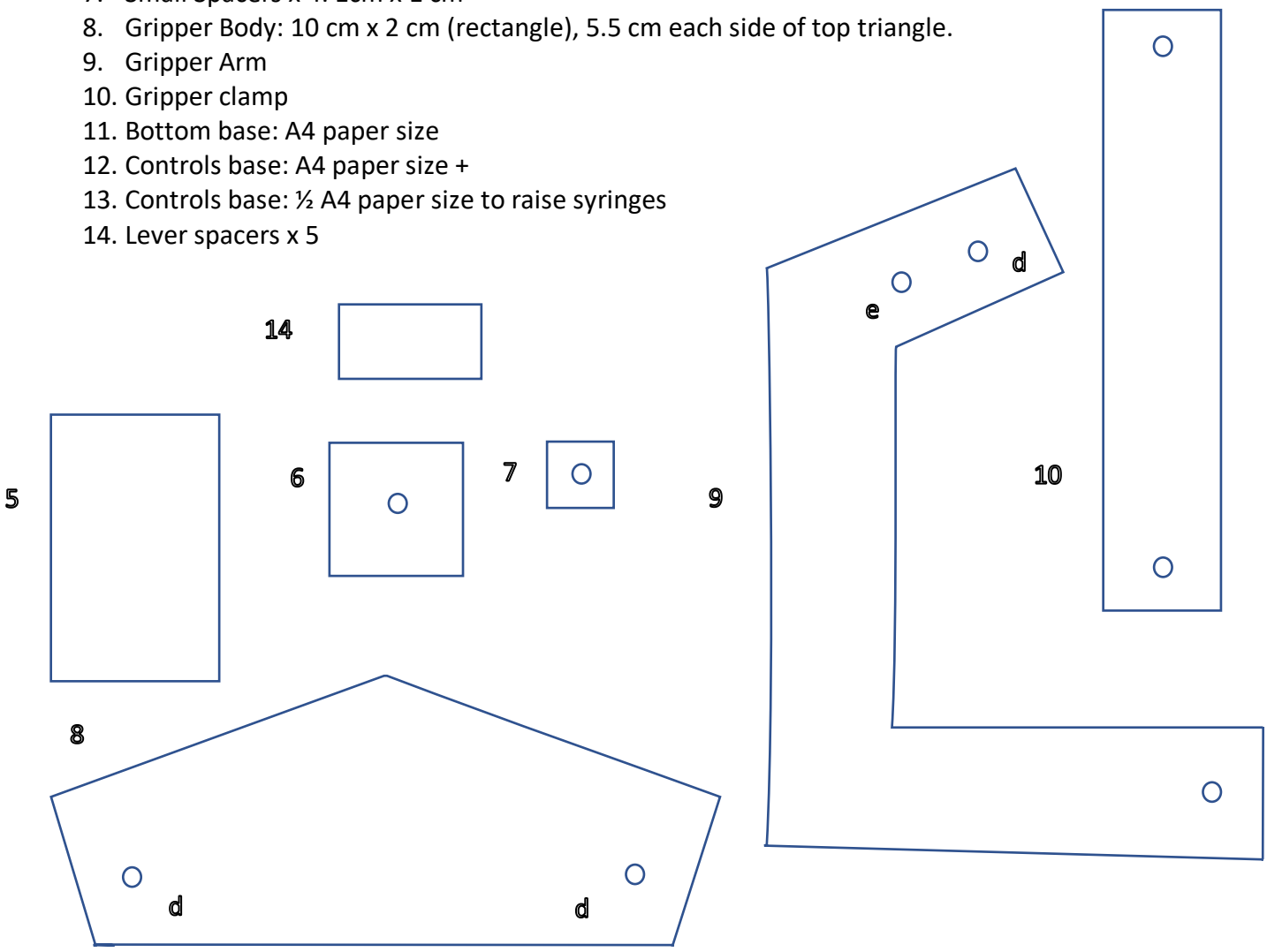
