

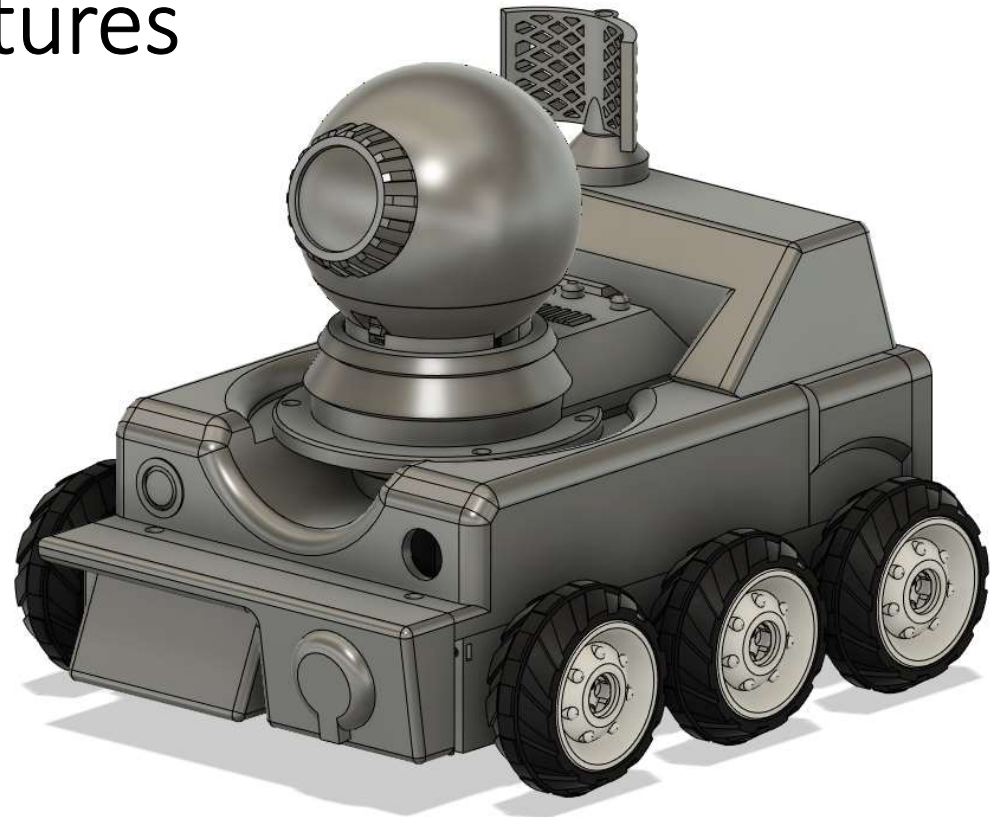
MrBaddeley
EY-3B (Rover Eye Bot) assembly
(Draft)

<https://www.patreon.com/mrbaddeley>

for other parts and instructions

EY-3B (Rover EyeBot) features

- Works with any 6 channel standard RC controller
- 6 wheel direct drive
- Full control, 360 degree turning
- Large battery compartments
- 3 axis "eye"
- Rotating Radar Disk
- Headlights
- Magnetic cover for easy battery swap out



Printing guidelines

All parts are oriented for printing!! No support needed

Generally all parts should be printed with a .2 layer height as maximum.

On outer facing parts it may be easier to print some on .1 (or use variable settings on the slicer to add higher resolution on gradual slopes etc for easy finishing.)

Recommend 3 or 4 (1.2 / 1.6mm thick walls) outer layers generally, up to 6 / 7 for high stress parts, gears, pins etc. (2.4 – 2.8mm).

**Note Infill has effect on compress strength, but wall thickness has the largest effect on strength. As infill increases above 70% the parts become more likely to fracture as there's less room to expand. Typically I print 15-20% infill, 25% max for high stress. **

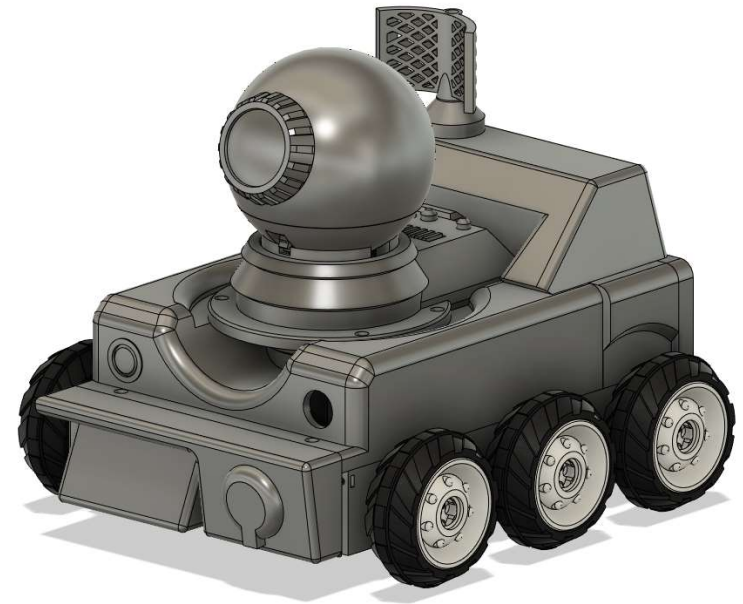
All parts orientated for printing, (note I can occasionally upload a part and forget to orient it, if it looks crazy, ping me a note).

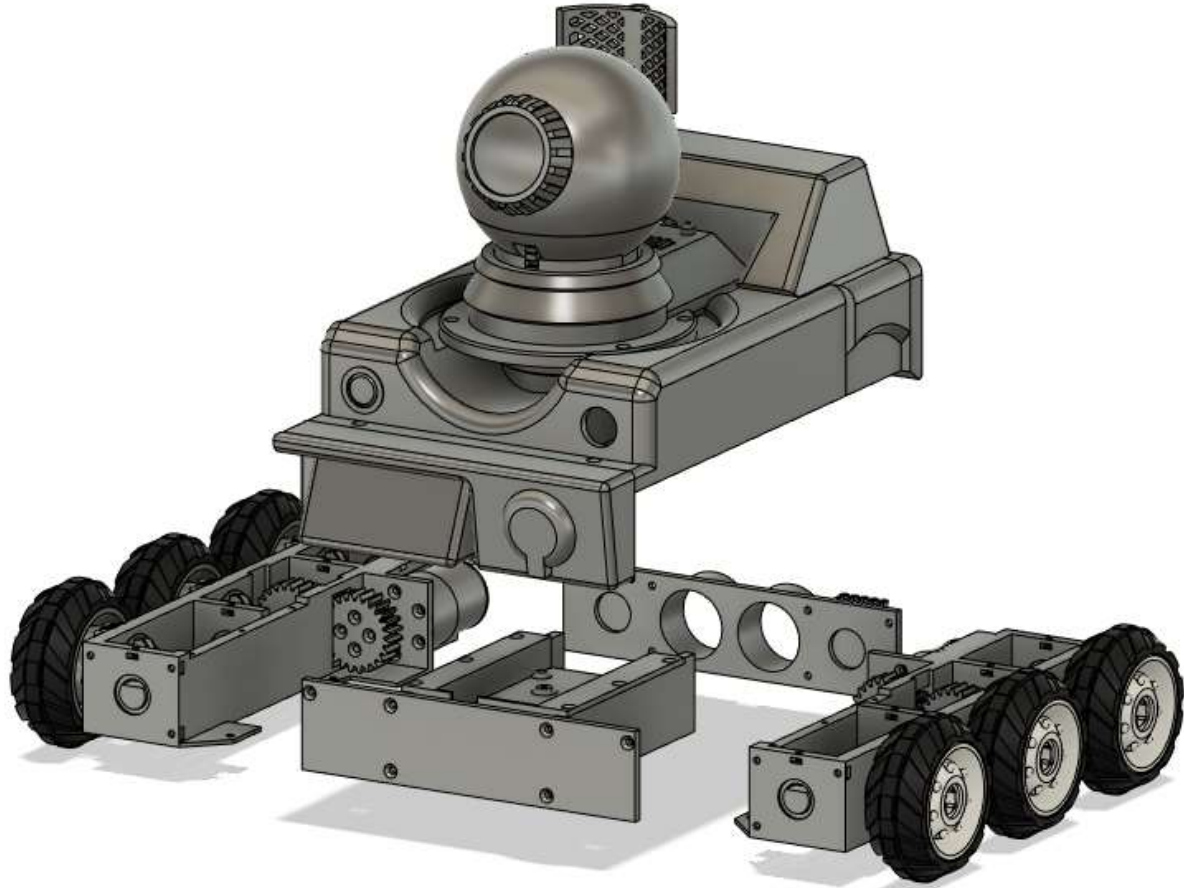
On holes & certain areas where I used to use support, I now use a .4mm layer and bridging, so some holes will need cutting out with a craft knife or file, literally take seconds.

