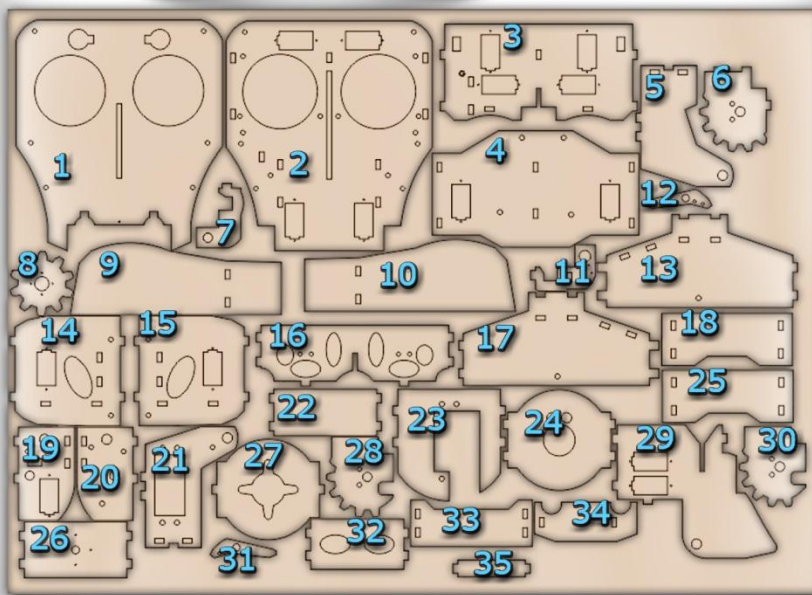




# FRITZ: THE ROBOTIC HEAD

## ASSEMBLY INSTRUCTIONS

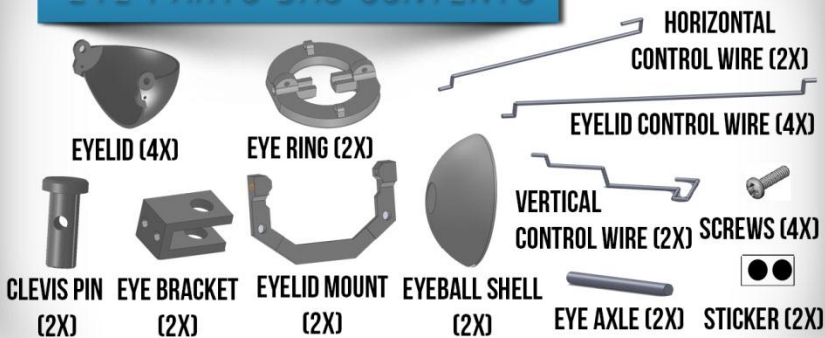
### LASER CUT PARTS



### COMPONENTS



### EYE PARTS BAG CONTENTS



VIDEO VERSION AT [WWW.XYZBOT.COM/HELP.PHP](http://WWW.XYZBOT.COM/HELP.PHP)

