

This document tells of tips and tricks used during the physical assembly of the STAR robot. If there is enough interest, I may do a better assembly guide.

#### Side “Wing” Sub-Assemblies:

- Needed to drill out the holes on the wings for all the Spur and Combo Bevel and Spur Gears. The gear hubs should turn within there captive thru holes with very little friction.
  - Also added in some silicone grease during assembly, to ensure little friction between the gear hubs and the wing captive thru holes.
- Recommend using blue or red Loctite for the Wheel flat head screws, as they can unscrew themselves when climbing over obstacles.
- The hinge dowel pins and the set screws used to lock the wing with respect to the outer pulley is a weak point of my design. I was continually having to tighten them to keep the sprawl mechanism working. And eventually the hinge dowel pins began to press thru the plastic, with all this tightening of the set screws.
- You might want to consider using the gearhead motors with no PCBs already attached, as this will make the robot lower profile. I was continually fighting with the wiring going to the wing motors sticking up too high. Versions of the motors without PCBs attached are available from Pimoroni.

#### Sprawl Sub-Assembly:

- The “Sprawl Motor Mount Bracket, STAR” and “Sprawl Middle Gear Mount Bracket, STAR” are used to tension the belts. Adjust the tension by moving these brackets up or down and then tightening the screws.
- Assembly of this sub-assembly is order dependent- make sure the belts are in place before you get too far! As I write this, I wonder if anyone will actually read this guide?
  - Get 3 of the dowel pins engaged- outer pulley dowel pins and motor dowel pin.
  - Then use an allen key or small screwdriver to help the “Sprawl Middle Gear, STAR” dowel pin into its slot.
  - Then tighten the “Sprawl Support Bar, STAR” via 2x socket head cap screws.

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#### Possible Design Improvements to Make:

- Thicken the area around the hinge dowel pins to allow for more force when tightening the set screws. This will require clearance on the main body (and possibly Protoboard).
  - It would be ideal to have flats on all the dowel pins for maximum holding power, but that would require machining.
- Try the [1006:1 gear motor](#) for the sprawl motor. Setting the sprawl height just right was still difficult with the 298:1 motor currently being used.

- Having the wheels be keyed to the Spur gears might help with the unscrewing issue.
- Experiment with adding a “tread” to the wheels.
  - Either use rubber plastic dip
  - Or 3D print some flexible “tires”
  - It might also be interesting to have a treaded part in the center of the wheel, which is only engaged when the robot is in its flattest position.
- Cleaner wiring to the wheel motors.