I would strongly recommend a dry fit of all the parts and reading the full assembly before you start gluing.

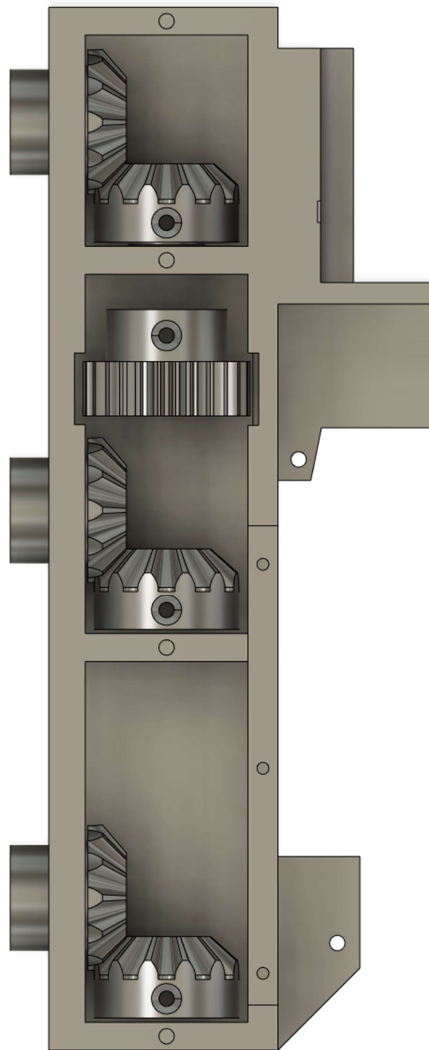
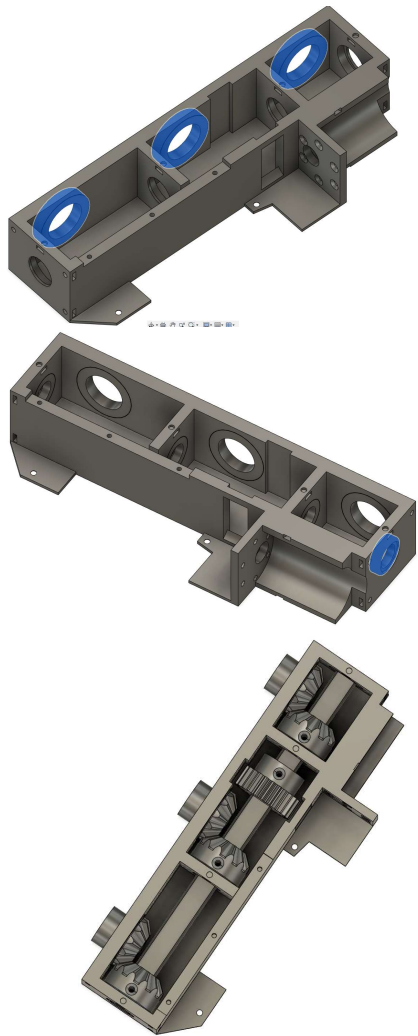
Hardware & electronics

- Pololu 50:1 37Dx54L 12V motor (x2)**
- FS90R continuous servo**
- MG92b Servo (x2)**
- Arduino Mega**
- Cytron MDD10A motor driver**
- Ubec 14.8v to 5v, 5 amp upwards.**
- Rocker power switch (XW-601BB1)**
- Motor Coupler, 6mm x 22mm x 12mm (x2)**
- Servo Cable 26 AWG**
- Bearing 6805-2RS (x13)**
- Bearing 6802-2RS (x8)**
- Bearing 683ZZ (3x7x3) (x1)**
- M3x5mm countersunk bolts (x2)**
- M3x8 Countersunk bolt (x29)**
- M3x10mm Countersunk bolts (x22)**
- M3x15 Countersunk bolt (x24)**
- M3x10mm set screws (x3)**
- Hardware: M3x20mm bolt (x1),**
- M3x35 Countersunk bolt (x12)**
- M3 nuts (x8)**
- M3 Square Nuts (x12)**
- 5mm LEDs (x2)**
- Magnet (10mmx5mm) (x4)**





Assembling the drive train



First let's assemble the two drive trains. Left and Right are just mirrors of each other, so I'll step through one side and repeat for the other.

Firstly, take the frame and insert three 6805-2RS (25x37x7) bearings in the outer wall.

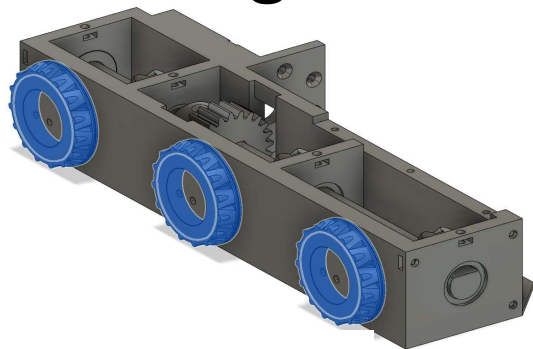
Next, take four 6802-2RS (15x24x5) bearings and fit these to the frame. Note they may be slightly loose, but will be held in by the gears except the very end bearing. (marked in blue), for this bearing, use a tiny bit of 2 part epoxy glue to secure this into the frame. This is the one on the outer wall on the smallest "cube" in the frame.

Take the three BevelWheelGears and fit them through the larger bearings with the gears on the inside. Then take the BevelGearShaft (3) and the GearShaft and position as shown. Finally take the DriveShaft, noting the holes, so they'll line up with the holes in the gears, and slide the shaft through the smaller bearings, and through all the gears (note the flat edge on the shaft alignment).

Take M3x15mm Countersunk bolts (x8) and bolt the gears to the shaft. Note the countersunk bolts will "self tap" into the shaft plastic holes holding the gears securely.

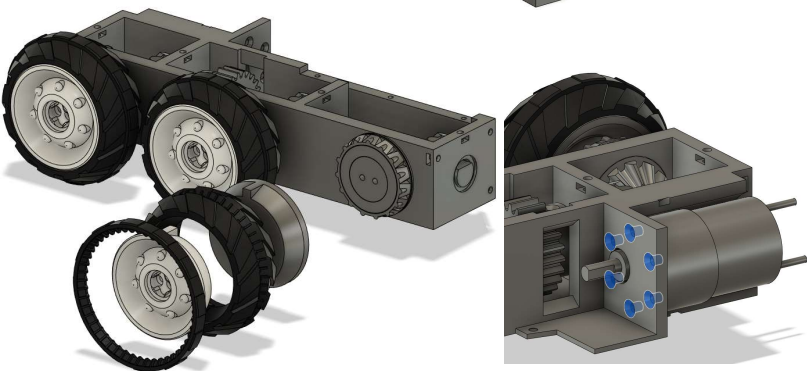
Hardware: 6805-2RS (x12), 6802-2RS (x8), M3x15 Countersunk bolt (x16)

Assembling the drive train



Take three 6805-2RS (25x37x7) which go on the outside of the frame. These first fit into the Hub (x3). Fit the three bearings into the three hubs and then they slot over the visible WheelBevelGears. At this stage they just rest there and will come off easily.

Next, assembly the wheels, each wheel comes in 4 parts. The two part wheel and main tyre can all be printed in standard filament. There a flex outer tyre, which can be also printed in black so minimising the flex printing requires as only the outer tyre is flex.



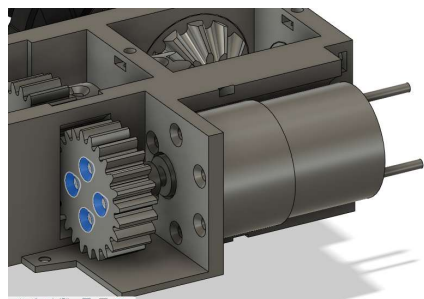
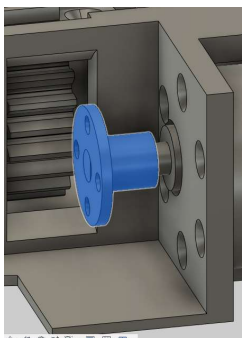
Assemble the three wheels, then they bolt onto the WheelBevelGears using two M3x35 countersunk bolts per wheel (6 in total). These “self tap” into the WheelBevelGear finishing off the main drive frame.