#### TOOLS NEEDED:

HOT GLUE GUN  
SMALL SCREWDRIVERS  
NEEDLE NOSE PLIARS  
4 AAA BATTERIES



#### NOTES: FOR ACRYLIC ASSEMBLY



**A.** HOT GLUE RECOMMENDED, BUT YOU CAN USE ACRYLIC SOLVENT IF PREFERRED



**B.** PEEL OFF PROTECTIVE PAPER



**C.** USE ACRYLIC ADD-ON HARDWARE KIT #2-56 BOLTS, WASHERS, NUTS TO ATTACH MICRO SERVOS

## ASSEMBLY INSTRUCTIONS

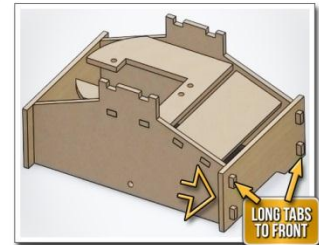
### 1 PUNCH OUT CHAFF PARTS



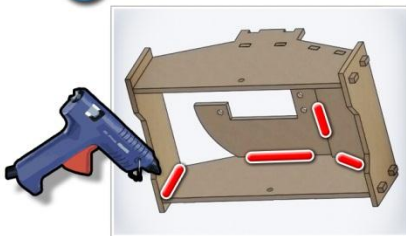
### 2 BASE



### 3 DRY ASSEMBLE THE BASE PARTS



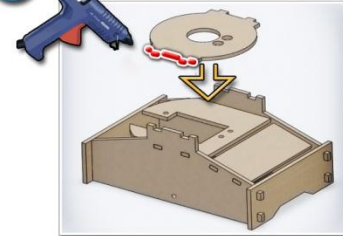
### 4 GLUE INSIDE CORNERS



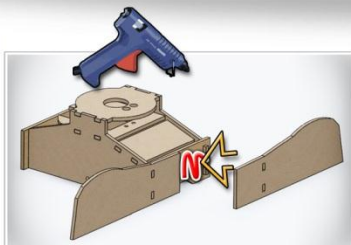
### 5 GLUE SO THAT IT TOUCHES BOTH SIDES OF CORNER



### 6 ADD GLUE AND INSTALL



### 7



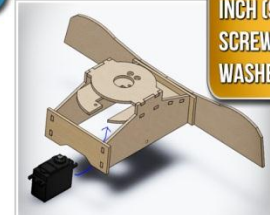
### 8 CENTER EACH SERVO MOTOR — SEE VIDEO 02:20 FOR MORE INFORMATION



### 9

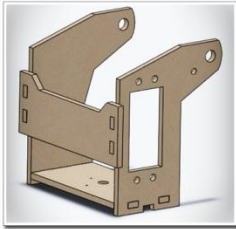
#### INSTALL MOTOR

USE 3 #4-40 3/8 INCH (9.5 MM) SCREWS, LOCK WASHERS, NUTS





**10** DRY ASSEMBLE THE NECK TOWER PARTS. NOTCH ON BACK GOES UP



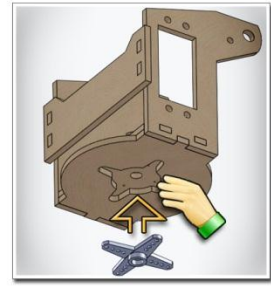
**11**

PLACE AND **GLUE** THE TOP NECK BEARING

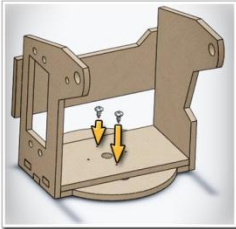


**12**

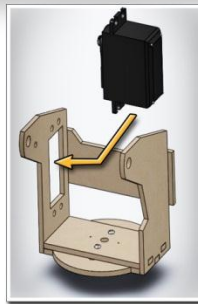
PLACE SERVO HORN AS SHOWN AND HOLD IN PLACE WITH HAND



**13** USE #2-56 1/4 INCH (6MM) WOOD SCREWS TO MOUNT SERVO HORN



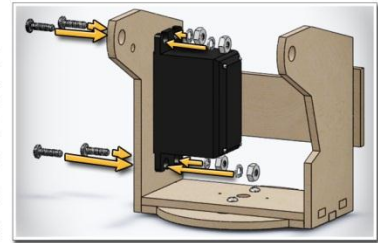
**14**



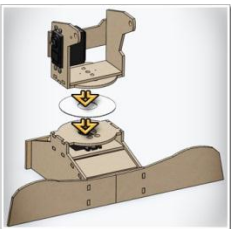
**15**

ATTACH MOTOR