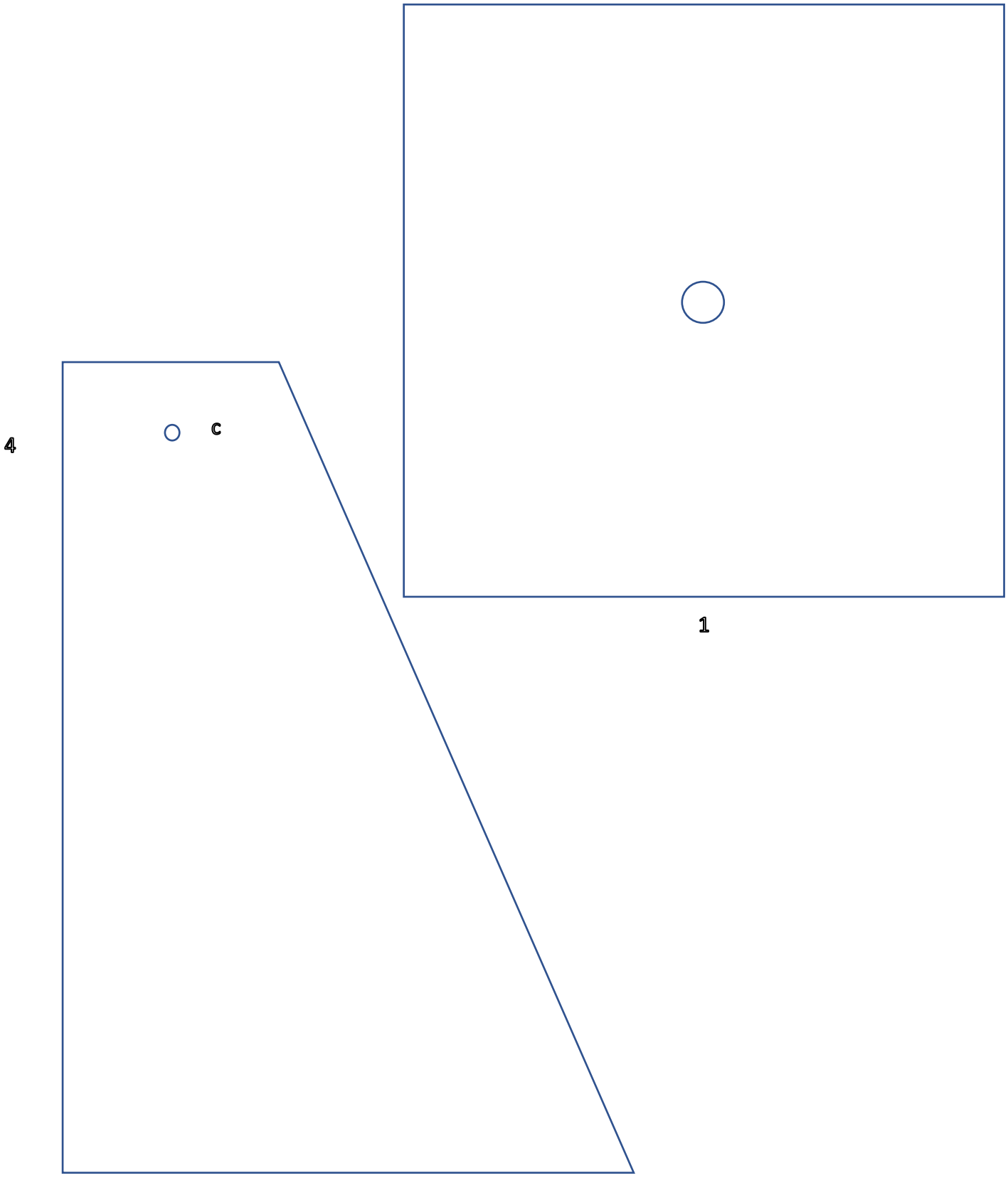
Hydraulic Crane