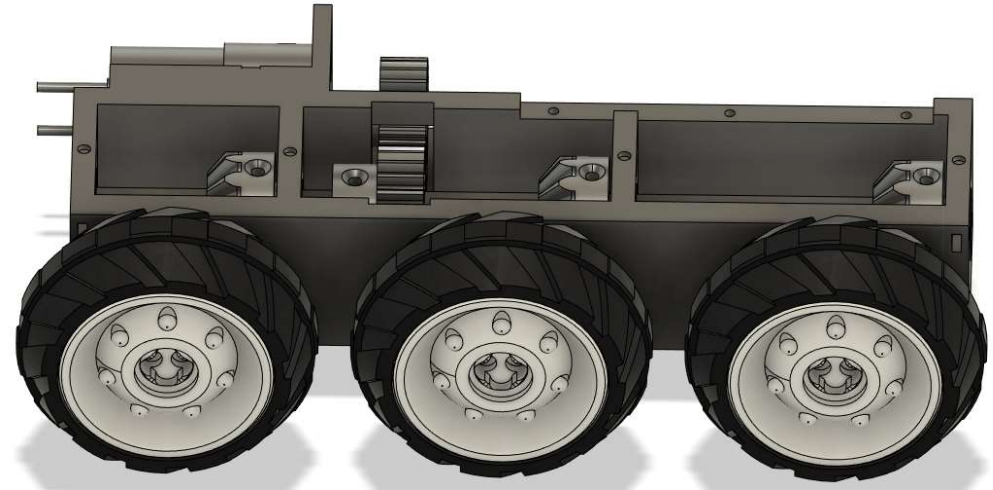
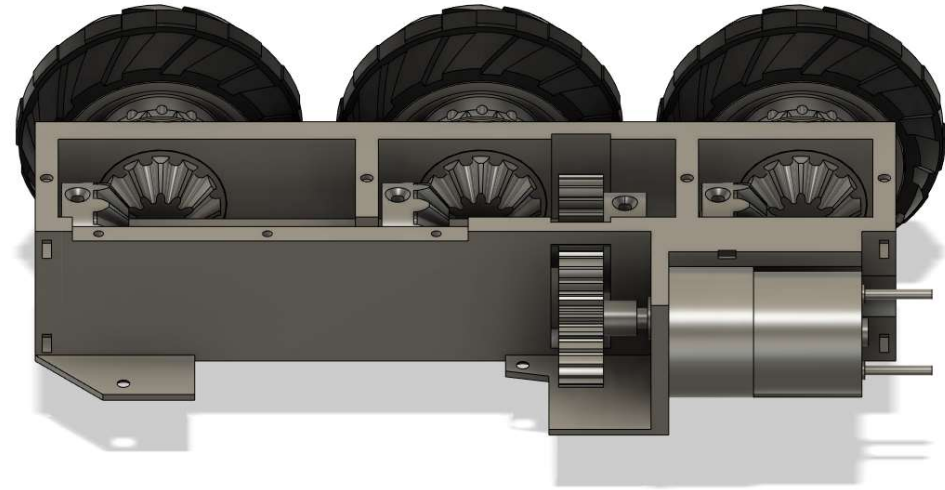
Next, mount the Pololu 50:1 Metal Gearmotor 37Dx54L mm 12V onto the mainframe using M3x8 (x6) countersunk bolts as shown.

Then, take a Motor coupler (6mm diameter, 22 mm wide, 12mm deep as shown in the hardware list) and using the two grub screws attach to the motor before fitting the drive gear. (you can use locktite to ensure it doesn't work loose).

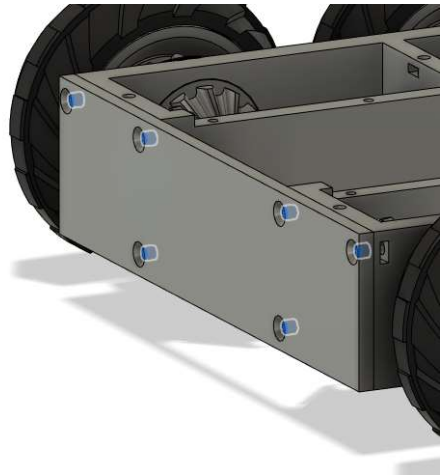
Finally take the MotorDriveGear and position over the coupler, meshing with the shaft gear and secure using four M3x15 countersunk bolts & nuts. Holding the nuts with snipe-nose pliers and tighten the bolts securely to attach the drive gear.

Hardware: 6805-2RS (x6), M3x35 Countersunk bolt (x12), Pololu 50:1 37Dx54L 12V motor (x2), M3x8 Countersunk bolt (x12), Motor Coupler, 6mm x 22mm x 12mm (x2), M3x15 countersunk bolt (x8), M3 nuts (x8)





connecting the drive trains



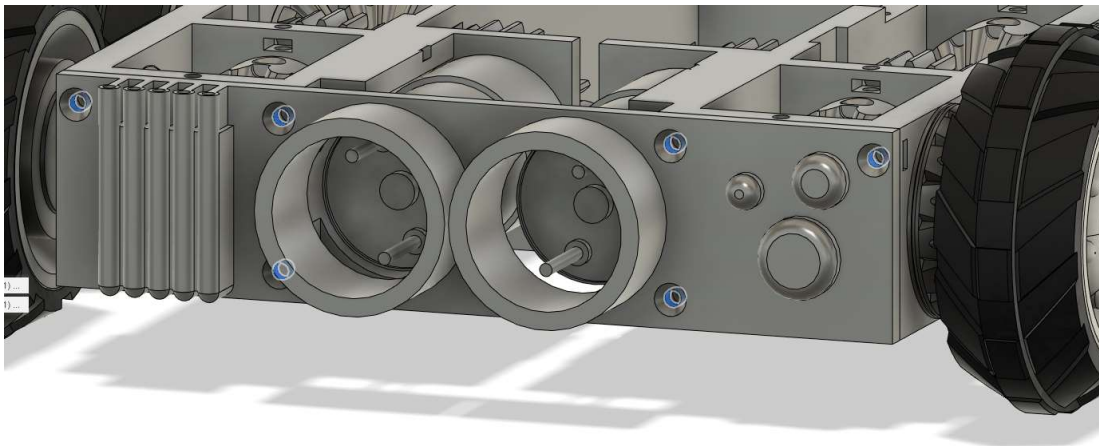
Next take the FrontFrame and the RearFrame. These both attach with M3x10mm countersunk bolts, 6 for each frame going into captive M3 square nuts (6 per frame), you can see the slots in the drive trains. You can use hot glue to hold the nuts in securely if they don't hold firmly with friction.

Tighten the 12 M3x10 bolts into the square nuts to create a solid drive unit. This is the main chassis completed.

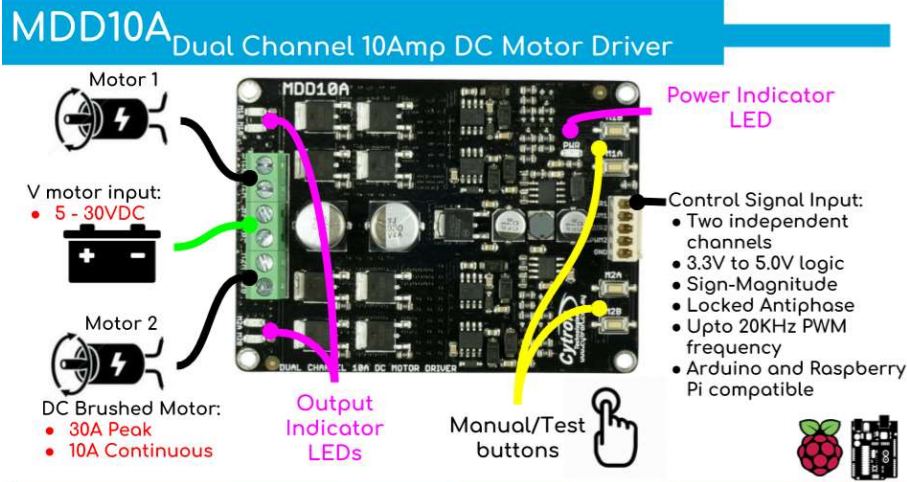
Next we'll assemble the board mount, this holds the motor driver board and an Arduino mega and connect the wiring to the motors.

For the next stage, remove the rear panel so you can access the motors for soldering on the motor cables.

Hardware: M3x10mm Countersunk bolts (x12), M3 Square Nuts (x12)



Fitting the Arduino and Motor driver board



We're using the Cytron MDD10A dual channel motor driver board to drive the motors and the Arduino Mega as the "brains" of the build.

Firstly, take 6 length of cable (3 pairs of red and black cable) for the battery input and the motor drivers. Strip the cable and attach a pair as the "V Motor input", a pair for "motor 1" and a pair for "motor 2". Push these into the connectors and tighten up to ensure a solid connection with no stray fibres of wire.