USE 4X 4-40 NUTS, LOCK WASHERS AND 3/8 INCH (9.5 MM) LONG MACHINE SCREWS

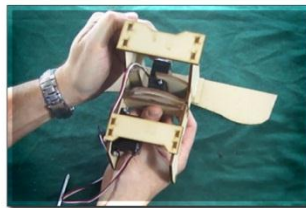


**16** INSTALL DISK THEN ATTACH NECK TO BASE



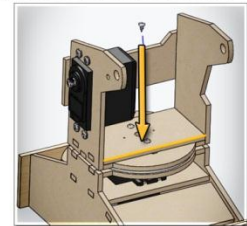
**17**

HOLD MOTOR WITH HAND WHILE PRESSING NECK SERVO HORN ONTO MOTOR



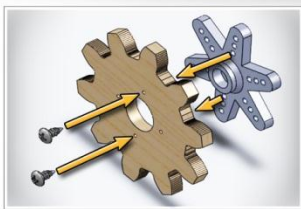
**18**

ATTACH NECK ROTATE SERVO HORN USING SMALL SCREW FROM THE SERVO ACCESSORY BAG



**19**

ATTACH SERVO HORN TO NECK TILT SERVO

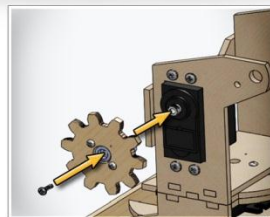


USE #2-56 1/4 INCH (6 MM) LONG WOOD SCREWS

**20**

ATTACH GEAR TO NECK SERVO

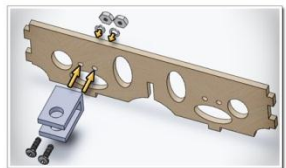
USE THE SMALL SCREW FROM SERVO'S BAG



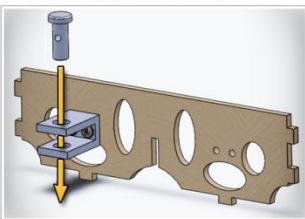
**21**

ATTACH EYE BRACKET TO SKULL FIREWALL. REPEAT FOR OTHER SIDE

USE 4-40 NUTS, LOCK WASHERS AND 3/8 INCH (9.5 MM) LONG SCREWS

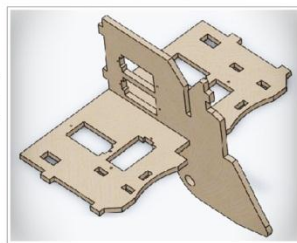


**22** INSERT CLEVIS PIN. REPEAT FOR OTHER SIDE



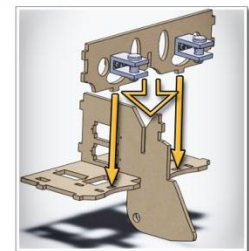
**23**

INSERT NOSE PANEL INTO SKULL BOTTOM

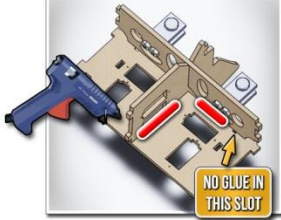


**24**

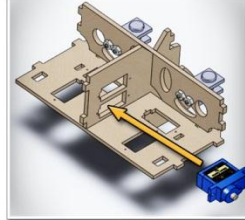
INSERT FIREWALL



**25** GLUE INSIDE CORNERS. DO NOT GLUE SLOT NEAR OUTSIDE

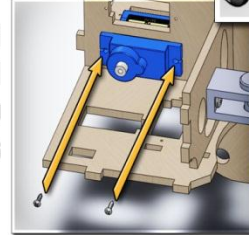


**26** CENTER A MICRO (BLUE) SERVO AND INSERT



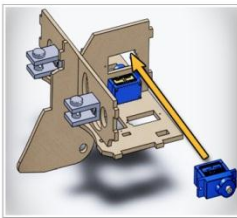
**27**

FASTEN WITH SCREWS FROM MICRO SERVO BAG



FOR ACRYLIC — USE #2 NUTS, LOCK WASHERS AND 5/16" (8 MM) SCREWS

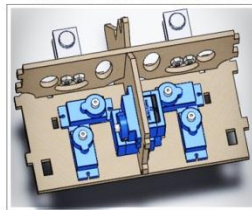