Supplies:
8 x 10 ml syringes
4mm vinyl tubing (about 4 meters)
1 x metal skewer (to make holes)
Wooden skewers
Double wall cardboard
1 AAA battery (old, for base hinge)
Wire
Coloured water
12 x Wide craft sticks
Duct Tape
20 x Cable ties
Super glue
Hot glue

Parts (as numbered on templates below):

1. Rotating Base: square 10 cm x 10 cm
2. Forearm x 2: 20cm x 4 cm
3. Arm x 2: 26cm x 4 cm
4. Supporting platform for arms x 2: 9 cm (base) x 15 cm (height) x 5 cm (top) x (about) 16 cm (diagonal)
5. Bottom base spacer x 2: 4x2.5.
6. Big Spacers x 6: 2cmx2cm
7. Small Spacers x 4: 1cm x 1 cm
8. Gripper Body: 10 cm x 2 cm (rectangle), 5.5 cm each side of top triangle.
9. Gripper Arm
10. Gripper clamp
11. Bottom base: A4 paper size
12. Controls base: A4 paper size +
13. Controls base: ½ A4 paper size to raise syringes
14. Lever spacers x 5

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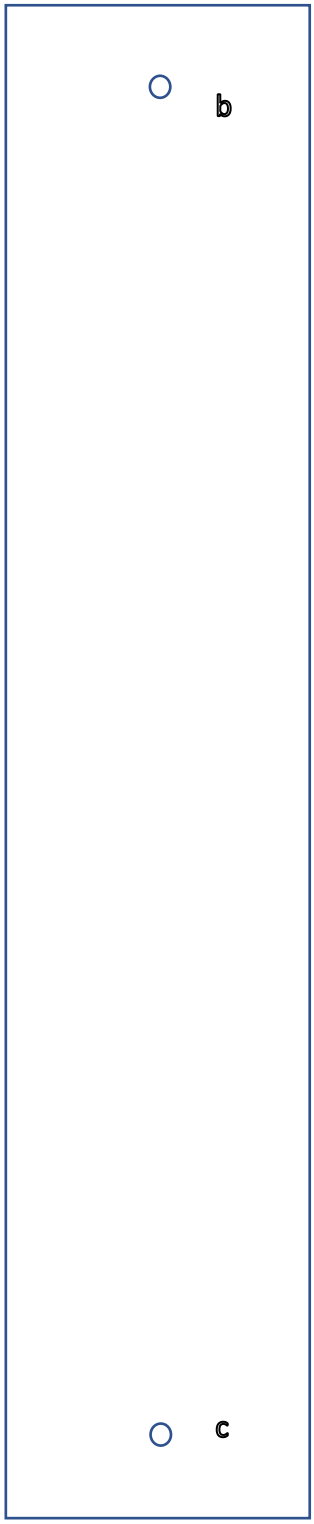

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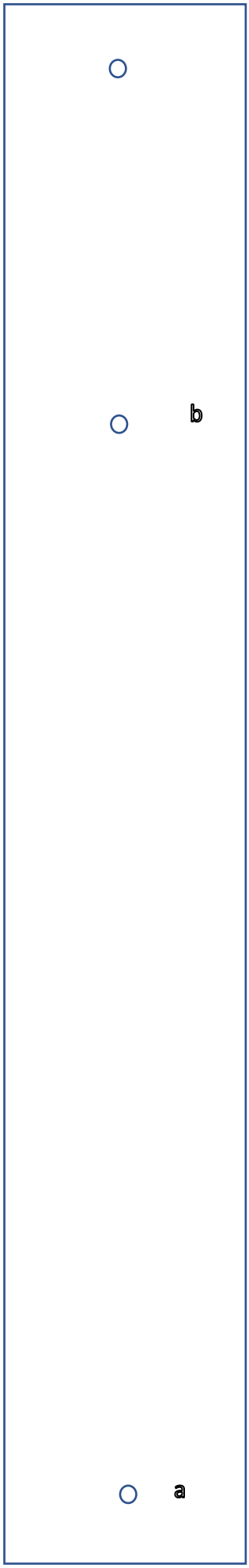

