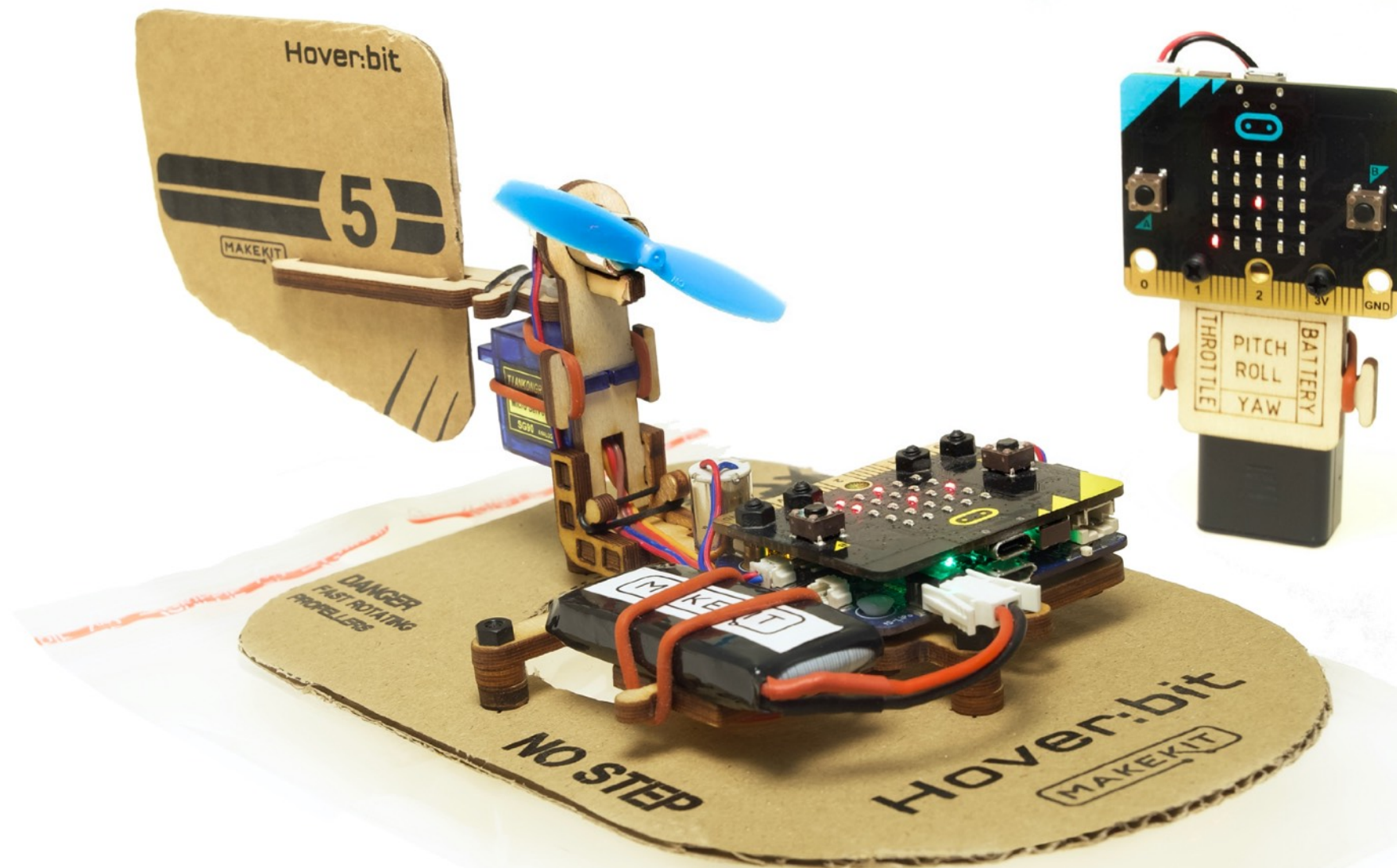


Hover:bit V2

Assembly



makekit.no



Watch the video:
<https://www.youtube.com/watch?v=SjuJtKg4Ces>



"Hovercraft" by Phil_Parker is licensed under CC BY 2.0

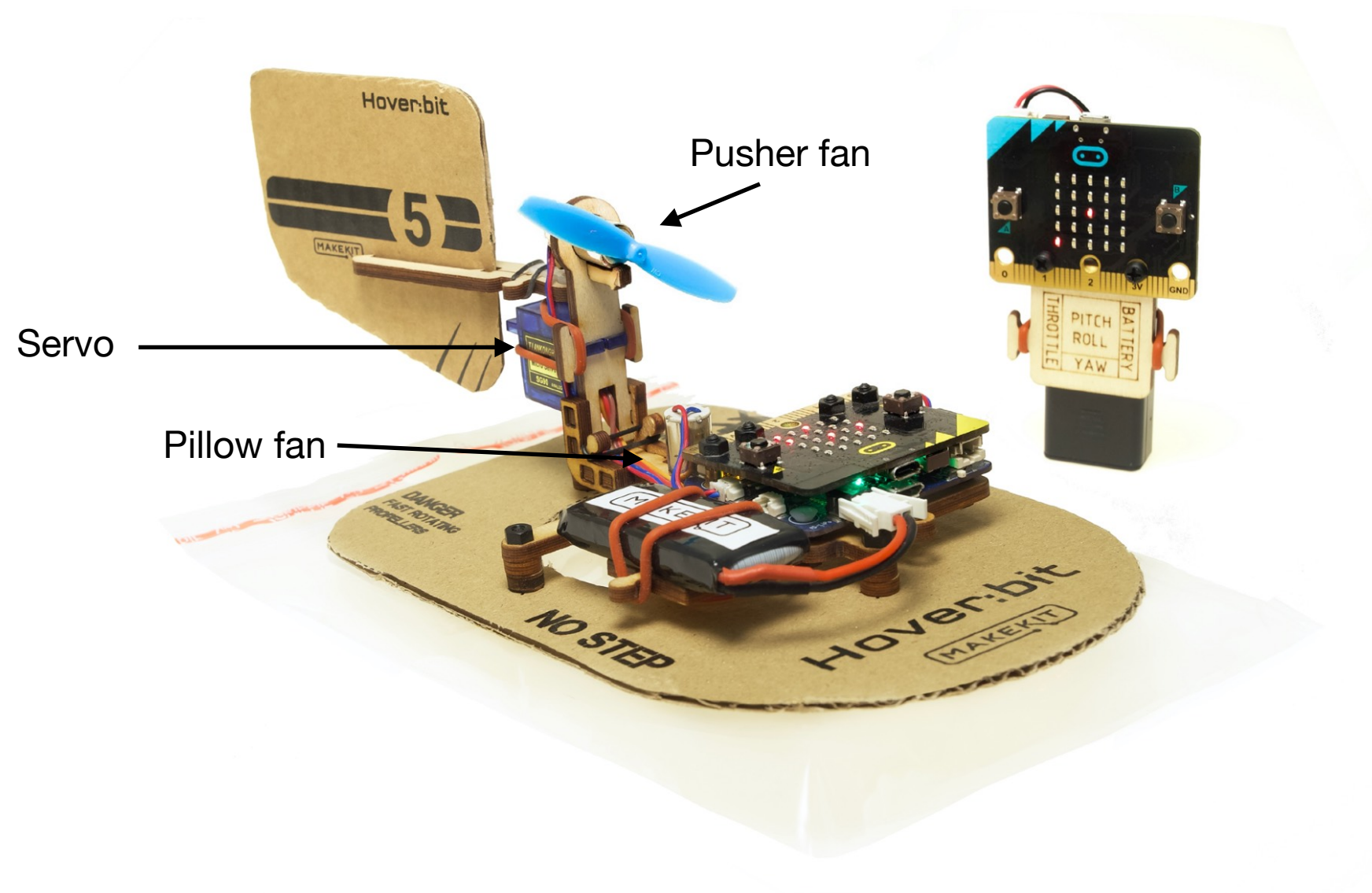
A hovercraft uses a pillow of moving air to create a small space between the vehicle and the surface. This removes the friction, and the craft can move forward by blowing air from a rear engine.



