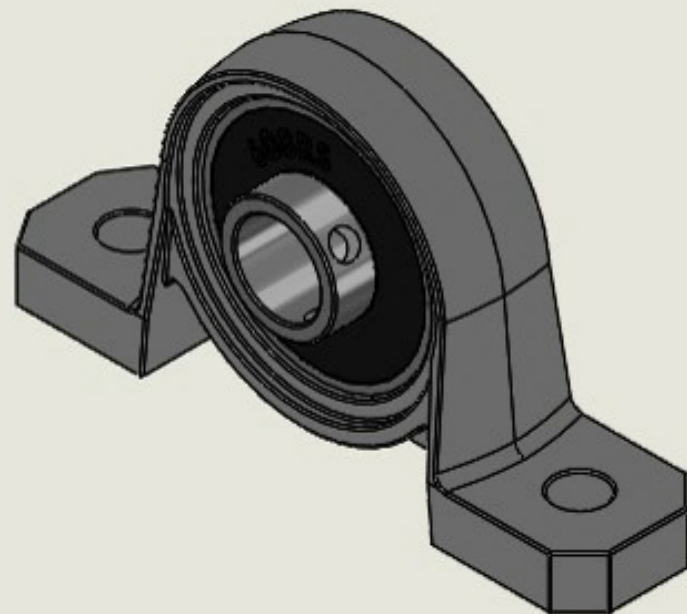
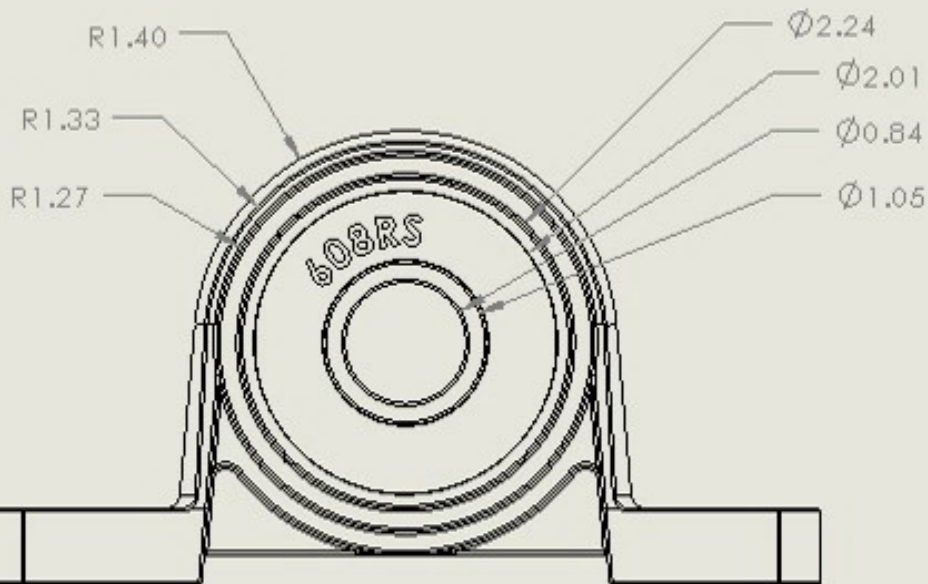
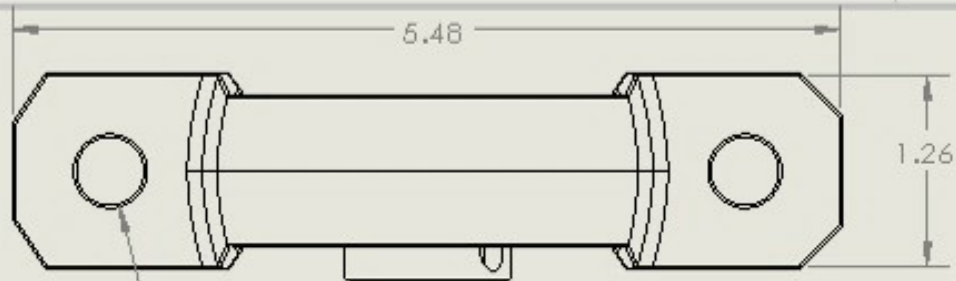
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Saud Alabhouli		UNLESS OTHERWISE SPECIFIED:	NAME	DATE
Mohammad Albaghl		DIMENSIONS ARE IN CM FRACTIONAL ± ANGULAR: MACH ± BEND ± TWO PLACE DECIMAL ± THREE PLACE DECIMAL ±	DRAWN	
Jasim Albendli			CHECKED	
Rashed Alfadhli			ENG APPR.	
Abdulaziz Kandari		NON-PRE GEOMETRIC TOLERANCING PER:	MIC APPR.	
		MATERIAL	Q.A.	
		FINISH	COMMENTS:	
NEXT ASSY	USED ON	Metal	https://grabcad.com/library/kp08-8mm-zinc-aluminum-alloy-pillow-block-bearing-1	
APPLICATION		DO NOT SCALE DRAWING		