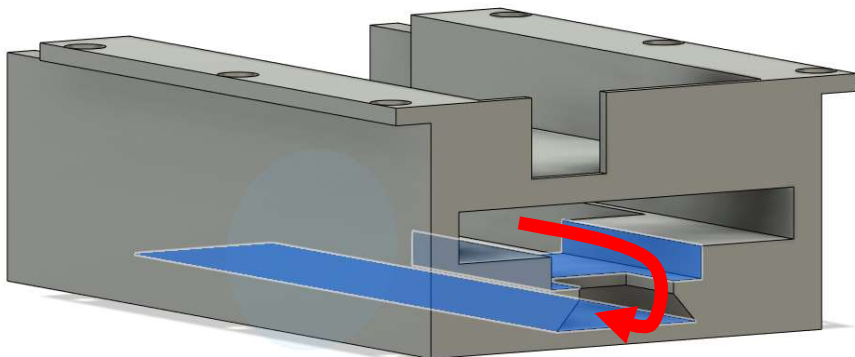
Next, you should have 4 plastic mounts supplied with the board, these clip in underneath the board providing 4 "legs" which M3 bolts can screw into.

Slide the board, wires first, into the slot beneath the Arduino mount. The cables come out of the top hole, the motor cables reverse back, into the channel underneath the motor driver board and towards the motor sticking in the centre channel. The Battery cables do not reverse back, but stick out of the front.

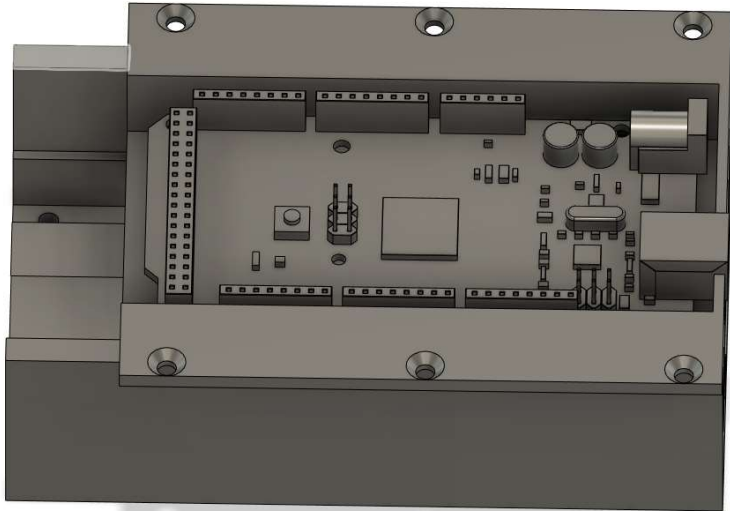
The two pair of Motor Cables should be sticking out towards the rear, and the centre battery pair of cables should stick out towards the front.

Finally, take four M3x8mm and screw the board in place, into the plastic mounts. You may need longer pliers or screwdriver to hold the pegs whilst tightening.

Hardware: cable, Cytron MDD10A motor driver, M3x8mm bolts (x4).



Fitting the Arduino and Motor driver board



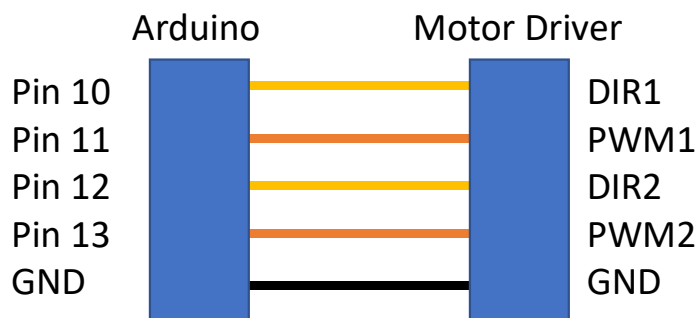
You can fit the Arduino Mega now into the board frame. It holds in place with a couple of M3x5mm bolts which self tap into the plastic frame and holds the Arduino securely.

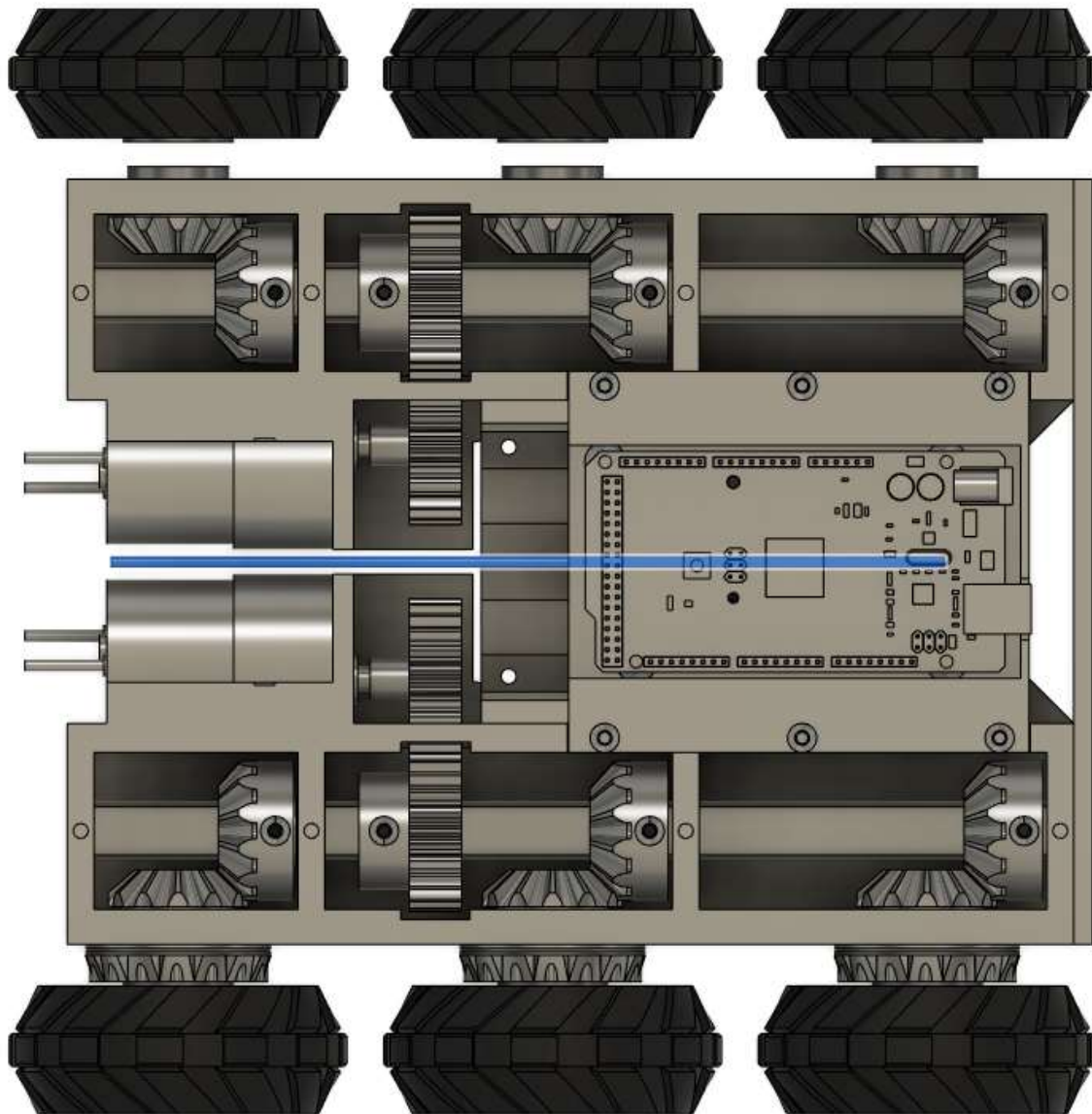
You'll need to make up a cable to connect the Arduino to the Cytron Motor Controller. It's a five cable connection. The DIR cables control the direction and the PWM the speed. 1 is for motor 1, 2 is for motor two.

The last cable is ground **Note, on all logic systems it's critical you share the ground or negative on the battery, this is a reference the signals and the negative or ground should be connected together across all devices**

You'll need to make up the cable, it's well worth preserving with the Dupont crimper set, once you've got the hang of it, it's superb to be able to make custom cables as you get to more advanced builds.

Hardware: Arduino Mega, M3x5mm countersunk bolts (x2)





You're aiming to get all the cables to the rear of the model. The two motor pairs and the battery connection run under the Motor Driver board, they should fit between the gap in the frames. Use a few cable ties to create a single wire loom which has the power cables and motor cables.