"1/52 - Air Hockey" by Skakerman (Archive) is licensed under CC BY 2.0

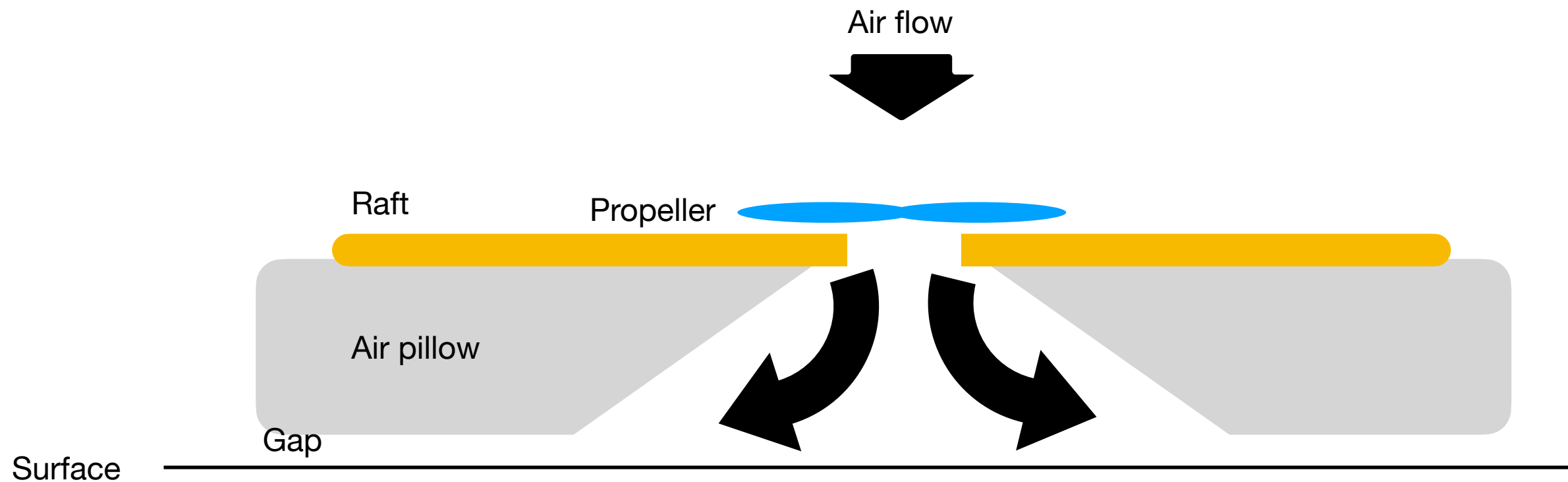
Air hockey table uses the same way of elimination friction. A small air gap between the discs and table removes friction, and the objects can float and bounce in great speed, for a long time.

How it works?



The Air:bit has one pusher fan to move forward, a pillow fan to blow air downwards, and a servo to steer the rudder.

Air pillow



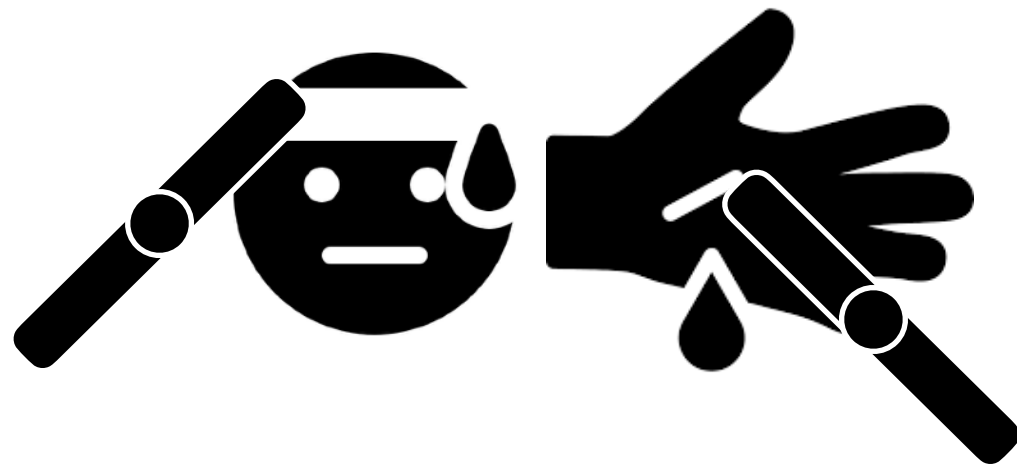
When the propeller blows, the skirt will be filled with air. The air will be pushed under the pillow, creating a small gap to the surface. Because the pillow is soft, it can adapt to uneven surfaces without being scratched or getting hang ups.

Safety warning

Fast rotation propellers can hurt humans and animals

To prevent injury, do:

- Keep hands off a running vehicle
- If you loose control of the vehicle, stop immediately



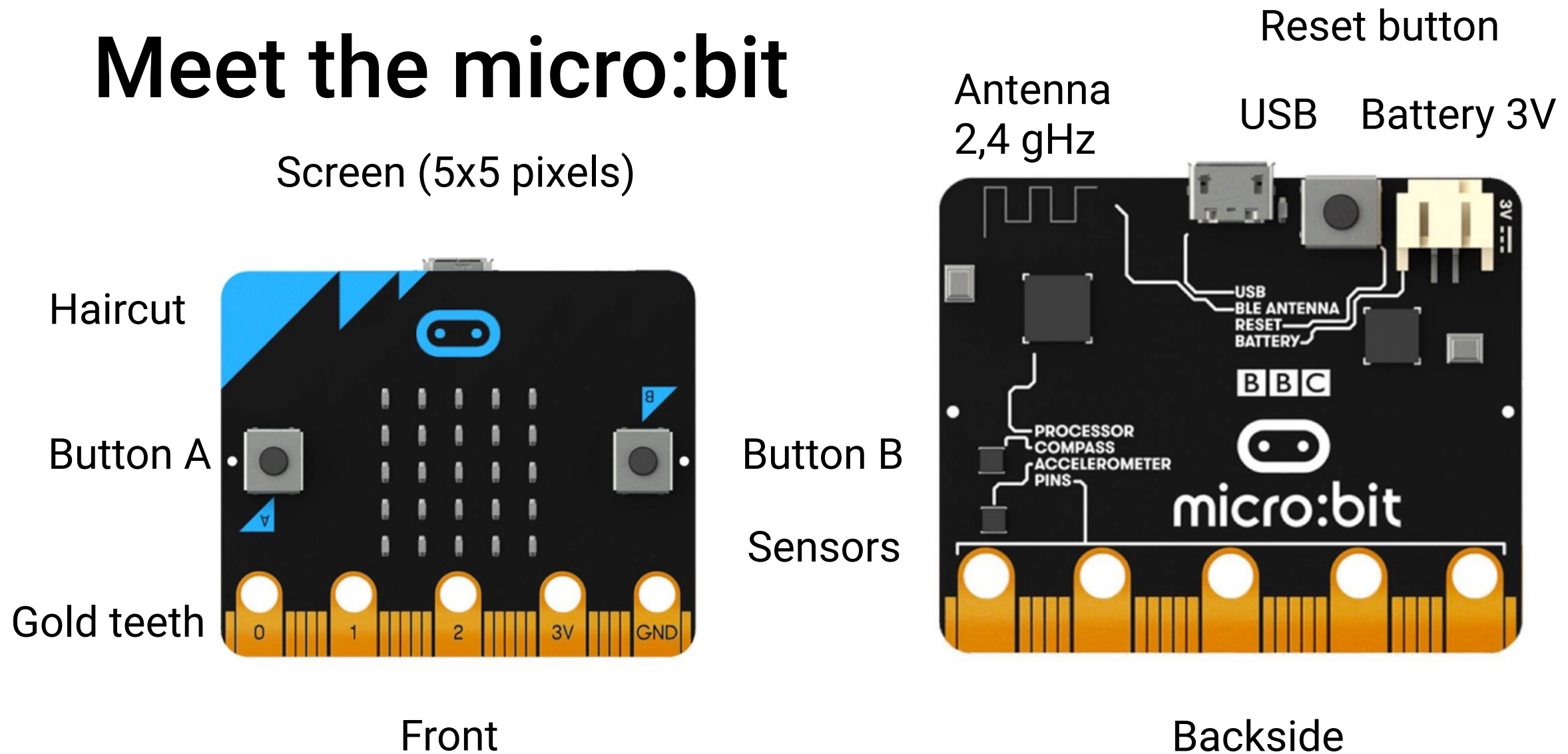
Lithium batteries can release smoke or cause a fire

To prevent damage, do:

- Don't charge the batteries unattended
- Don't use a damaged or punctured battery
- Do not short circuit the battery
- Avoid temperatures below -10 and above 50 degrees celcius.
- Always have a plan for what to do in case of a fire: If you are indoor, open a window and get the battery outside to prevent smoke or fire.
- Do not open or modify the battery in any way.
- For optimal performance, store the battery at around 50% capacity and between 10 and 20 degrees celcius
- Follow airport regulations for carrying lithium batteries on airplanes. (Usually hand luggage only)