ME 486C		
TITLE:		
SumoBot		
SIZE	DWG. NO.	REV
A	Bearing KP08	Bearing_16
SCALE: 2:1	WEIGHT:	SHEET 16 OF 22

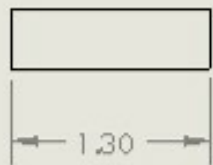
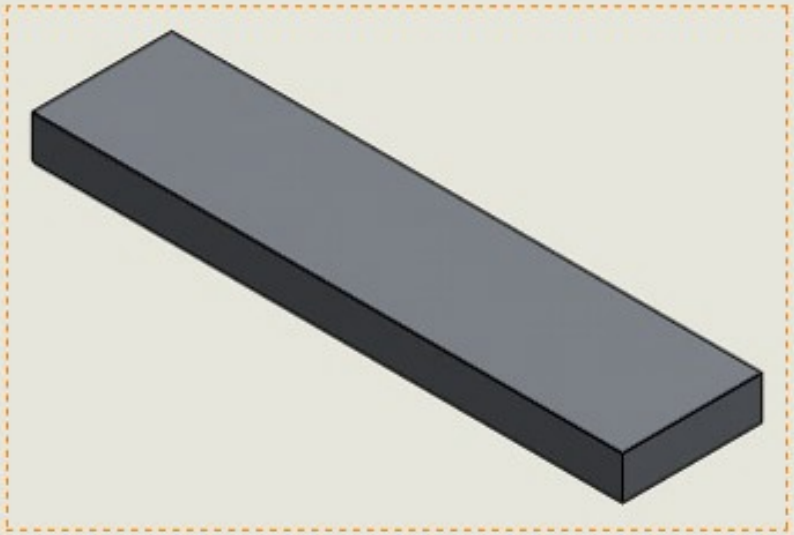
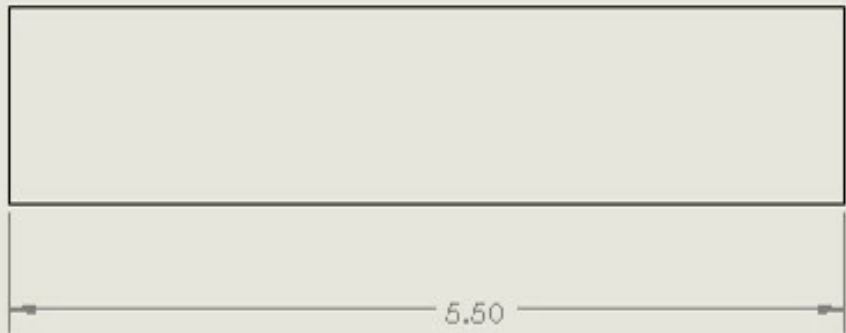
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Saud Alabhouf		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
Mohammad Albaghl		DIMENSIONS ARE IN CM	DRAWN		
Jasim Albenali		TOLERANCES: ±0.5 CM	CHECKED		
Rashed Alfadhli		FRACTIONAL ±	ENG APPR.		
Abdulaziz Kandari		ANGULAR: MACH 1 BEND ±	MIC APPR.		
		TWO PLACE DECIMAL ±	Q.A.		
		THREE PLACE DECIMAL ±	COMMENTS:		
		INTERPRET GEOMETRIC	Keeps the bearing high		
		TOLERANCING PER:	enough to have all tires		
		MATERIAL:	with same elevation		
		Aluminium			
		FINISH:			
		ROUGH			
		APPLICATION:			
		DO NOT SCALE DRAWING			