**28** CENTER A MICRO SERVO MOTOR AND INSERT FOR OTHER EYEBROW MOTOR



USE SCREWS ON MDF, #2 BOLTS, NUTS, WASHERS ON ACRYLIC

**29**

CENTER AND INSTALL THE OTHER EYE CONTROL MOTORS



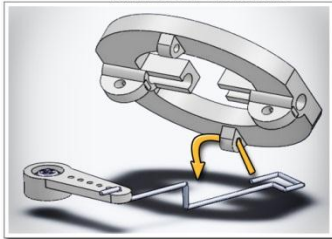
USE SCREWS ON MDF, #2 BOLTS, NUTS, WASHERS ON ACRYLIC

**30**

INSERT VERTICAL CONTROL WIRE INTO A MICRO SERVO HORN

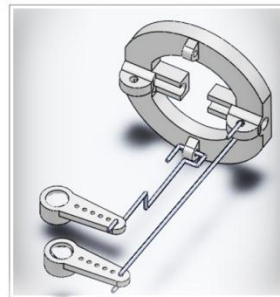


**31** INSERT CONTROL WIRE THROUGH EYE RING



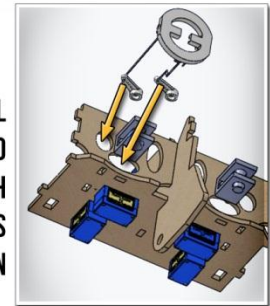
**32**

ATTACH HORIZONTAL CONTROL WIRE AS SHOWN



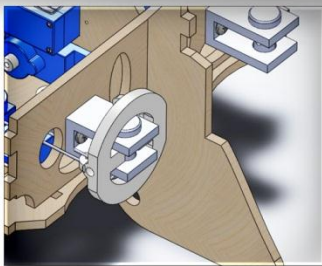
**33**

INSERT CONTROL WIRES /SERVO HORNS THROUGH FIREWALL HOLES AS SHOWN



**34**

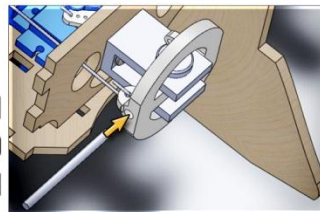
INSERT EYERING ONTO CLEVIS PIN



**35**

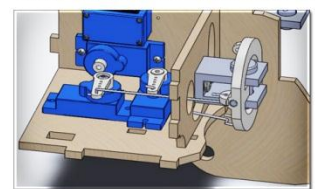
INSERT EYE AXLE

THROUGH EYE RING AND CLEVIS PIN



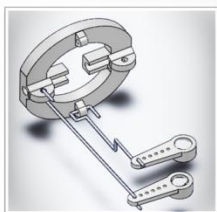
**36**

PLACE SERVO HORNS ON MOTORS SO THAT EYE RING IS IN NEUTRAL TILT



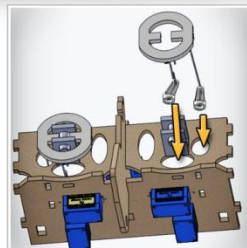
**37**

REPEAT FOR OTHER EYE BUT HORIZONTAL WIRE GOES TO OTHER SIDE OF EYE RING



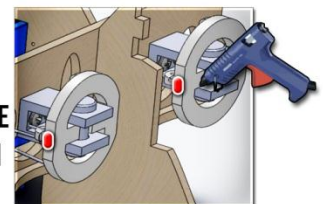
**38**

REPEAT INSERT AND MOUNT EYE RING AND SERVO HORNS ON OTHER SIDE



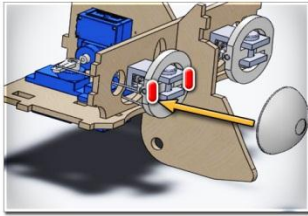
**39**

ADD SMALL DROP OF HOT GLUE AT AXLE TO HOLD AXLE INTO EYE RING, ON BOTH EYE RINGS

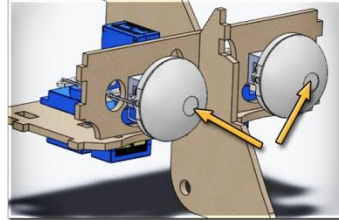




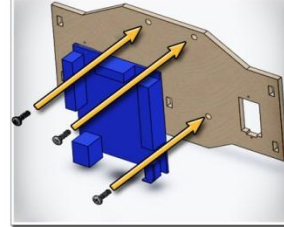