Meet the micro:bit

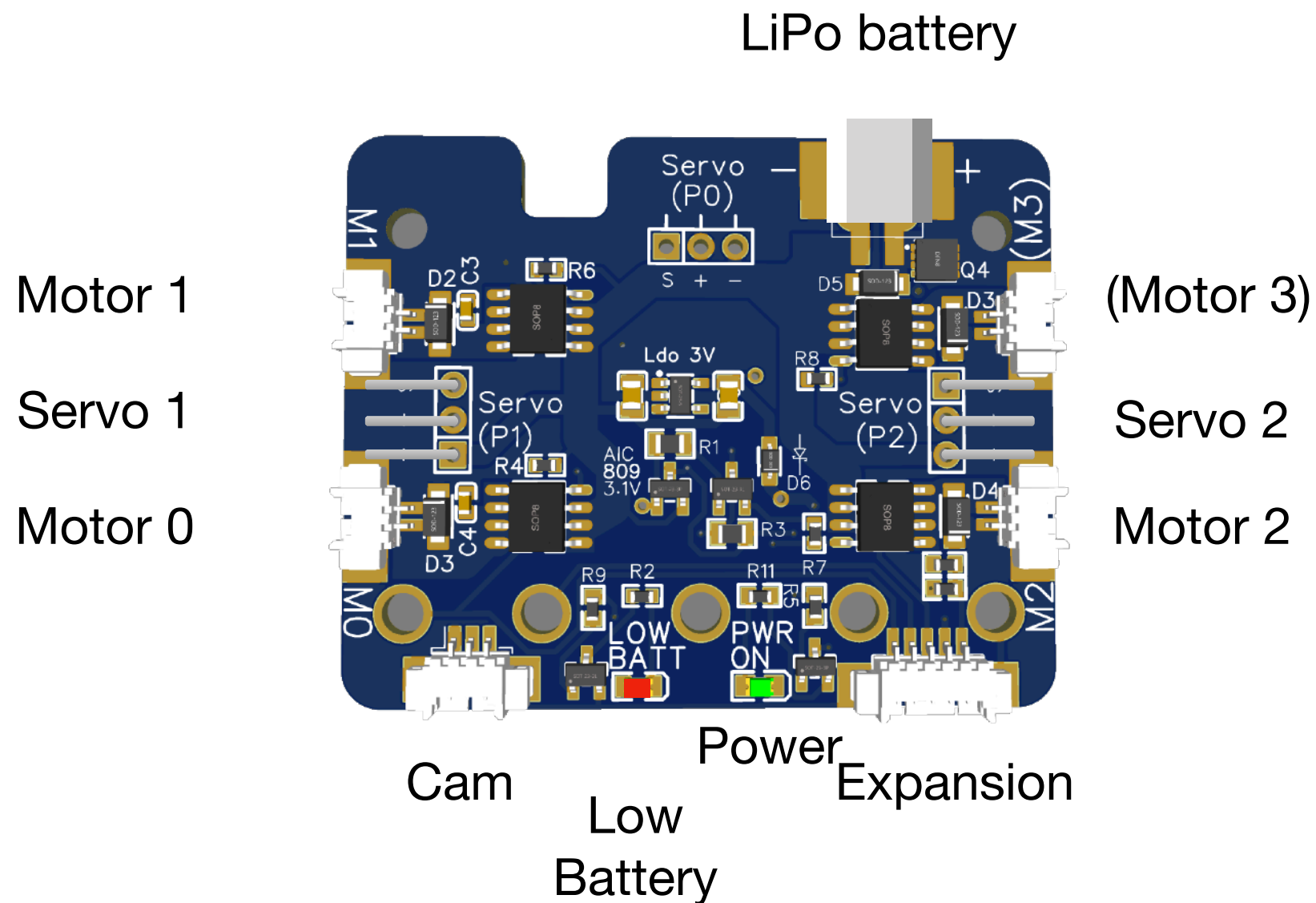


micro:bit is a small computer with prosessor, sensors, display and radio. It has connection pins for external components like LEDs, speakers or various sensors.

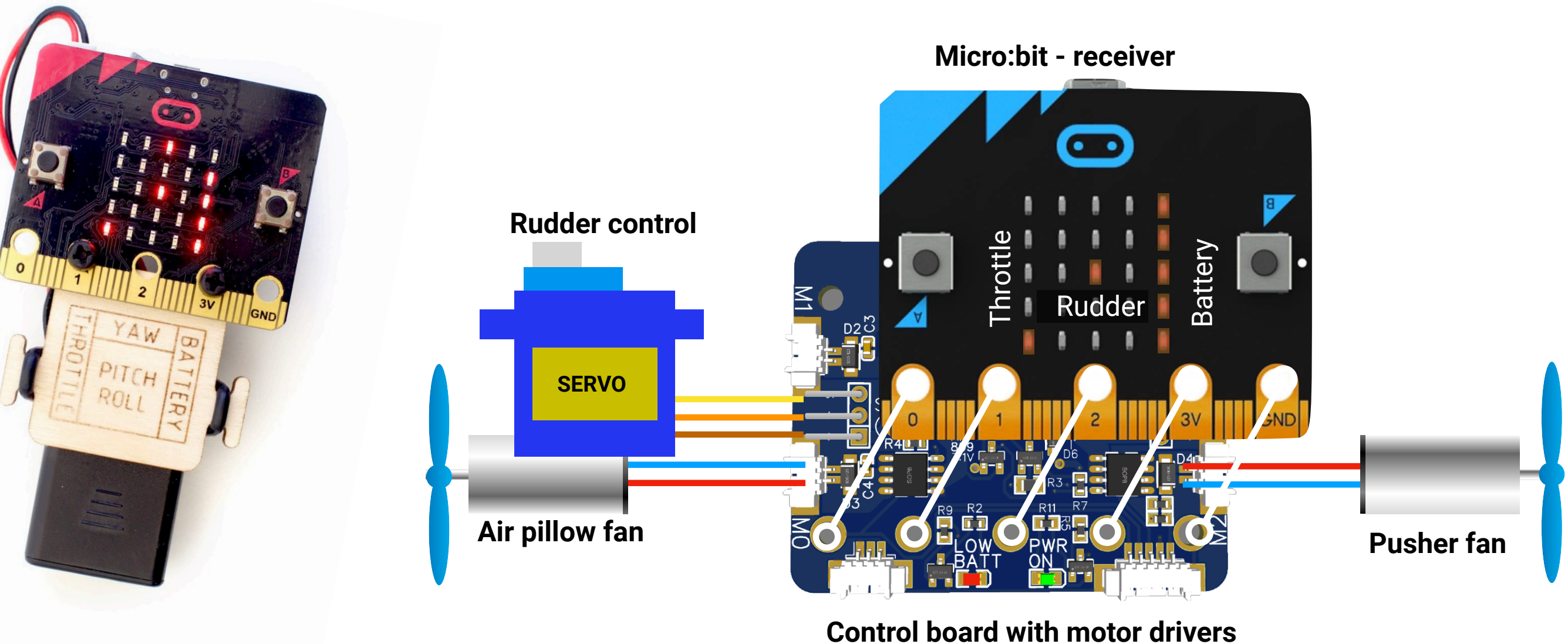
You can learn more at: <https://tech.microbit.org/hardware/>

Control board

The multibit control board is a motor and servo controller for micro:bit. It can be used for general motor control, solenoids, loudspeakers, pumps and more. It basically amplified the electricity that comes from the micro:bit.



How it works

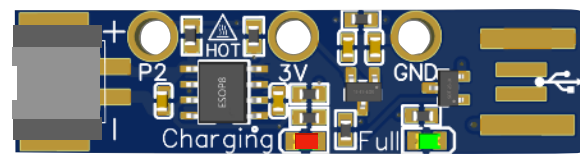


The microbit on the left transmits speed and direction of the hovercraft over radio.

The other micro:bit is receiving the signal, and controls the servo on pin P1, pillow fan on P0 and pusher fan from P2. The signals gets amplified with the control board and sent to the motors and servo.