ME 486C		
TITLE: SumoBot		
SIZE	DWG. NO.	REV
A	Spacer_17	
SCALE: 2:1	WEIGHT:	SHEET 17 OF 22

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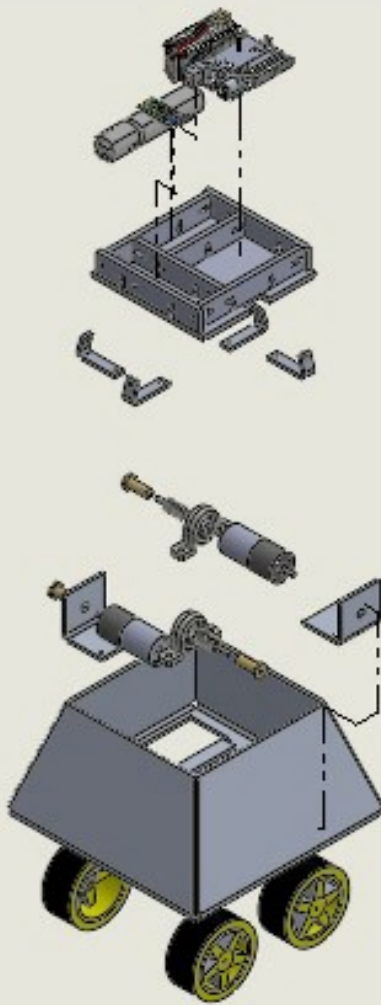
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Saud Alabhoui		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
Mohammad Albaghli		DIMENSIONS ARE IN INCHES	DRAWN		
Jasim Albenali		TOLERANCES:	CHECKED		
Rashed Alfadhli		FRACTIONAL ±	ENG. APPR.		
Abdulaziz Kandari		ANGULAR: MACH ± BEND ±	MIC. APPR.		
		TWO PLACE DECIMAL ±	QA.		
		THREE PLACE DECIMAL ±	COMMENTS:		
		INTERPRET DRAWING TO DIMENSIONING PRACTICE			
		MATERIAL			
		FINISH			
REVISION	REASON				
		DO NOT SCALE DRAWING			

ME 486C		
TITLE: SumoBot		
SIZE	DWG. NO.	REV
A	Exploded View	
SCALE: 1:10 WEIGHT:		SHEET 20 OF 22