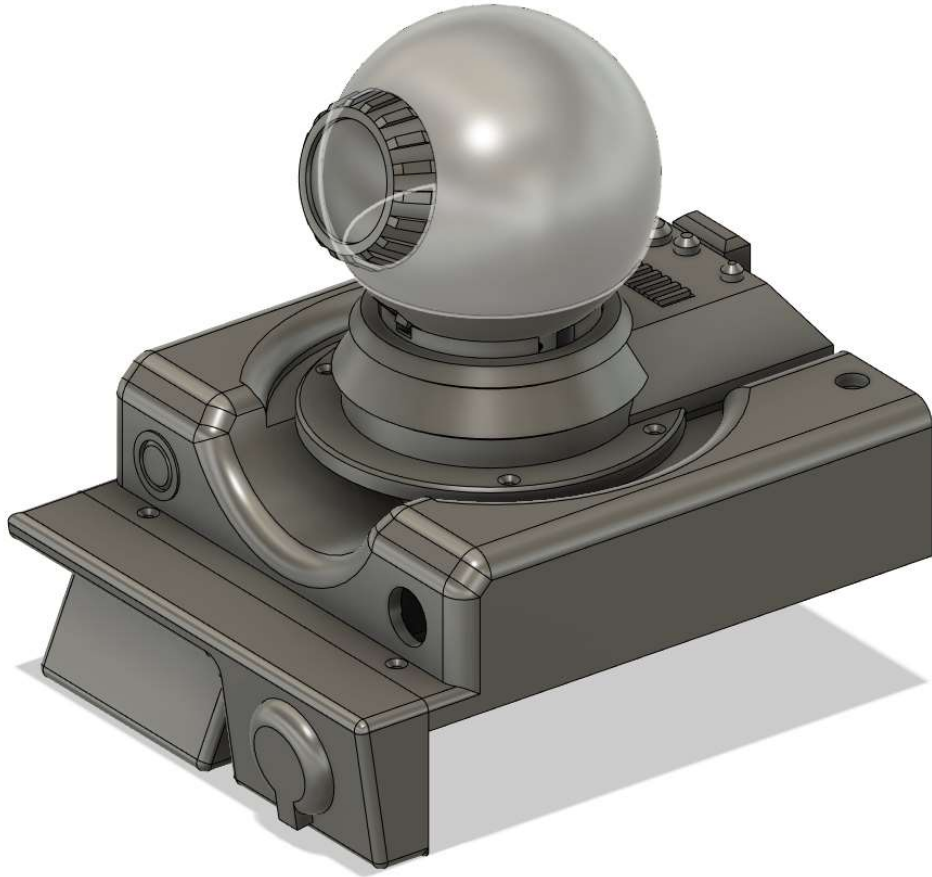
Once you're happy with the way the cables run, solder the two motor pairs onto the motors.

At this point you've got the Arduino logic connected to the Motor Driver Board and the power connected to the Motor Driver board along with both motors.

The BoardFrame will bolt into the chassis using six M3x8mm countersunk bolts, these will self tap into the plastic holding the boardframe into place. There's also four M3x8mm which screw underneath, this finishes the main drive.

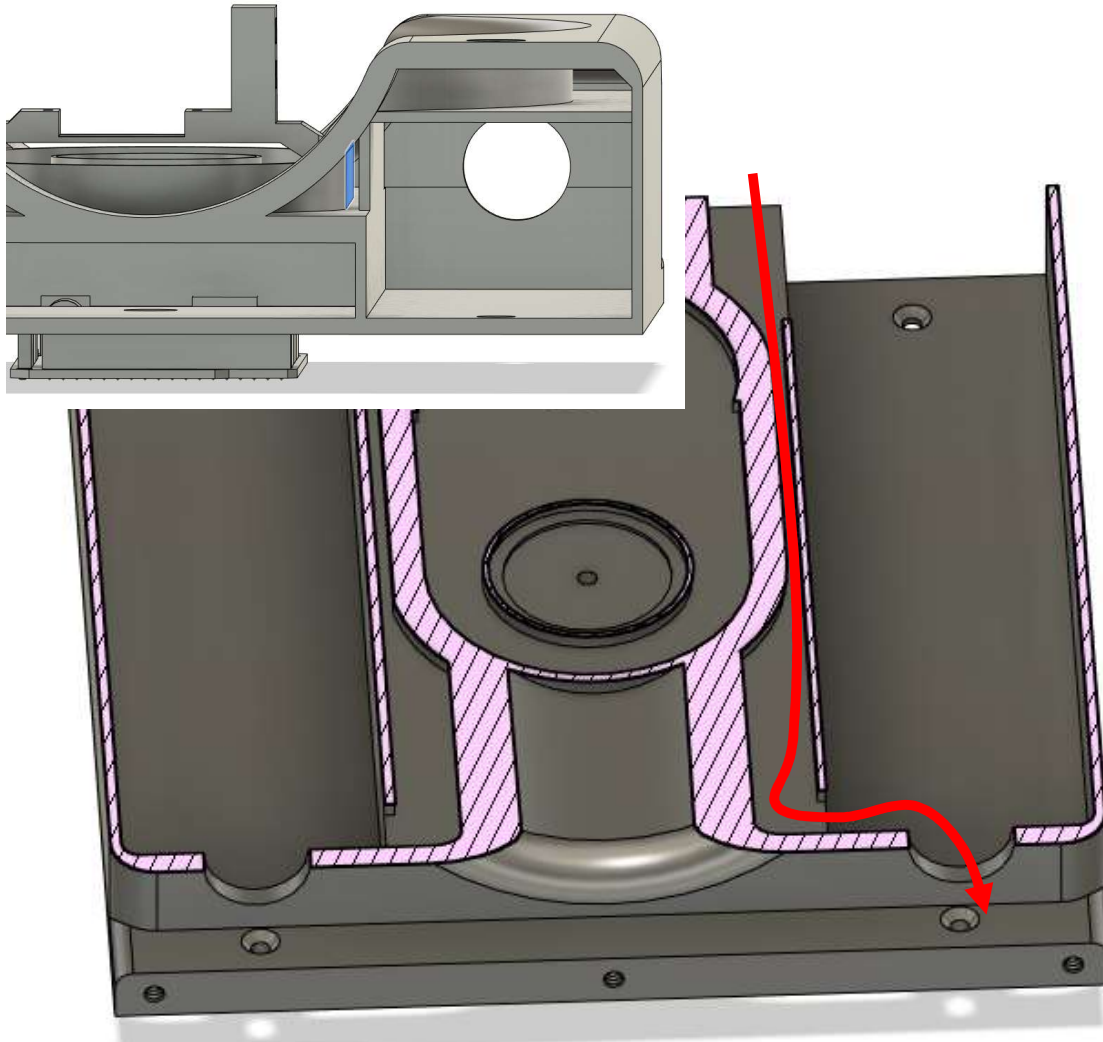
Hardware: M3x8mm countersunk bolt (x10)

Main Skins and Dome



Next we'll build the top skin and dome.

Routing the headlamp cables



Firstly, put the cables in for the headlamps.

First take two lengths of Servo cable about 1 and ½ the length of the top skin (leave plenty of cable) (I use 26 AWG, which is the thickness of the cable, 26 is fairly standard Servo cable). Strip off the signal cable (white, yellow or orange), which just leaves the black and the red (Negative and Positive).

Route this cable from the back through the small gap shown in blue, push it down, it's a bit fiddly, but there's a channel for the cable, at the end there a small gap you should be able to get it into the main battery hole, using a long screwdriver or snipe nose pliers, pull this through the headlamp hole.

This should give you a cable from the rear of the frame, through the length and it comes out through the front headlamp.

The channels are to keep the cable away from the battery compartment.

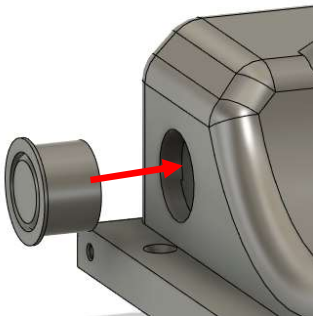
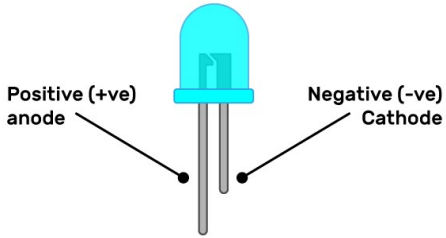
Repeat this for the other side.

Next we'll solder on the LEDs and fit the headlamps.

Hardware: Servo Cable 26 AWG

Main headlights

LED (light emitting diode)



Next, we'll add the headlights. These are two 5mm LEDs hot glued into a headlamp soldered onto the cable. The headlamps can be printed in Natural or White filament, unpainted to allow the light to diffuse through.