Charge the battery

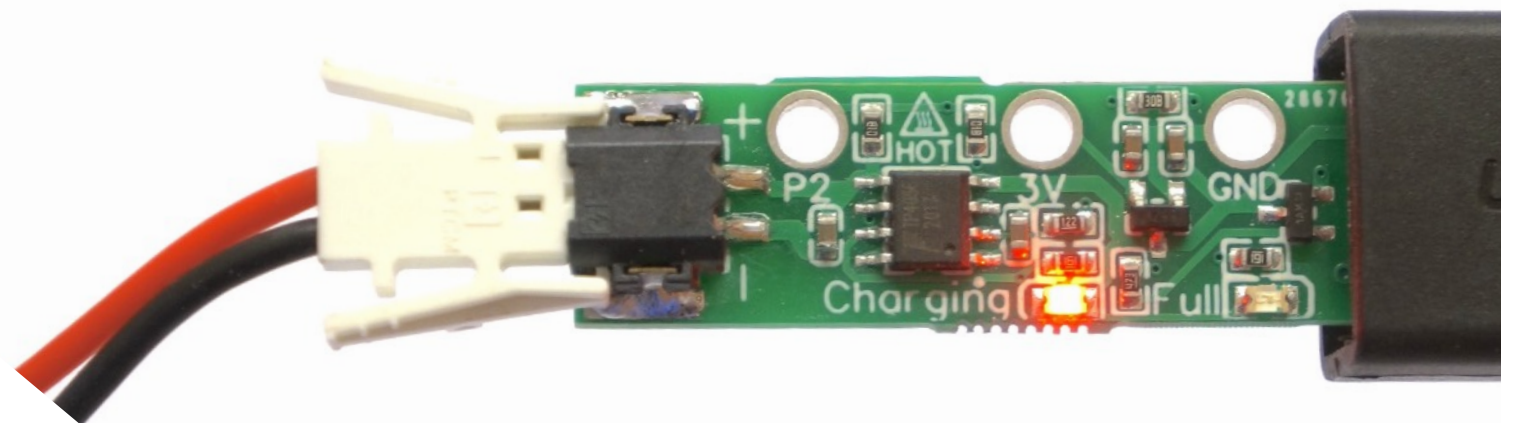
Parts:



Smart Charger



Lithium (LiPo)-
battery



- Connect the battery to the plug on the left
- Plug the right part of the charger into a USB port
- You should see a **red** light while charging
- Light will turn **green** when fully charged
- Charging takes approx. 1 hour
- The charger can reach 60°C. This is normal.
- **Warning! Never charge lithium batteries unattended!**
- If battery gets hot, inflates or releases gases, stop charging immediately.

Tools

Must have:



Small
philips
screwdriver



Marker



Scissors



Utility knife



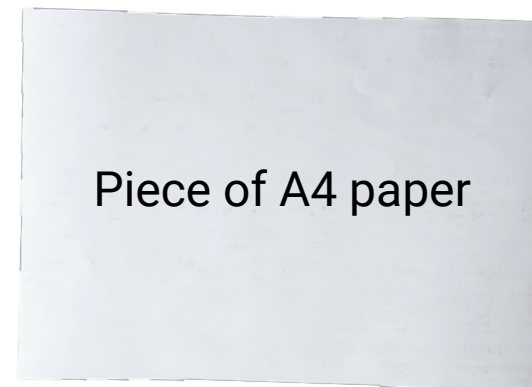
Ruler



Glue gun
or
contact
adhesive glue



Recommended:



Piece of A4 paper

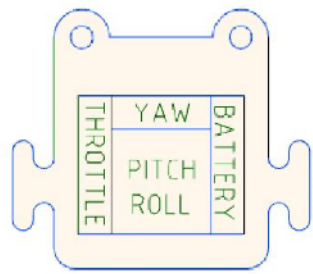


Small cutting
pliers

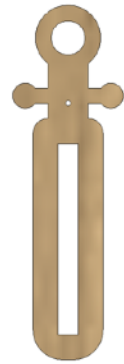


Socket wrench
5.5mm

Parts



Remote holder



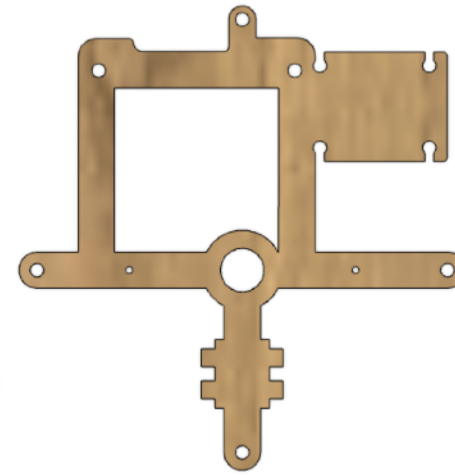
Tail fin holder



Motor holder



2x angle connectors



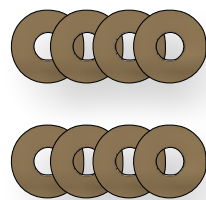
Base frame



Ziplock bag, 15x20 cm



Wedge



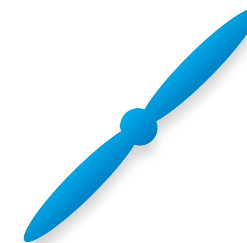
8x spacers



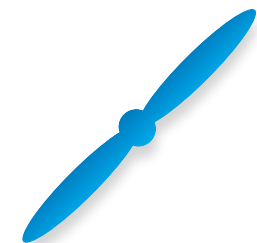
2x small O-rings



3 Large o-rings



1 CW propeller



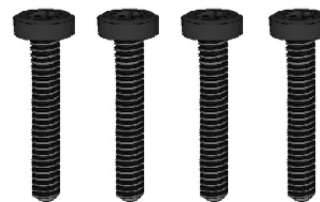
1 CCW propeller



2x m3x8 nylon screws



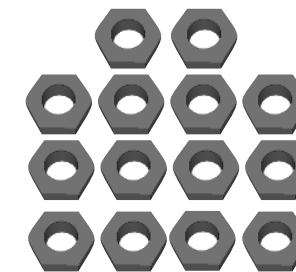
5x m3x12 nylon screws



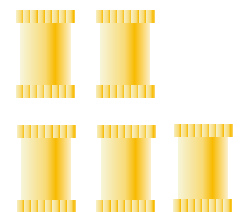
4x m3x15 nylon screws



2x m3x12 countersunk



14x nylon nuts



5x knurled barrel nuts

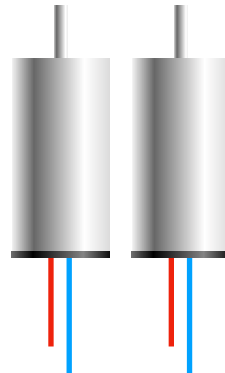
Parts (electronics)



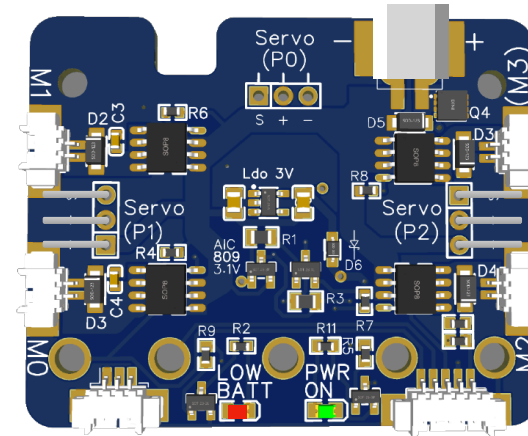
Servo motor



Servo horn



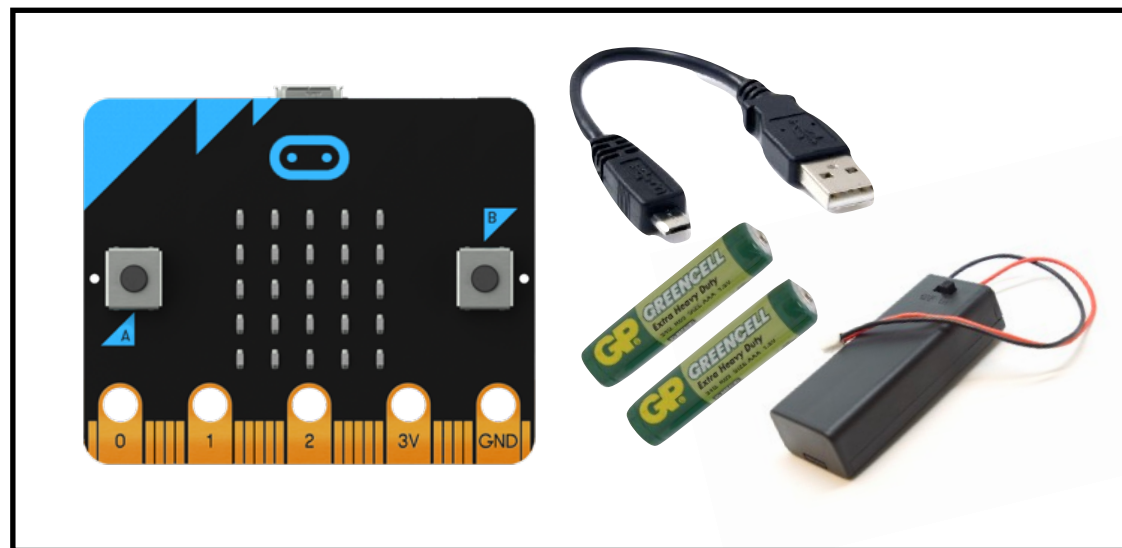
2x Motors



Control board



Lithium battery



1-2 Micro:bit start kit (sold separately)

Assembly

Assemble the remote (skip if you made the Air:bit)