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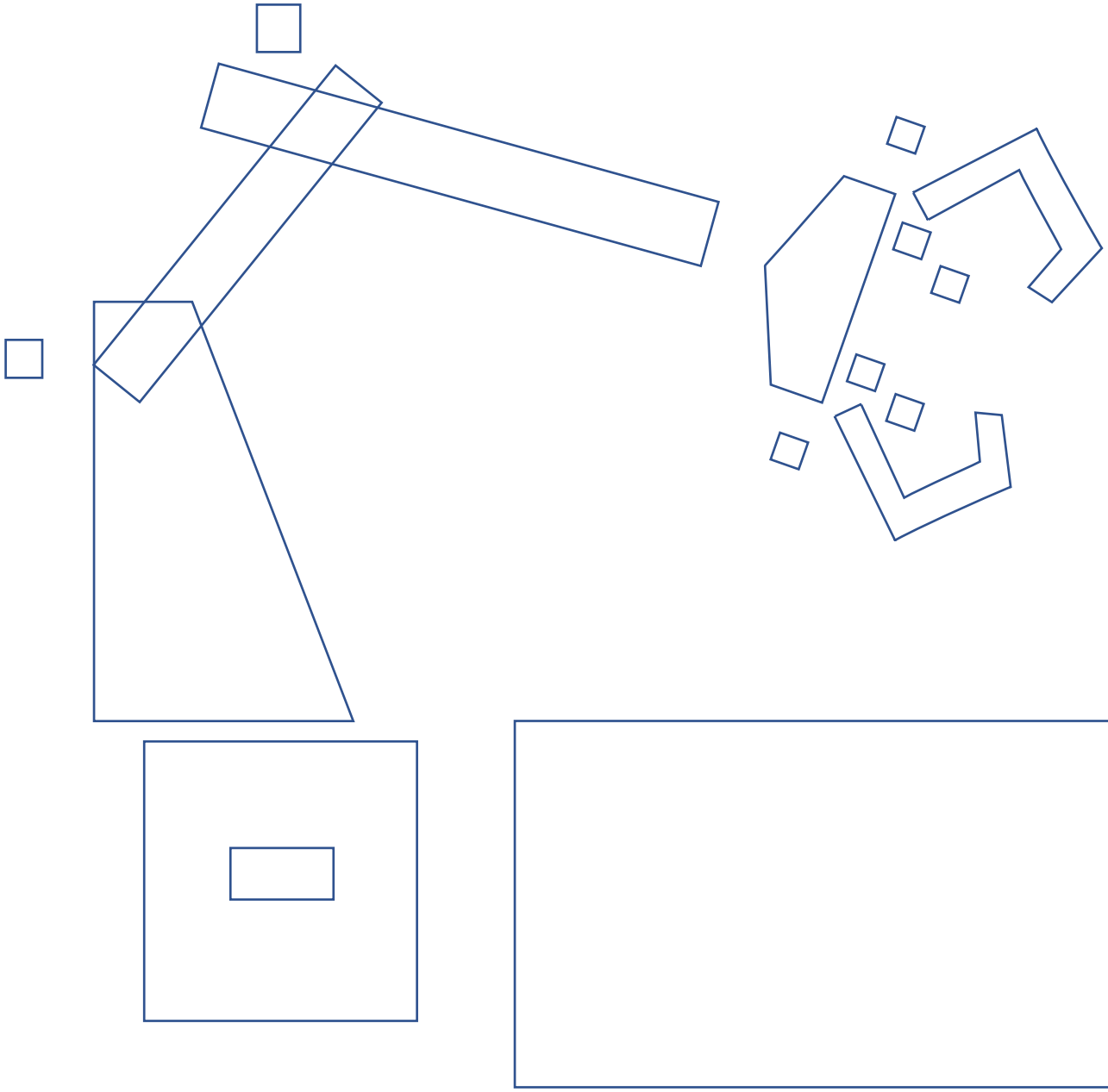