**40** HOT **GLUE** EYEBALL SHELLS ONTO EYE RINGS



**41** PLACE STICKER ON EYE PUPIL AREA, OR COLOR WITH PAINT OR MARKER

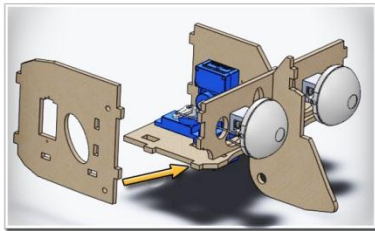


**42** ATTACH ARDUINO UNO BOARD TO THE SKULLBOX BACK PLATE

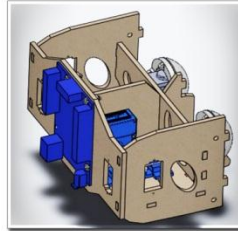


USE 3 #4-40 3/8INCH (9.5 MM) LONG BOLTS, NUTS, WASHERS. USB CONNECTOR POINTS DOWN

**43** ATTACH SKULL BOX SIDES AND **GLUE** INSIDE CORNERS. THEN REPEAT FOR OTHER SIDE



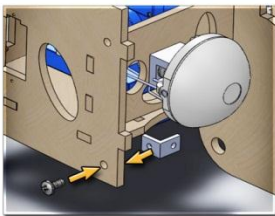
**44** ATTACH THE BACK WITH ARDUINO AND **GLUE** INSIDE CORNERS



**45** FIND ANGLE BRACKETS. NOTE THAT ONE END IS SHORTER



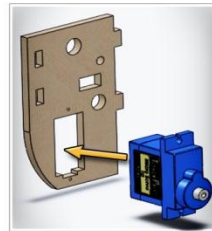
**46** ATTACH ANGLE BRACKET LONG SIDE ONTO SKULL BOX. REPEAT ON OTHER SIDE



USE 1/4 INCH (6 MM) LONG SCREW

**47**

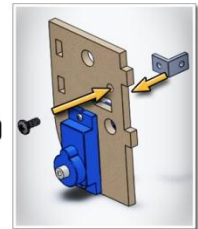
MOUNT JAW SERVO TO LEFT MANDIBLE



**48**

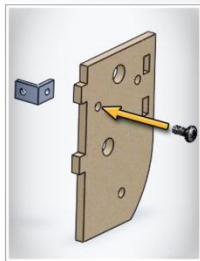
MOUNT LONG SIDE ANGLE BRACKET

USE 1/4 INCH (6 MM) LONG SCREW



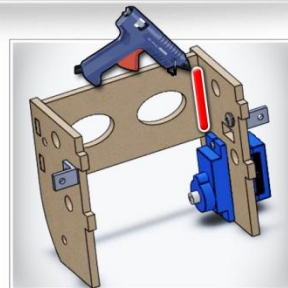
**49**

MOUNT LONG SIDE ANGLE BRACKET TO OTHER SIDE, 1/4 INCH (6 MM) SCREW



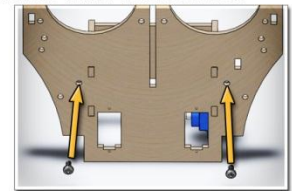
**50**

ASSEMBLE 3 PARTS AS SHOWN AND **GLUE** INSIDE CORNERS



**51**

ATTACH TO SKULL FACE WITH 1/4 INCH (6 MM) LONG SCREWS



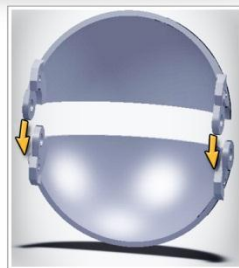
**52**

MOUNT 4 MICRO SERVOS IN SKULL FACE. CENTER EACH FIRST



**53**

ASSEMBLE TWO EYELID HALVES



**54**

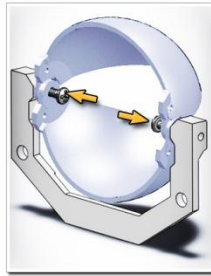
INSERT #2-56 5/16" (8 MM) LONG SCREWS FOR AXLES