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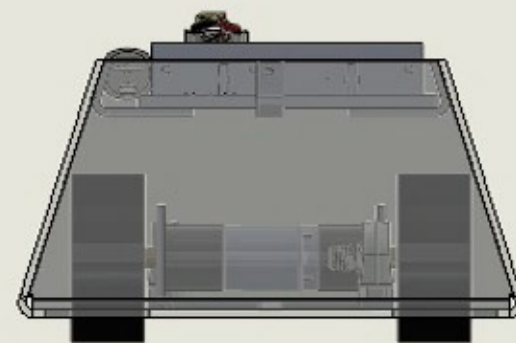
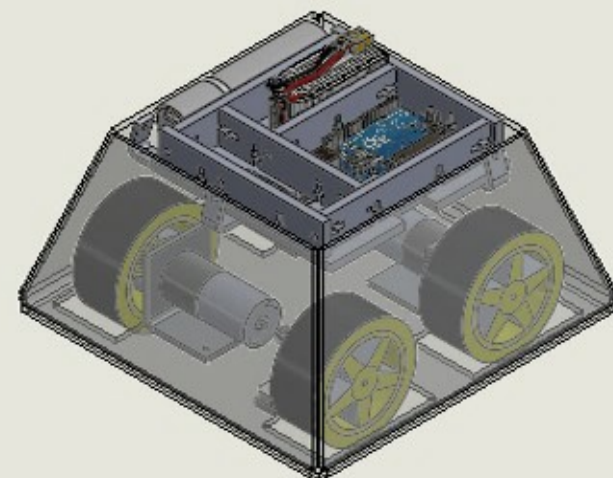
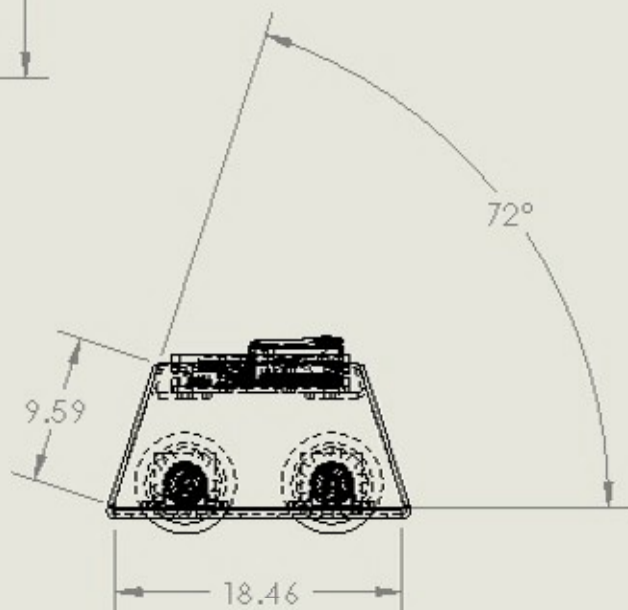
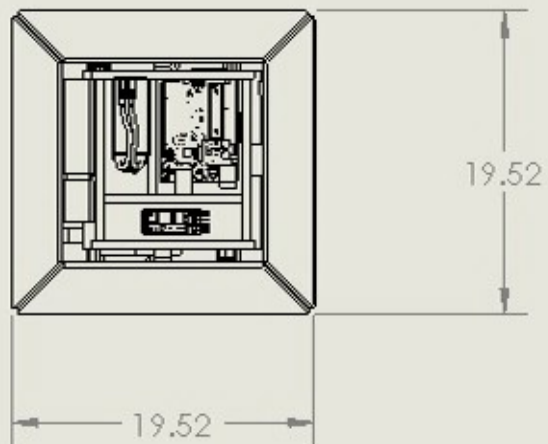
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UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:		FINISH:		DEBURR AND BREAK SHARP EDGES		DO NOT SCALE DRAWING		REVISION	
NAME		SIGNATURE		DATE		ME 486C			
Saud Alabhoui						TITLE: <h1>Sumobot</h1>			
Mohammad Albaghli									
Ja'im Albenali									
Rashed Almadhi									
Abdulaziz Kandan									
				MATERIAL:		DWG. NO.:		A4	
				WEIGHT:		Full design_21			
						SCALE: 1:1		SHEET 21 OF 22	