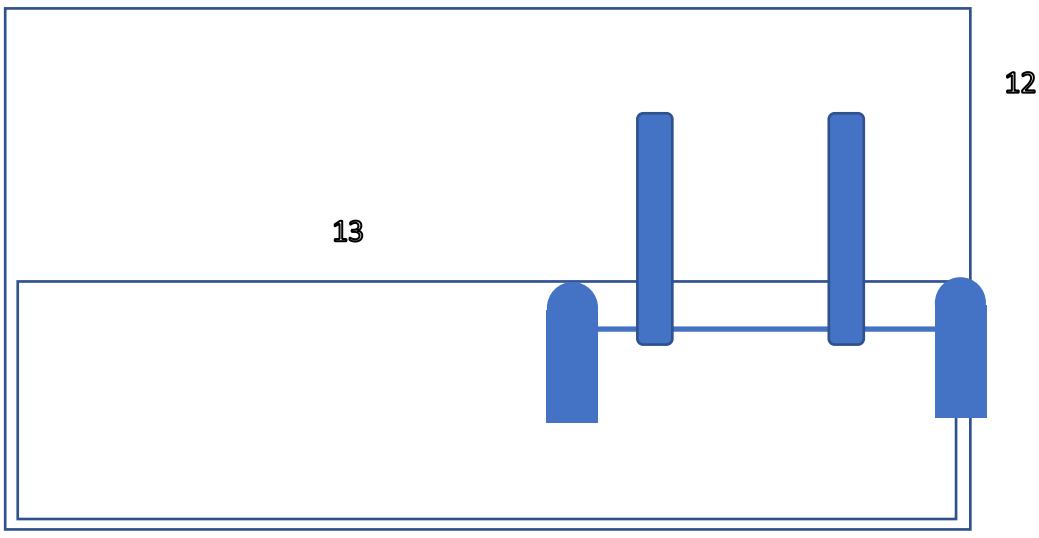

1. Cut template pieces out of double walled cardboard.
2. Use metal skewer to punch holes through cardboard (without flattening it).

Arm:

3. Join both sides of forearm (#2, ‘a’) with a skewer measuring the spacing with a syringe. Cut the skewer close to the cardboard. Use superglue to fix wood to the outside. (from now own described as ‘join’).
4. Join points ‘b’ on parts #2 and #3 with a skewer and use a large spacer (#6) on either side. Cut skewer and superglue wood to spacer on the outside.
5. Join points ‘c’ on parts #3 and #4 with a spacer (#6) as above.
6. Hot glue both spacers #5 together, and then hot glue the bottom of the supporting platform (#4) to the middle of the rotating base (#1) with spacers (#5) in between.

Claw:

7. Join points ‘d’ as follows: part #8, spacer #7, part #9, spacer #7. (both sides of part #8)
8. Fold wire (“Z) to attach to syringe and to point ‘e’ on part #9
9. Using a large popsicle stick, fold part #10 into a kind of triangle, matching the two skewer holes. Remove stick.
10. Join gripper clamp (part #10) to gripper arm (part #9).
11. Add hot glue to flat part of clamp for better grip.
12. Hot glue the clamp body #8 to the top of the forearm and attach the wire to the top syringe.

Syringes

13. Put a cable tie around the front of each of the syringes, with another cable tie around it for skewers to go through. If necessary, put a drop of hot glue over the cable tie around the syringe to keep in place.
14. Drill a skewer size hole through the top of the plungers.
15. Join syringes to frame with skewers at top and bottom.
16. Use food dye or liquid watercolours to make 4 different coloured liquids.
17. Attach tubing to syringes and draw liquid through them.
18. Attach tubing to control syringes.

Controls

19. Hot glue #12 & #13

Levers:

20. Drill holes at top and bottom of craft sticks
21. Join 2 craft sticks by hot gluing a lever spacer #14 to 2 thick craft sticks, between the holes for the skewer
22. Join the top of the sticks with a skewer & super glue.
23. Cut the edges of the top of the syringe’s plunger so it will fit between the two sticks. Put a skewer through the middle of the sticks to attach the syringe between them.
24. Cut 2 craft sticks in half. Drill hole through craft sticks, put skewer through them, threading the bottom of the levers through (2 at a time)
25. Put duct tape around the skewer between the levers to keep them in place.

Swivel

26. Join 2 craft sticks by hot gluing a lever spacer #14 to 2 thick craft sticks in the midle.
27. Join top of sticks with a skewer & super glue.
28. Cut edges of syringe plunger and attach the syringe through the bottom of the stick.
29. Hot glue the stick to the side of the crane’s base

30. Attach the front of the syringe by inserting a skewer through
the front cable tie. Put a drop of hot glue over the top of the skewer to keep from popping out.