OPEN AND CLOSE SEVERAL TIMES TO ENSURE SMOOTH MOTION

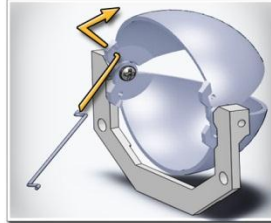
55

SCREW BOTH INTO EYELID MOUNT. LEAVE ENOUGH GAP TO ALLOW MOTION



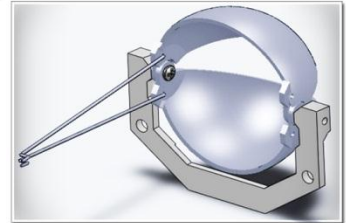
56

INSERT EYELID CONTROL WIRE



57

REPEAT FOR THE LOWER EYELID



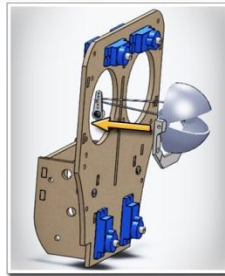
58

ATTACH A MICRO SERVO HORN AS SHOWN. SERVO HORN SHOULD POINT UP



59

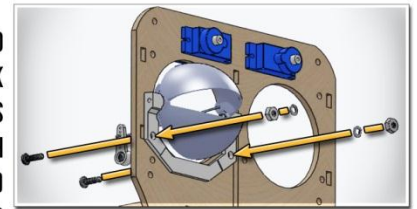
INSERT THROUGH SKULL FACE



60

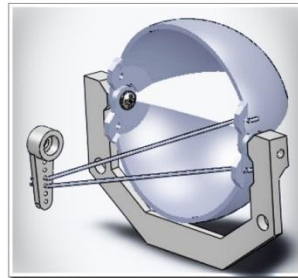
ATTACH EYELID MOUNT

USE 4-40 NUTS, LOCK WASHERS AND 3/8 INCH (9.5 MM) LONG SCREWS



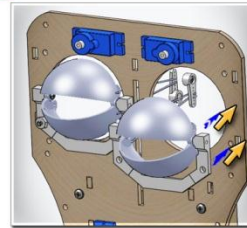
61

REPEAT FOR OTHER SIDE, BUT NOTE THAT EYELID CONTROL WIRES ARE ON OTHER SIDE AND SERVO HORN POINTS DOWN



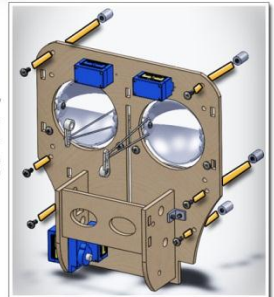
62

AND ATTACH TO SKULL FACE



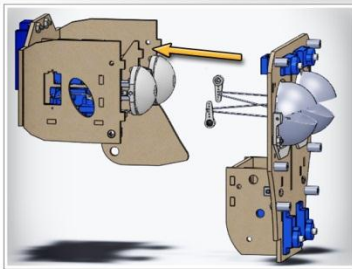
63

INSTALL ALUMINUM SPACERS  
USE 4-40 1/4 INCH (6 MM) LONG SCREWS



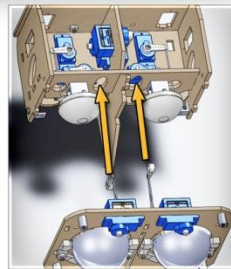
64

INSTALL SKULL FACE ONTO SKULL BOX



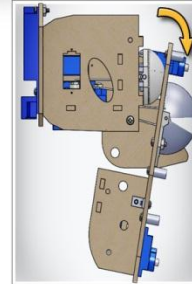
65

EYELID WIRES GO THROUGH HOLES IN FIREWALL



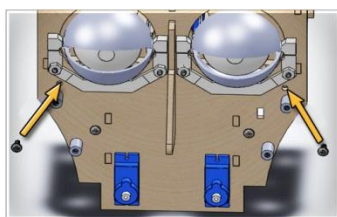
66

TILT TO GET CLEARANCE OF NOSE OVER THE MANDIBLE



67

ATTACH SKULL FACE USING 1/4 INCH (6 MM) LONG SCREWS INTO ANGLE BRACKETS



68

MOVE EYELIDS TO ABOUT HALF OPEN, THEN FIT EYELID SERVO HORNS ONTO MOTOR

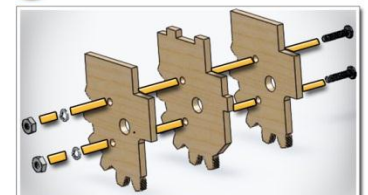
FEED MOTOR CABLES DOWN HOLE



PLACE SMALL SCREWS FROM SERVO BAG TO FIX THE HORN ONTO MOTORS

69

ASSEMBLE NECK GEARS

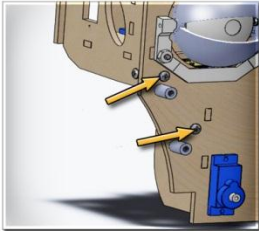