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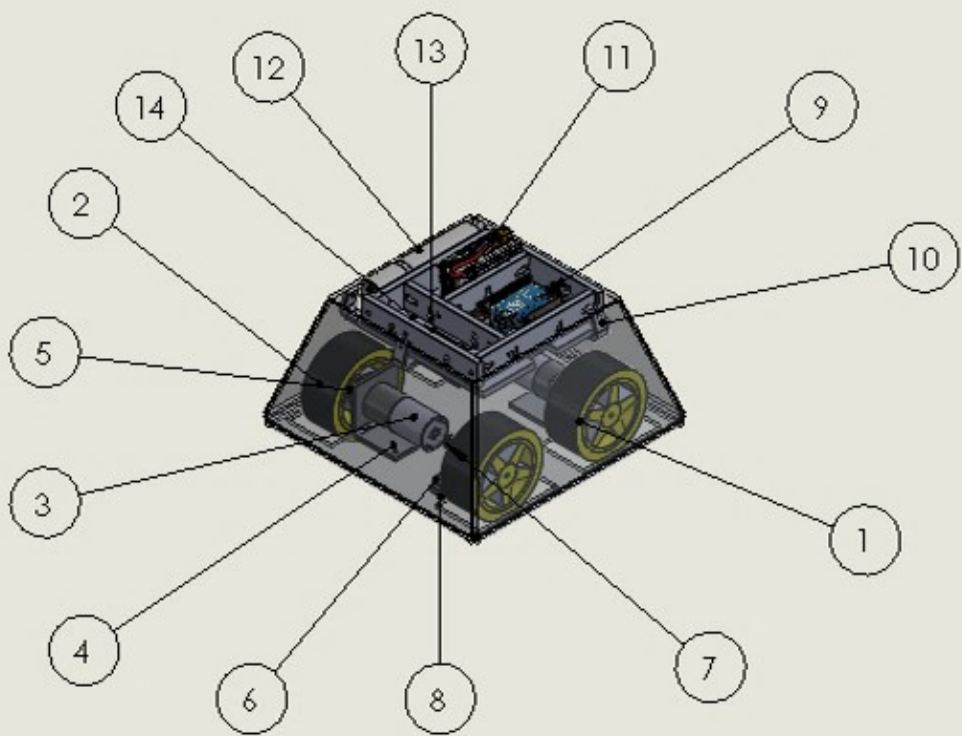
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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1		Aluminum Frame	1
2		Wheel	4
3		Motors	2
4		Motor Fixation Angle	2
5		Coupler	4
6		KP08 Bearing	2
7		Wheel shaft	2
8		Spacer	2
9		Arduino	1
10		Control Fixation angle	4
11		Battery	1
12		BSMPB03 Power Bank	1
13		hc05 Bluetooth Module	1
14		Wooden Frame	1

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 DIMENSIONS ARE IN MILLIMETERS
 SURFACE FINISH:
 TOLERANCES:
 LINEAR:
 ANGULAR:

FINISH:

DEBURR AND BREAK SHARP EDGES

DO NOT SCALE DRAWING

REVISION

NAME	SIGNATURE	DATE
Saud Alabhouli		
Mohammad Albaghi		
Jasim Albenali		
Rashed Alfadhli		
Abdulaziz Kandari		

MATERIAL:

WEIGHT:

ME 486C

SumoBot

TITLE:

DATE NO.:

Bills Of Material

A4

SCALE: 1:1

SHEET 22 OF 22

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Bill of Material

Table 1: shows all the parts that is installed to get the full design without the extra parts.

Part No.	Part Name	Qty.	Description
1	Arduino UNO	1	Microcontroller
2	Battery	1	LIPO battery 1100 mAh
3	Motor	2	Motor 250 rpm and 8.8 kg/cm torque
4	Wheel	4	Rubber Wheel
5	Driver	1	Monster motor shield VNH2SP30
6	Bluetooth Module	1	HC05 Bluetooth Module
7	Aluminum Body	1	Metal Body
8	Power Bank	1	2000 mAh power bank
9	Block bearing	2	KP08 housing pillow block bearing
10	Wooden Frame	1	Controlling electronic parts on top of the device
11	Coupler	4	Connect the tires to the bearings and motors.
12	Motor fixation	2	Holds the motors in place.
13	Control Fixation	4	Holds the wooden frame in place.
14	Shaft	2	Shafts are connected from the bearing to the tires through the couplers.
15	Spacers	2	A spacer beneath each bearing to hold in place and to keep it high enough.