Tools: Philips Screwdriver

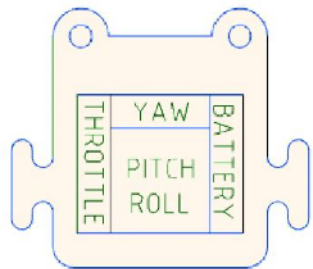
Parts:



2 nylon screw
m3x8



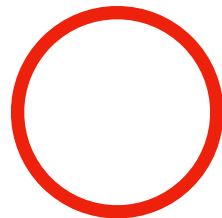
2 nylon
nuts m3



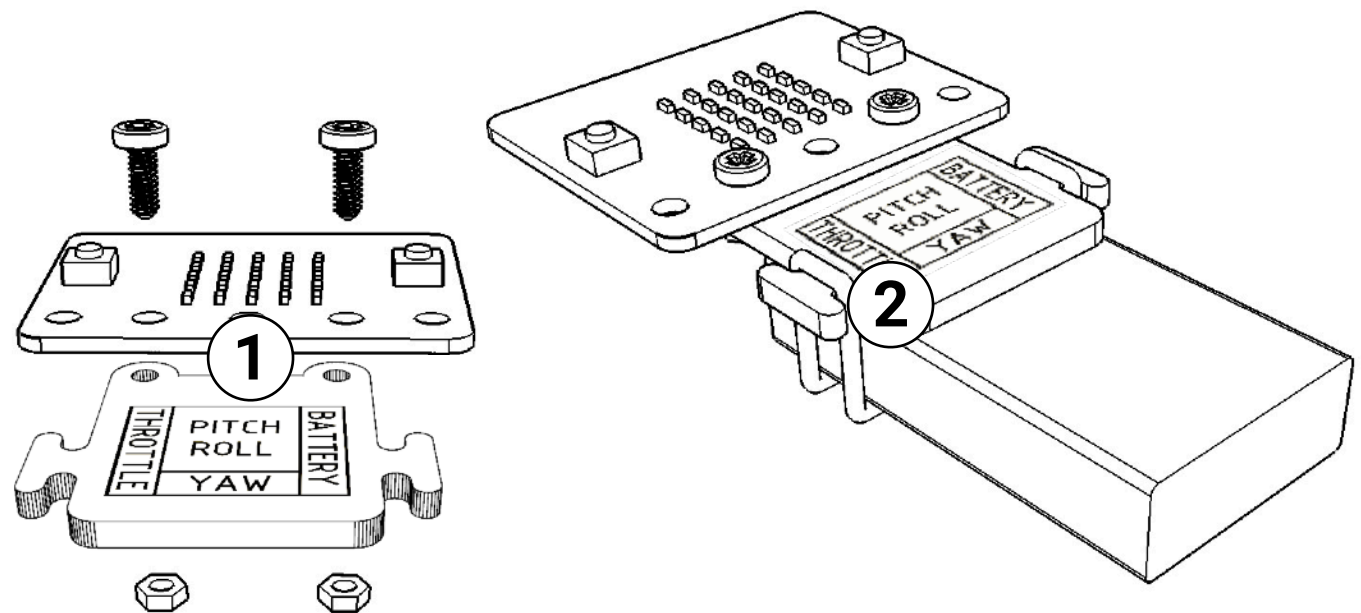
Remote holder



Battery box AAA



Large silicone ring



- Place the micro:bit with **screen facing up** on top of the holder (1)
- Make sure the remote holder also is **facing up**
- Mount battery box with the silicone ring (2)

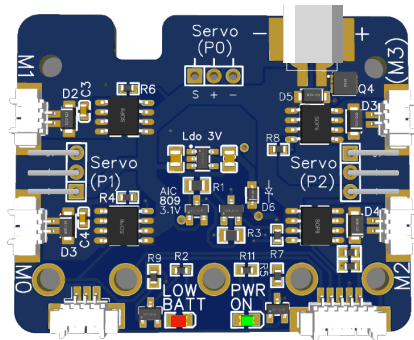
Control board

Tools: Philips Screwdriver, optional, nose pliers

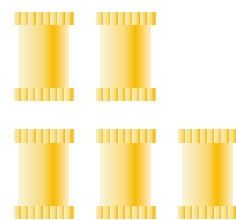
Deler:



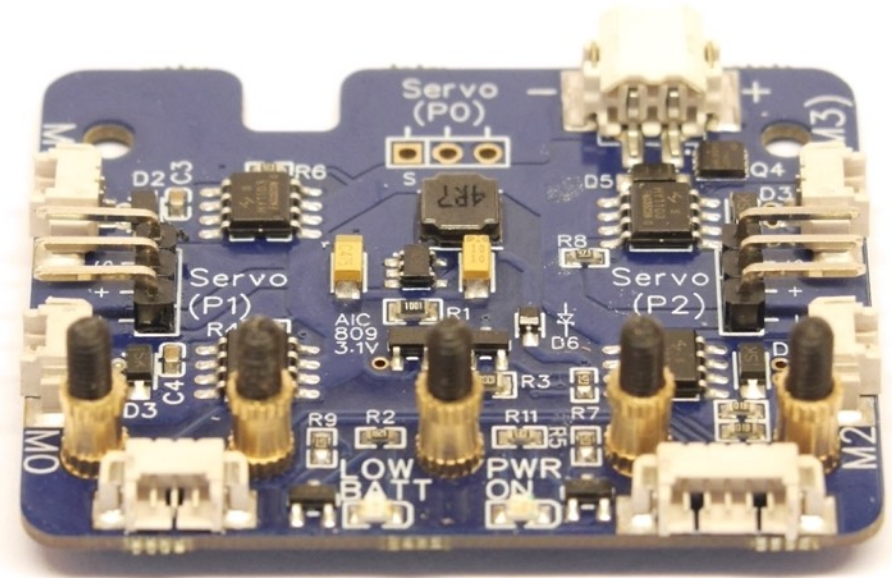
5x nylon screws m3x12



Airbit control
board



5x knurled
barrel nuts



- Screw the barrel nuts to the control board. They will provide a connection to the micro:bit
- **Make sure they are “finger tight”:**
 - Tight enough to provide a steady connection
 - Not so tight the screw is damaged

Countersunk screws

Tools: Philips Screwdriver

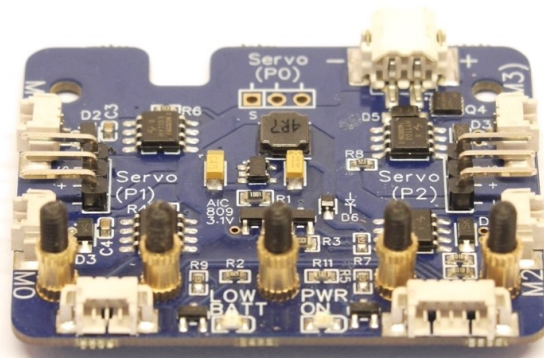
Parts:



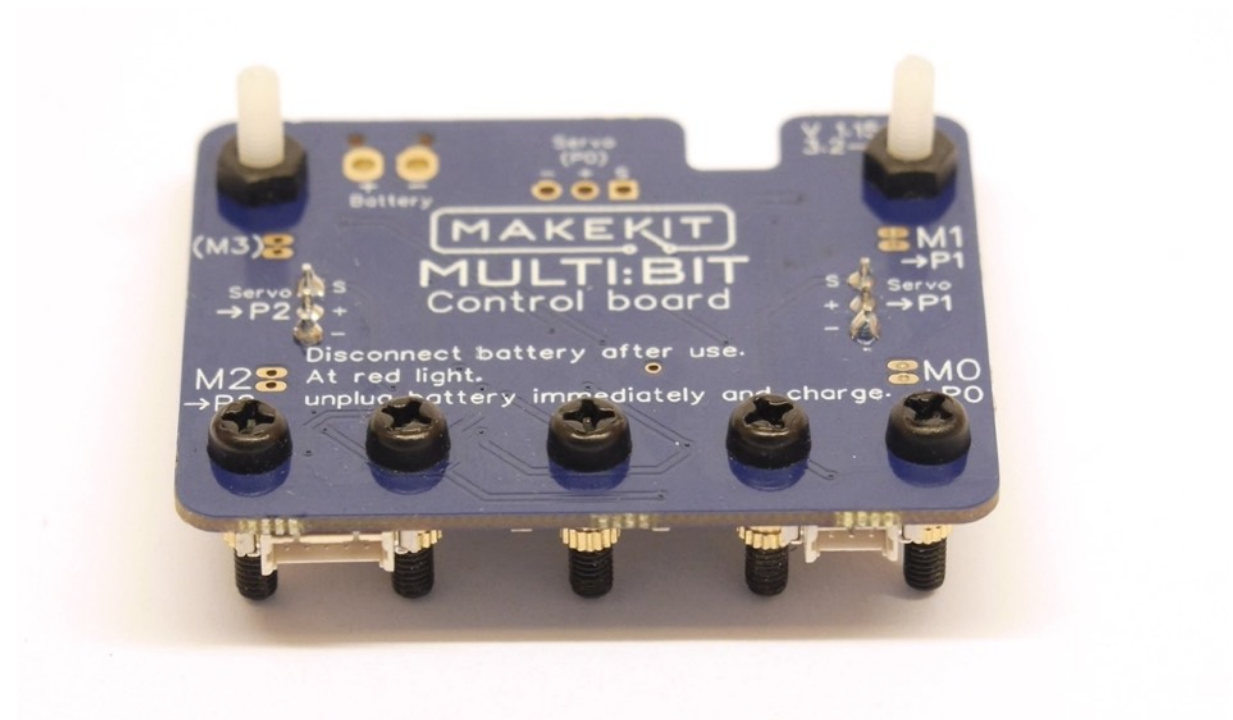
2 x
countersunk
screws



2 x
Nylon nuts



Assembled control board

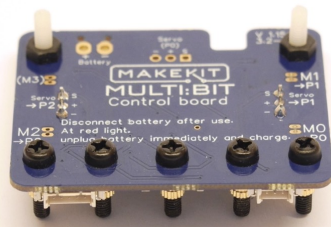


- Pull the screws through and attach the nuts on the bottom side of the board.

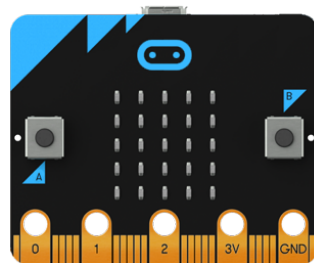
micro:bit (skip if you made the Air:bit)

Tools: Philips Screwdriver, pipe wrench 5.5mm

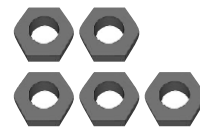
Parts:



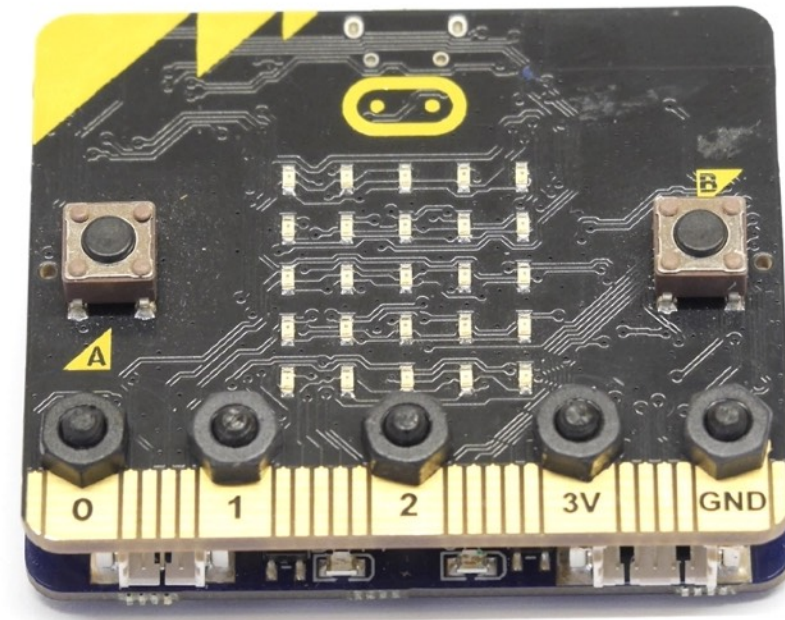
Assembled control board



micro:bit



5 nuts



- Place the micro:bit on the barrel nuts on the control board
- Screw on the nuts “finger tight” so the connection is solid but you don’t damage the plastic screws.

Making the raft

Tools:

Utility knife or scissors

Parts:



Cardboard box from kit



- Carefully cut along the dotted lines
- Cut out one of the tail fins



Making the raft

Tools:
Marker

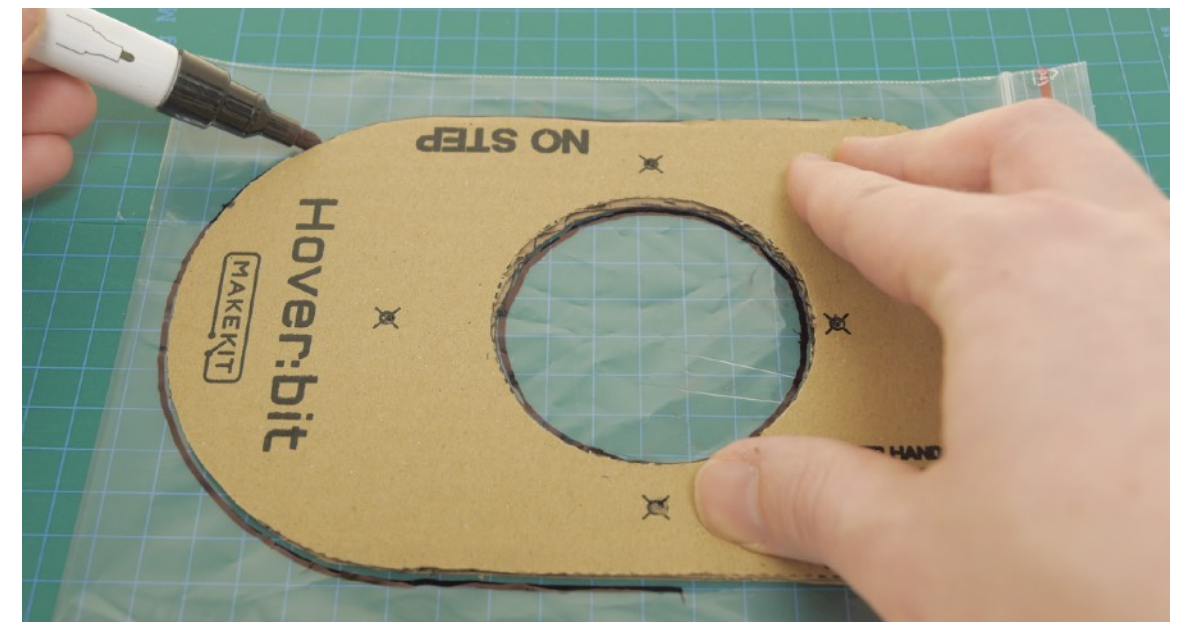
Parts:



Cardboard parts



Large ziplock bag from kit



- Place cardboard exactly in the middle of the ziplock bag
- Mark the inner circle and the outer line with a marker

Making the raft

Tools:
Marker

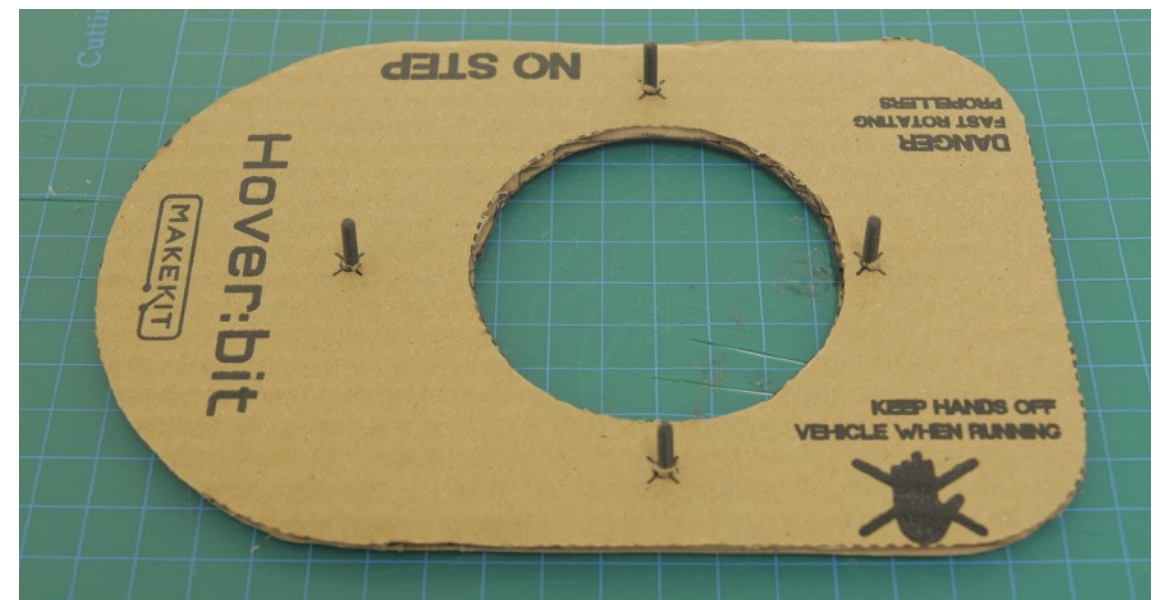
Parts:



Cardboard raft



4 nylon screw
m3x15

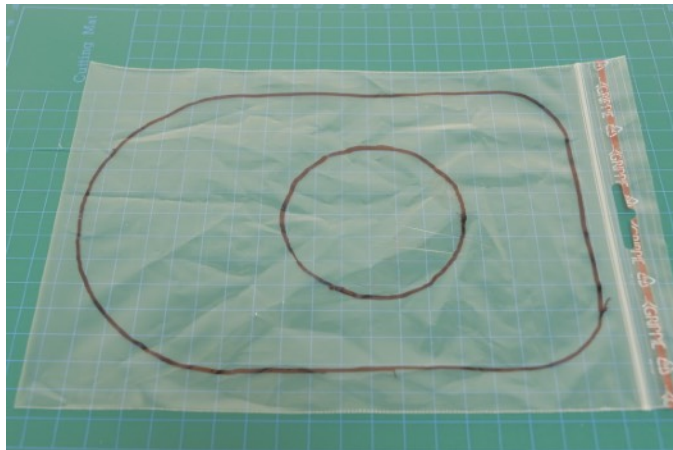


- With a small screwdriver or sharp tip, punch 4 thin holes in the marked crosses.
- Insert the four screws as shown above

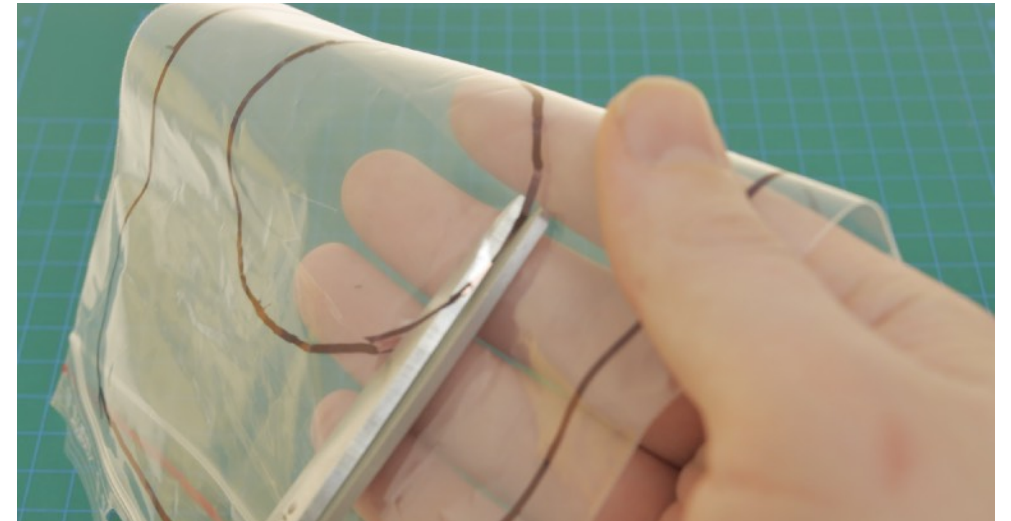
Making the raft

Tools:
Scissors
Marker

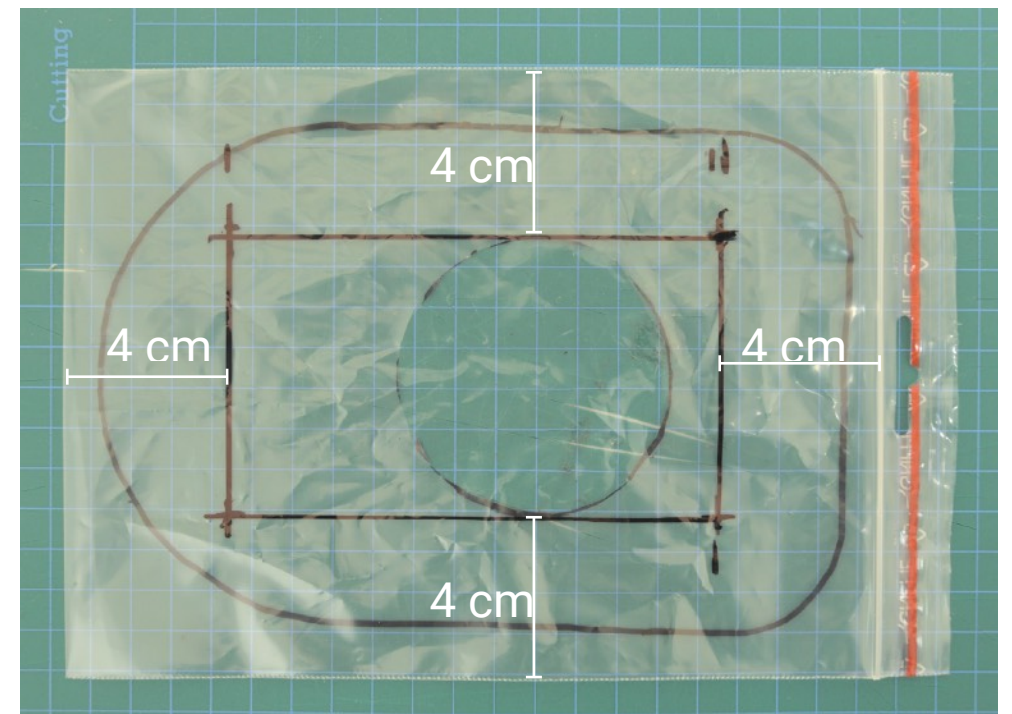
Parts:



Ziplock bag



(Cut hole on one side only)

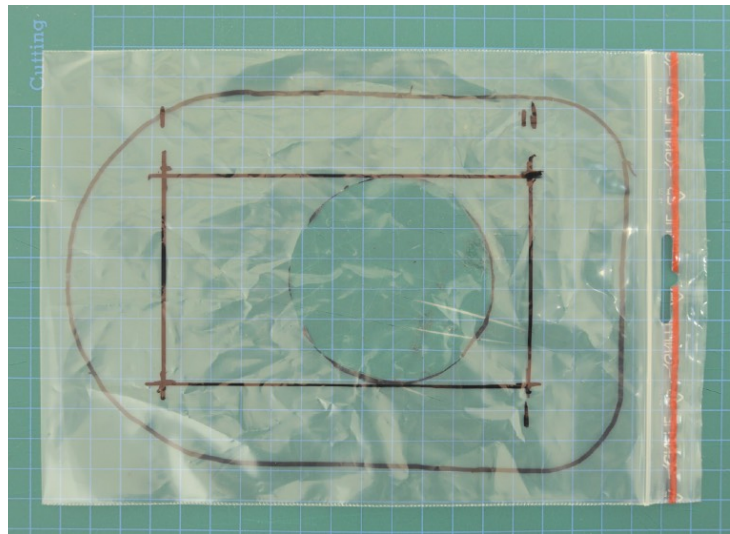


- On **one side** of the ziplock bag, cut out the marked hole with a pair of scissors
- On the **other side** of the bag, use a ruler to draw a square 4 cm from the edges.