The LEDs are soldered onto the cables extruding from the headlamp holes on the frame.

LEDs have a positive connection and a negative connection, it's critical you connect the positive power to the positive leg on the led and negative to negative.

I use heat shrink wrap as insulator, take a short length of the right diameter, put red on the red cable and black on the black cable, push the shrink down the cable away from the LED.

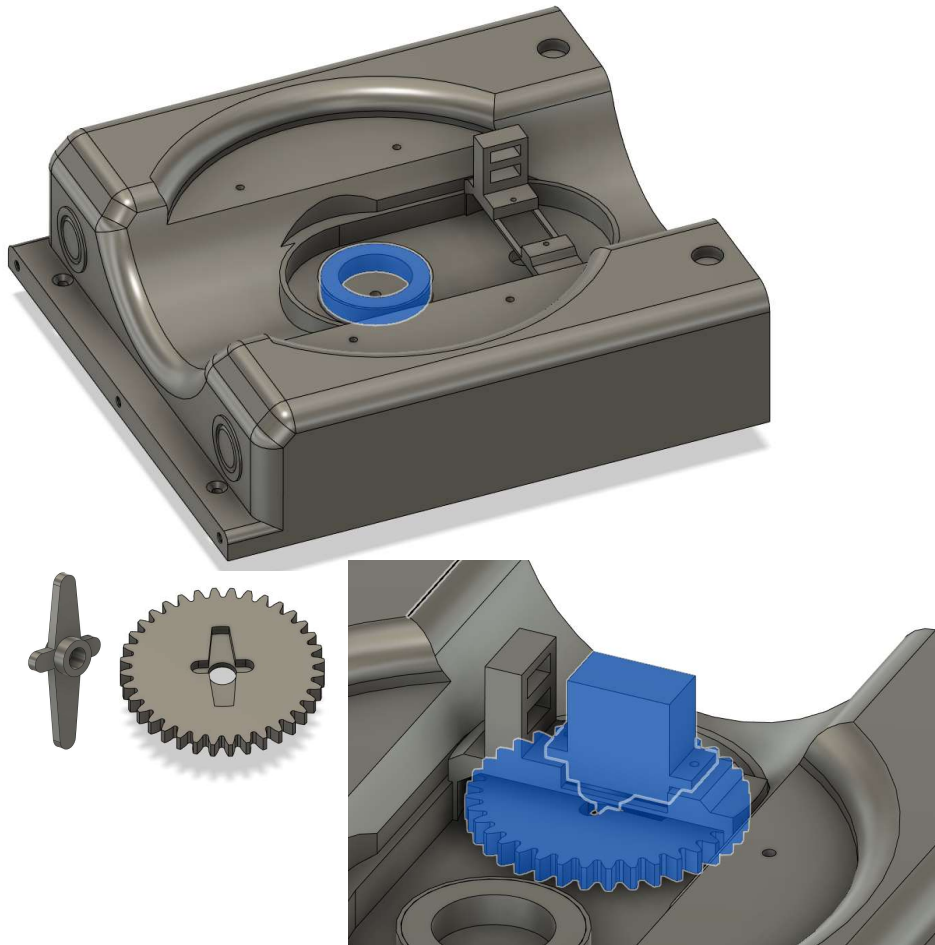
The longest leg is the positive (anode) and this is where the red cable is soldered onto. Strip the cable to about 4mm and wrap it around the leg close to the led, solder and trim the leg as close as possible. Allow to cool and slide the shrink wrap over the cable and flush to the LED, providing insulation. Do the same for the shorter leg with the negative (black) cable.

Do this for both LEDs and these are your LED fitted. Next, take the headlamp prints and hot glue the LEDs into the headlamps for both.

Finally the headlamps can be slotted into the mainskin.

Hardware: 5mm LEDs (x2) – I used white

Main skin & Dome



Take a Bearing 6805-2RS (25x37x7) and push this into the large hole in the main frame.

Next, take a MG92b servo, take the servo horn as shown. This fits into the turngear. Note you'll have to trim the longer arms slightly to get a good fit. First trim this and get a good fit. Then using two part epoxy, glue the servohorn into the turngear with the servo connection upwards so the gear will fit onto the servo. Wait for the glue to solidify.

Next, slot the gear into position beneath the Servo bracket and push the MG92b servo into the bracket and connect the gear to the servo. Note, at this stage it doesn't need any orientation, so just fit it as is.

Next, there's a hole underneath the gear (you'll have to clear the thin bit of filament out) which give access to fit the Servo screw, which holds the horn/gear assembly to the servo. Fit the servo screw that came with the servo and tighten up.

Then, take the two self tapping servo screws which came with the servo and tighten these up to fit the servo to the frame.

The cable from the servo will route through the top hole on the slight tower next to the servo and route the cable towards the rear.

Hardware: MG92b Servo, Bearing 6805-2RS

Main skin & Dome

We'll build the dome next. Firstly, assemble the main eye.

The main eye is fairly intuitive. The base glues onto the main ball using four M3x10mm set screws (grub screws) as alignment pins and two part epoxy. Hold in place with a clamp or tape.

Next, the lens glues into the surround, and then the lens assembly glues into the main ball, this completes the ball assembly.

Next, take a MG92b and take the servohorn as per the previous assembly, and clip the servohorn and using 2 part epoxy, glue this into the halfdrive gear.

Next, take the gear and slot it into the "UpFrame" with the gear on the inside.

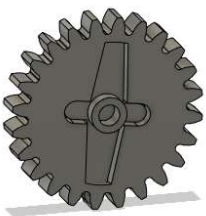
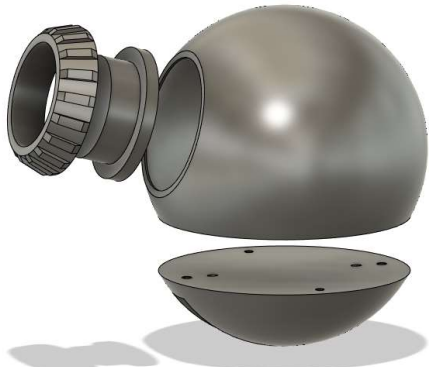
Then, take the halfdrive gear and slot this into the Upframe, with the servo side of the gear pointing towards the servo frame.

Take the MG92b, centre the servo using a servo tester, and fit the servo into the frame so the half gear is level and the servo is centred. Fit the servo screw to hold the gear on and use the two self tapping screws to fit the servo.

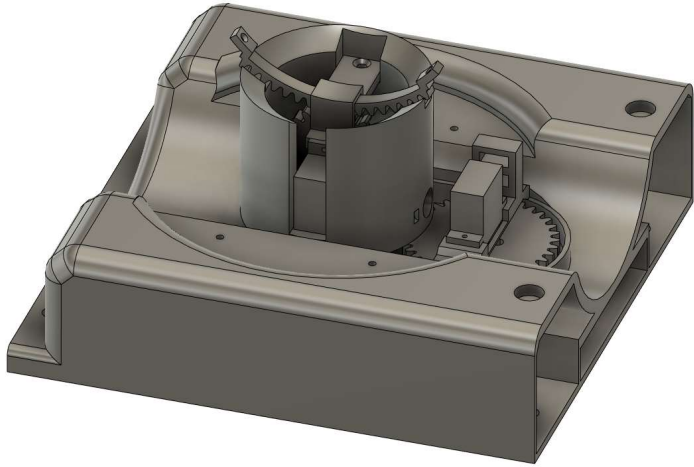
You can use cable ties to hold the cable to the Upframe. Then, take the assembly and slot this into the eyebase, with the servo cable coming out of the round hole. (there's another hole for the servo cable / cable ties). Secure the frame with one M3x8mm countersunk bolt.

Finally, screw the EyeBaseGear onto the bottom of the assembly using two M3x10mm countersunk bolts to finish the Dome support mechanism.

Hardware: M3x10mm countersunk bolt (x2), M3x8mm Countersunk bolt (x1), MG92b servo, M3x10mm Set Screw (x4)



Main skin & Dome



Take the dome support assembly and the main skin.

Firstly, centre the turn servo (the one in the main skin) and once centred, slot the dome support assembly into the large bearing in the mainskin base.

