

## How to make bumpers:

Bumpers are a necessity for all robots but the process in making them can be complex.

### Materials:

Pool noodles

Plywood- The width that is required by the rules

Gorilla Glue

Zip ties (long)

Long bolts

Nuts

Power drill

Aluminum tubing

Sharpie (Marking tool)

Hammer and Punch

### 1.) Read all Rules carefully!:

- Take note of: bumper zone → This will tell the height of the bumpers
  - → Dimensions
  - → Materials

### 2.) Cutting wood and tubing:

- Cut wood and tubing to required length (usually the length of the robot)

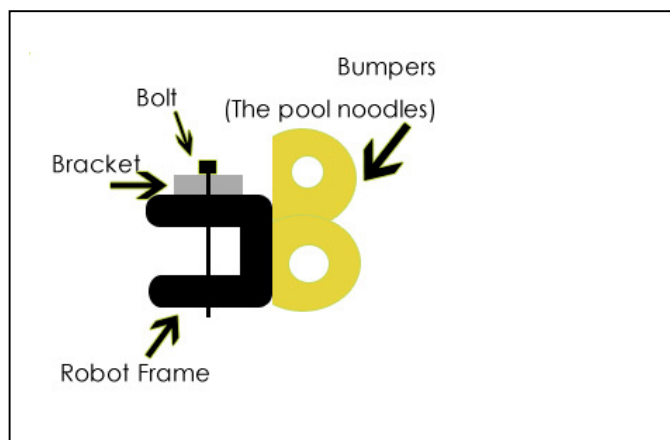
### 3.) Making brackets:

- Cut 10 brackets → 2' of light weight but sturdy aluminum
- Drill 2 holes (1/4 in) in side of metal to attach to bumper side
- Drill 1 hole on top of the metal to attach to the frame

Note: Works best if all brackets are EXACTLY the same

### 4.) Attaching the brackets to the bumper:

- 1.) Line up bumper to the frame at desired height
- 2.) Mark line vertically across
- 3.) Attach bracket to bumper with nuts and bolts to the top of line → make sure that brackets line up with holes on the bot



**5.) Making the bumper cushion on top of the wooden bumper structure:**

- Double up noodles and attach with gorilla glue and secure with zipties.

Final Bumper product: →

**6.) Cover bumper with fabric**

**7.) With long bolts attach the bumpers to the frame.**