USE 4-40 NUTS, LOCK WASHERS AND 1/2 INCH (13MM) SCREWS



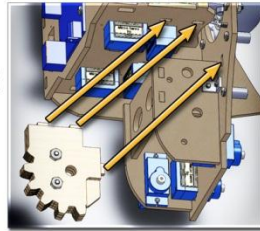
70

LOOSEN THESE  
SCREWS  
TEMPORARILY



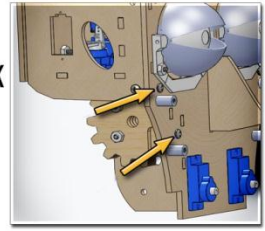
71

INSERT TABS  
OF NECK GEAR  
INTO SLOTS



72

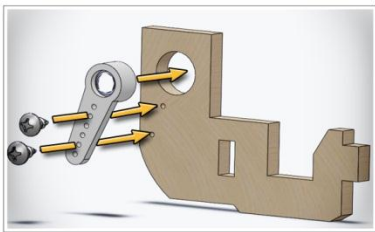
RE-TIGHTEN  
SCREWS TO LOCK  
IN NECK GEAR



73

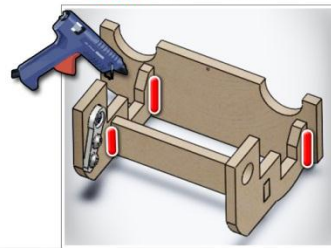
ATTACH MICRO SERVO HORN TO JAW PIECE

USE #2-56, 1/4  
INCH (8MM) LONG  
WOOD SCREWS



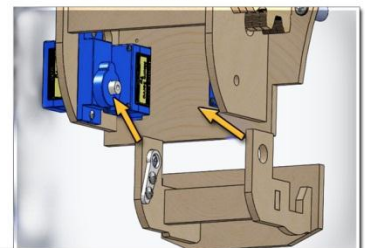
74

ASSEMBLE REMAINING PARTS OF JAW,  
**GLUE** ON ALL CORNERS



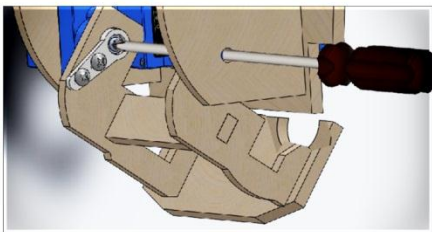
75

FIT JAW ONTO THE JAW  
CONTROL SERVO



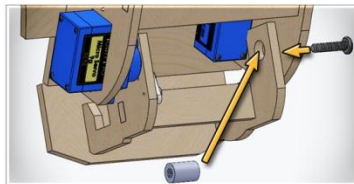
76

SCREW SERVO HORN ONTO MOTOR USING  
THE SMALL SCREW FROM SERVO BAG



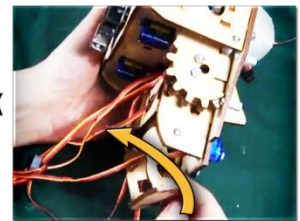
77

ON OTHER SIDE OF JAW, INSERT  
ALUMINUM SPACER AND ATTACH  
4-40 1/2 INCH (13 MM) SCREW



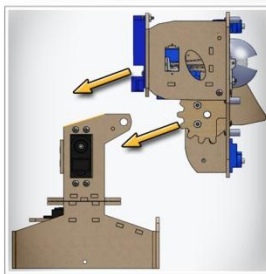
78

FEED LIP  
CABLES  
OVER BACK  
OF JAW



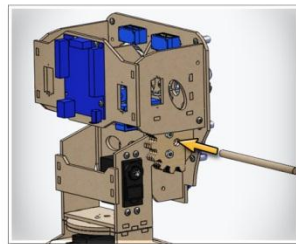
79

FIT THE COMPLETE  
SKULL ONTO THE  
BASE/NECK  
ASSEMBLY



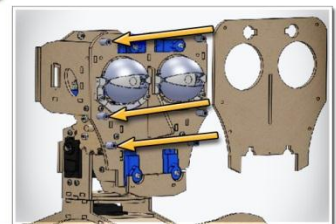
80

INSERT TILT  
AXLE THROUGH  
NECK AND  
SKULL  
ASSEMBLY



81

PLACE FACEPLATE ONTO SKULL



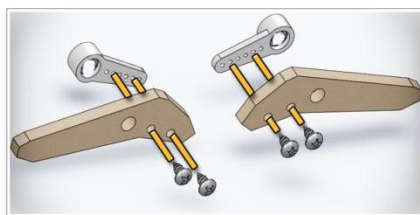
82

ATTACH FACEPLATE USING 6 4-40 1/4  
INCH (6 MM) LONG SCREWS



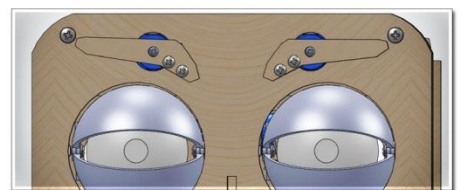
83

EYEBROWS ONTO SERVO HORNS USING  
#2-56 1/4" (8 MM) WOOD SCREWS



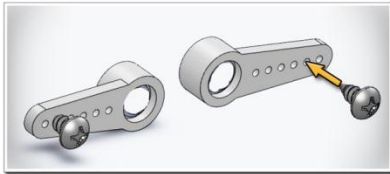
84

PLACE EYEBROWS ONTO SERVO  
MOTORS ROUGHLY LEVEL. ATTACH  
WITH SMALL SCREWS FROM SERVO