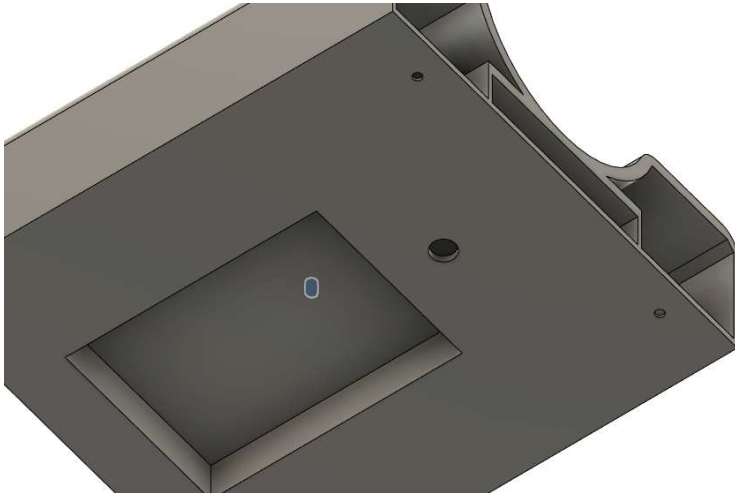
From underneath the base, you should see a small hole in the centre of where the bearing is, this is one of the holes which has a thin layer of filament over it (to allow bridging), clear the filament so you can see the hole.

Take a bearing (683ZZ, 3mmx7mmx3mm) and thread a M3x20mm bolt through it, then screw the bolt through the hole in the base, so it goes through the base and self taps into the gear at the bottom of the eye support assembly, tighten this up so the eye assembly is firm (but still moves smoothly round with the servo).

Then, route the cable from the eye support, leave enough slack so the eye can move 90 degrees either way left and right, push the connector through the top hole on the tower next to the turn servo, and cable tie in place with the second servo cable routing to the rear.

The final part is to fit the top of the main skin cover, this just pops over the eye support and bolts onto the main frame with 4 M3x10mm bolts, note you may need to slightly bend the half gear inwards to fit through the hole, but it flexes easily.

Hardware: Bearing 683ZZ (3x7x3) (x1), M3x20mm bolt (x1), M3x10mm bolt (x4)



Fitting the dome



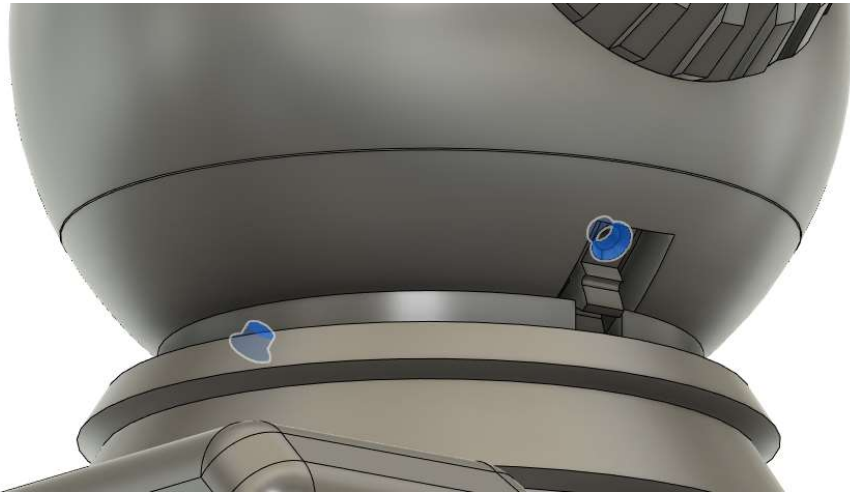
You've fully assembled the top skin assembly now. There's the front skin to fit and the dome on this part and it's done.

Next we'll fit the dome.

You can add a little thin cloth or felt on the dome support (shown in blue) which just makes smoother friction when moving the eye.

Not too thick though or it will stop / restrict the movement.

Fitting the dome



The dome screws on with two M3x8mm countersunk bolts.

You may need to move the servo to get the dome in the best position for adding the screws on both side.

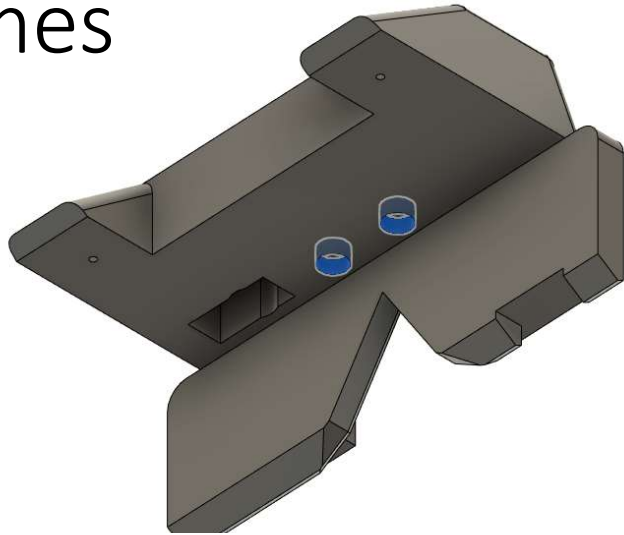
Tighten (but be very careful not to overtighten, as you'll split the gear if you overtighten and will have to replace.)

To complete the upper skins, take three M3x10mm set screws and glue the front skin onto the main skin at the front as shown.



**Hardware: M3x8mm countersunk bolt (x2),
M3x10mm set screws (x3)**

Rear frames



First, take the rear top frame and glue two 10mm diameter, 5mm thick into the rear top panel using 2 part epoxy. (make sure you check the polarity of the magnets, you'll glue the matching pair into the rear low frame.

Next, take an FS-90R servo and fit the servo into the hole in the rear of the top frame, using the two self tapping screws to secure.

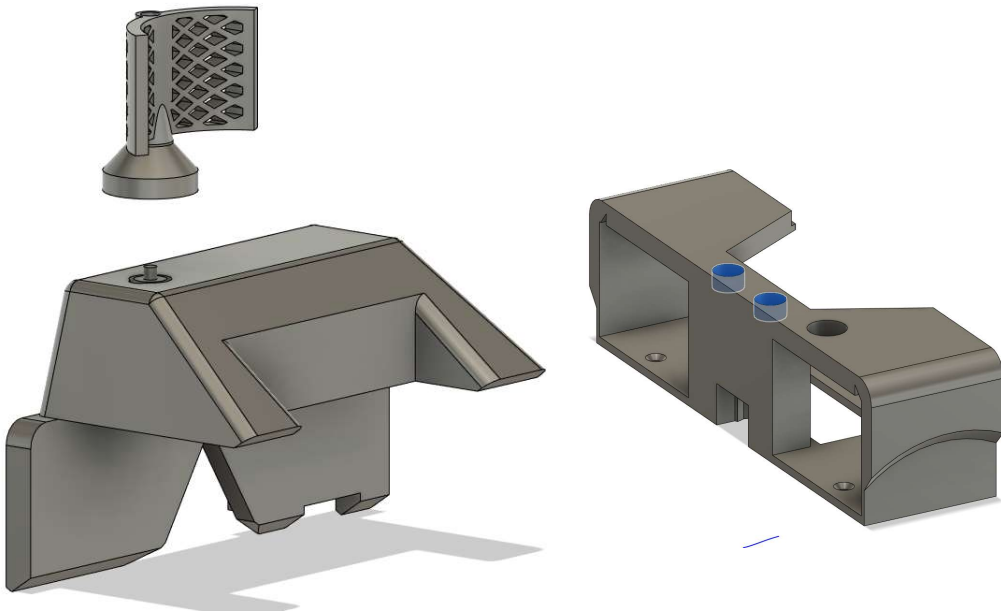
Next, take the radar and glue in the round servo horn using two part epoxy, with the servo connector pointing downwards.

Then, the radar fits into the top of the servo and is secured with the servo screw (using a thin screwdriver, bluetak is useful to keep the screws on whilst you position them and tighten them up).

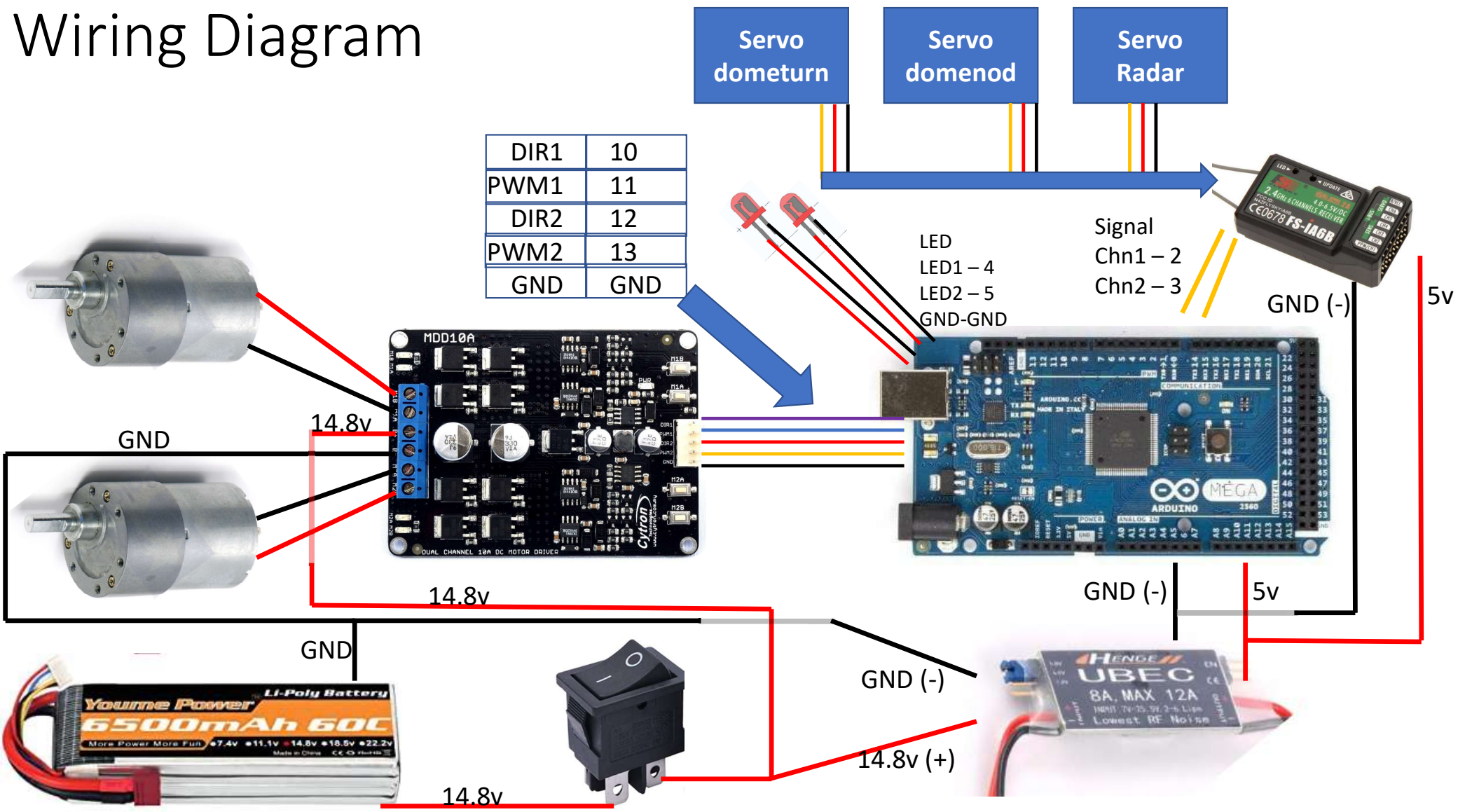
This is the top frame assembled.

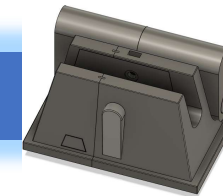
Finally, take the rear lower frame and glue two more 10mm diameter, 5mm thick magnets into the holes, these are the magnetic hold for the top panel, make sure you get the polarity correct so they attract.

Hardware: Magnet (10mmx5mm) (x4), FS90R continuous servo.



Wiring Diagram





Supported and tested by eric salottolo, BEUVIERE, Travis, jiff, John Durno, Dan Lowery, Geir Sire, Kory Tournear, Tomas, Jose Roberto Martinez, Michael Pollard, Michael Beranek, Alberto Moreno, Josh Gofu, Teresina Carper, Scott Davis, Nelson Rivera, Dan Walsh, Gary Dalrymple, Nick Tangaroa, Alyssa Januska, Nicholas Nonno, Leandro Massimo, Mike Lichtenwalner, Scott Millsap, Matthew McClinton, Tiger89, Zenofex Zenofex, matt Bird, Steve Lee, Andy Price, Xander, Christopher Colvin, Peter Weel-Moes, Orie Goudge, Lochlan McCoy, Denise Owen, Kurt McClain, Andrew, Joseph Domkus, Terrance mansworth, Joshua BAKER, Billy Stewart, Kerry Buchter, Felix Petterson, Matt Nichols, Shane Booth, Jordan, Stephen Bartlett, Ranny Gazoo, Jonathan Brinksman, Jon Minard , James Jones, benteux jean baptiste, Samuel7, Nathan Libby, TyroneRex, Mark Turner, Ruediger Weronetzki, Jennifer Carter, Bill, Mathias Kastrup, Eddie coleman, Brad Anderson, Kathy Allen, David Bowles, Jess Smith, Craig Clark, Adam Johnson, Adam Wolf, Martin , Johan Andersson, Jake Ezzo, Kevin Rutter, thomas christopher, Aaron Singleton, steve mead, Benji, Chris Sader, Katharina Janisch, Logan Staples, Ian Turner, Reece Whalen , Matt Van Der Steen, Bob Schwartz, Chris Rosenbaum, David Perez, Chad Jackson, Valerie Britton, Stephan Kempa, Jeff Duneheh, Sheldon Williams, Karl Wilkinson, ETSISKE, R R, Gregory Nachman, firefrog , John Ferguson, Colin Talbot, Brent Williams, Shaun Farmer, Richard Thursty, Dan O Pham, Shane, Morgen Vanesselstine, David Mullin, Craig Walker, Rodney Herbert, Alex Wolf, Cheng C, Kyle Larson, Jay Randall, Tim Horvat, Frank Licht, James Loughry, Keven Bennett, Mike Olmstead, Derek Thompson, Alex Lasher, Josh Jones, Steve, Guy Sawie, Keiji Hagiwara, Lilfooker , Jaime E Nuffo, David Bailey, Jeff Miklush, Bob Salter, Jason Crowton, Clint Slaughter, Julien Lestienne, Jimmie Thomas, Victor Nava, Charles Hul, Dr David Edley, Daniela Flores, Luis ortiz, Rhys Theodore, Juris Vecvanags, Ross Johnson, Jonathan DAVID, Ian Hawkins, Chris M, Nate Motich, Michael Binkley, Martin Walton, Christopher Wallace, M.A. Ldlvs, Bob Magnuson, John Butler, Rostant Antoine, Elizabeth Baker, Clive's Hobbies, Gerald Valentine, Dellinger Technologies, Darren Bischoff, Stacey Reddick, Michael Marrero, Lys Akerman-Frank, Kolin Roberts, Tyler Silcox, Gregory French, Noah Golly, The Little Suburban Homestead, Eran Sabat, Isak Törnblad, Mitchell Manning, Cory Fugate, Scott Donohoo, andrew gillum, Zsombor Fedor, Mark Julian Borg, Roger Thomas, Andy Griggs, Christoph Kretschmer, D, Justin , DuncanJB, Proforen , Timothy Gibbons, Eric Weber, Dave Darko, Ian D Fijalkovich, Kyle Burns, HDC , MICHAEL KOENIG, Brian Thuns, Scott O'Neal, Sven Blom, Andrew Konopacki, Richard Turnbull, Jerid , Dennis See, Cory Kerr, David Hugh Clements, Ariel, Pascal van den Broek, Carl Hunermond, Tim Troutman, Anthony DeGirolamo, Greg Newell, Fred DeBardo, David Kok, PhoenixForged , Steve O'Shea, Robert Schuetter, Francis Behen, Adam Ashley, Larry K., Peter King, Aaron Thompson, Arthur Hallen, Krakx , Rocinante , Rob Cromwell, erick parra, Jerry Summers, Kevin McQuarters, Paul Muir, Jason Guyer, philipp tudge, James E Lorimer, Adam Duvall, Ryan Lovell, Iain Stott, Corbin Campbell, Robert Weekley, Tony Retano, Greg Roan, William Thompson, Jan, Jon , Vernon Gilmore, Darren , Steven Margis, Nils Pa, John van Beurden, 3d Planet Ukraine, Walter Strain, Kalandir, Dj , Yann, Brannon Breau, Håvard Jørgensen, branden price, Heath Price, Toby Sabol, Shyam Lutz, Alexander Ingham, Adam Perkins, Robert Lee, Christopher Edwards, Donald Grissom, Mark Cox, mortag93 _ Jason Ament, Nathan Duncan, Gerald Hansen, Angel Marin Merino, Tim Scott, Mikey Bouchereau, Rusty, Roger Demers, Oliver Eckel, Tom Van Eynde, chronos1981 , Jeremy Wilkerson, ewaca, Gary B Garland, lister smeg, Eli Patton, David Nicolas, Moon jung hun, Noah Lewkowicz, Allen Mahurin, Anthony Wilson, Michael Wilke, Rick Hernandez, Chris - 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