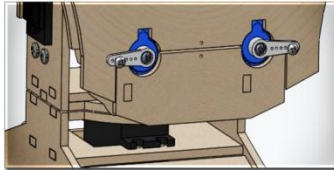




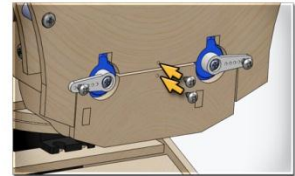
**85** PLACE #2-56 1/4 INCH (8 MM) LONG SCREWS ONTO SERVO HORNS FOR LIPS. LEAVE A GAP OF ABOUT 1/8 INCH (3 MM)



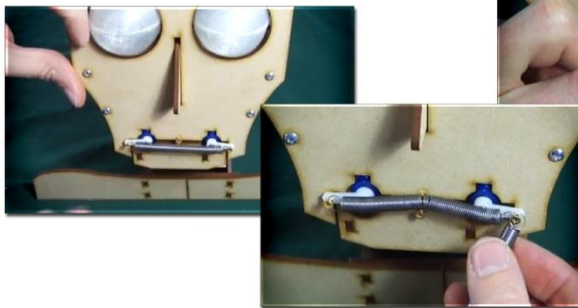
**86** PLACE THE LIP SERVO HORNS ONTO LIP MOTORS LEVEL. ATTACH WITH SMALL SCREWS FROM SERVO BAG



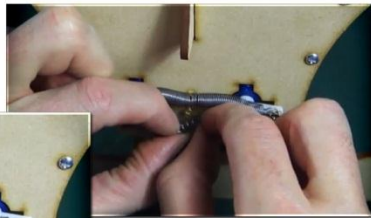
**87** INSERT #2-56 1/4 INCH (8 MM) WOOD SCREWS INTO FACEPLATE AND JAW. LEAVE ABOUT 1/8 INCH (3MM) GAP



**88** INSTALL LIPS SPRINGS, CONNECTING TO EACH LIP SERVO SCREW

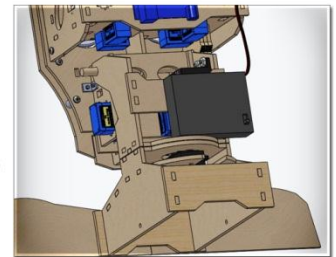


**89** INSERT SCREWS INTO THE SPRINGS

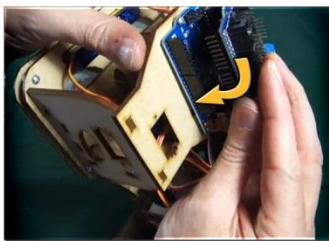


**90** MOUNT BATTERY HOLDER WITH DOUBLE SIDED TAPE, LAYING ON THE NECK BEARING AND AGAINST THE NECK BACK PIECE.

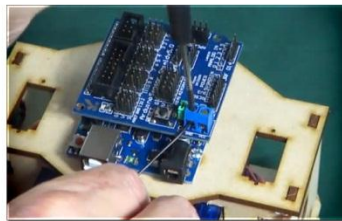
GIVE CLEARANCE FOR USB CONNECTOR TO PIVOT THROUGH



**91** INSTALL THE SERVO SHIELD BOARD ONTO THE ARDUINO



**92** CONNECT BATTERY POWER WIRES TO THE SCREW TERMINALS OF THE SERVO SHIELD



**93** INSTALL BATTERIES. FRITZ WILL NOT RUN ON USB POWER ALONE.



**94** CONNECT SERVO WIRES TO THE SERVO SHIELD ONTO DIGITAL AND / OR ANALOG I/O PINS

**BROWN WIRE** GOES TO THE PIN MARKED "G"

**YELLOW WIRE** GOES TO THE PIN MARKED "S"

ANY DIGITAL OR ANALOG PIN EXCEPT D0 AND D1



YOU WILL SET WHAT PORT EACH SERVO IS ON DURING SETUP USING THE FRITZ APPLICATION

**95** GOTO [WWW.XYZBOT.COM/INSTALLATION.PHP](http://WWW.XYZBOT.COM/INSTALLATION.PHP) FOR DIRECTIONS ON DOWNLOADING AND INSTALLING THE APPLICATION AND HOW TO SET UP THE SERVOS.