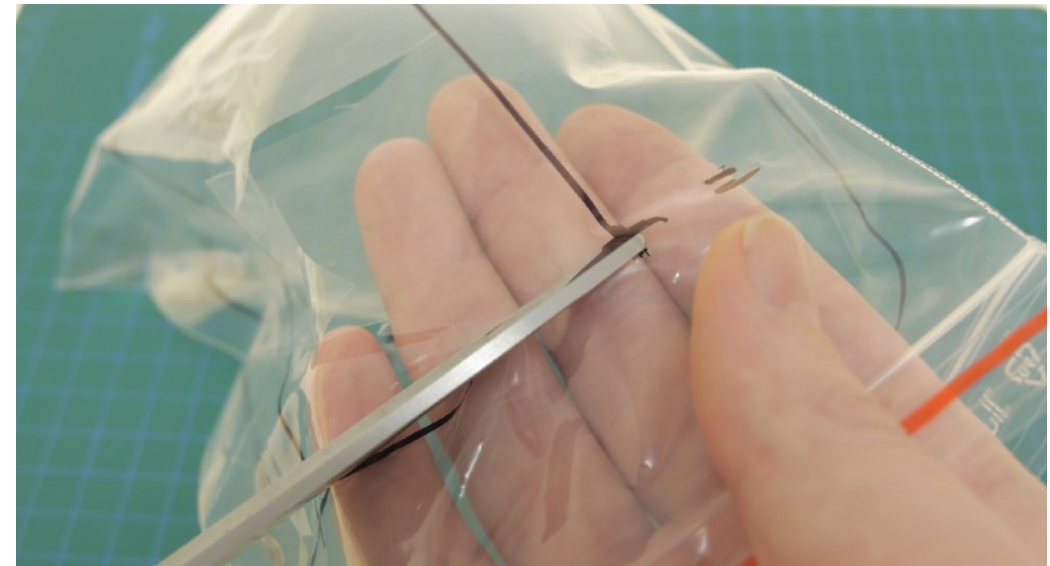
Making the raft

Tools:
Scissors

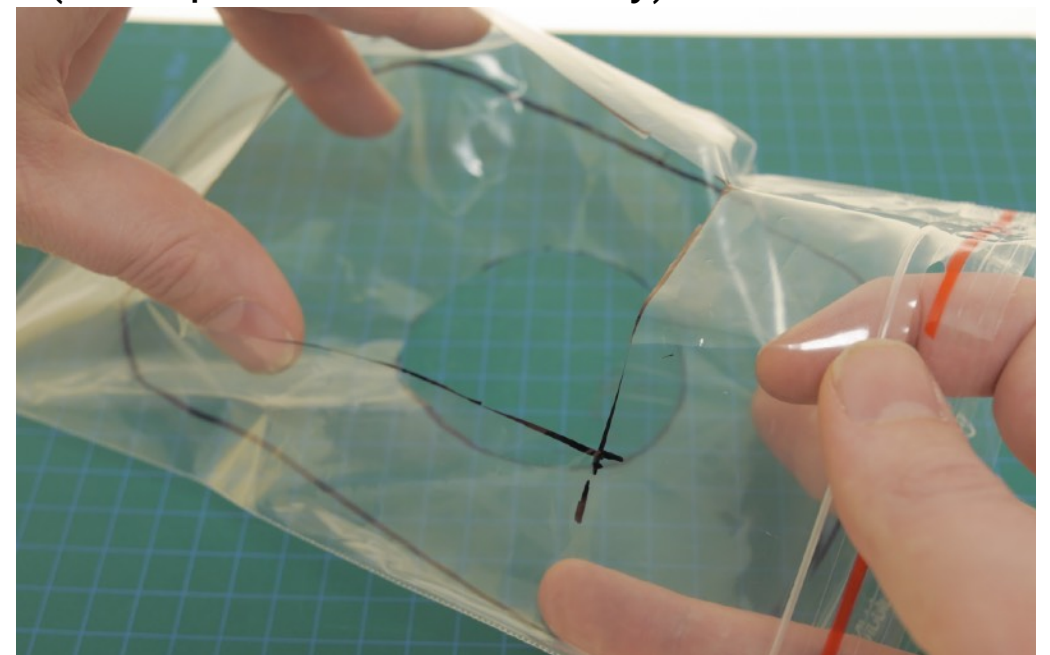
Parts:



Ziplock bag



(Cut square on one side only)



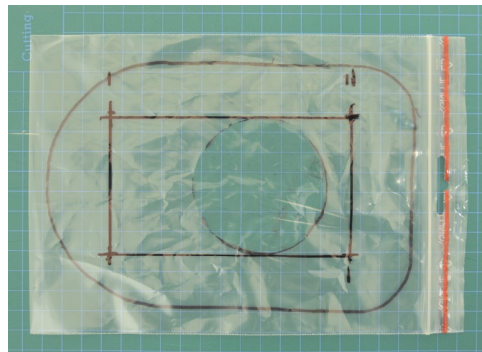
- Carefully cut out the square on back side only
- The bag should have a square hole on one side and a hole on the other side.

Making the raft

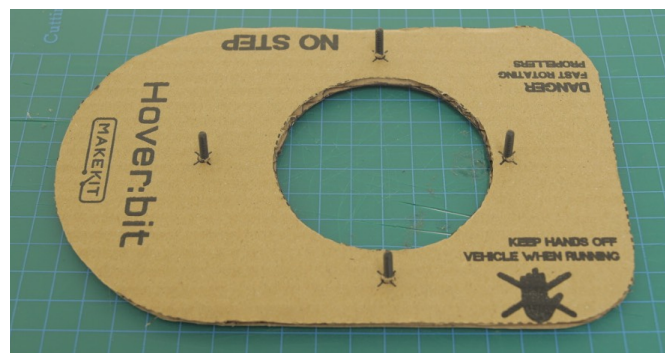
Tools:

Hot glue or contact adhesive glue

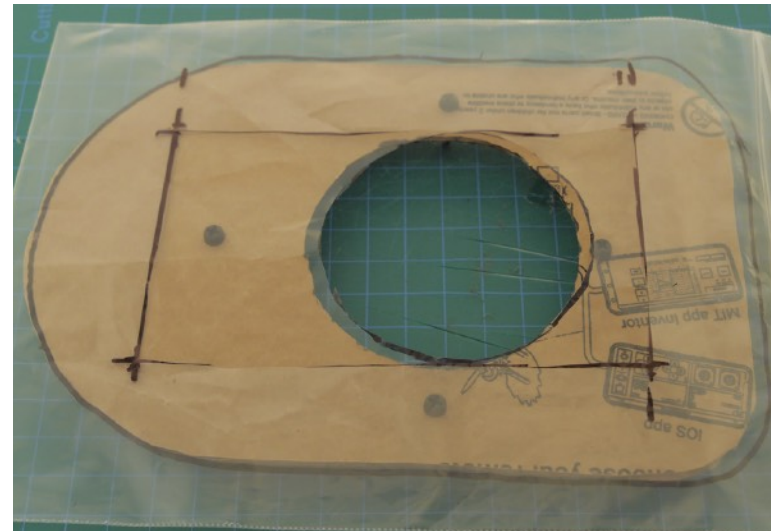
Parts:



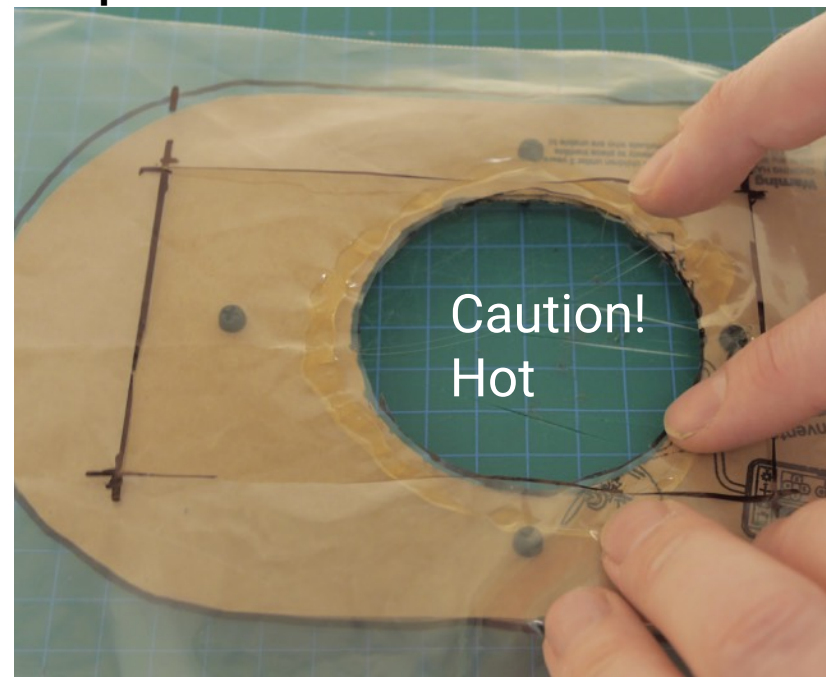
Ziplock bag



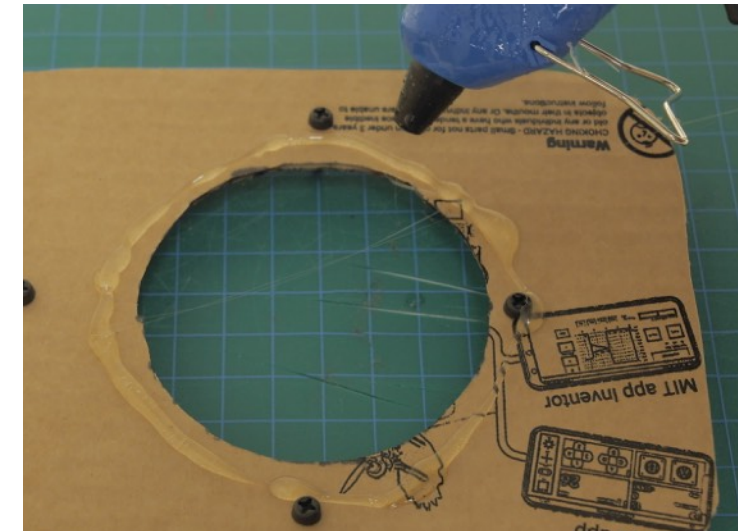
Raft with screws



- Turn the raft upside down.
- Place the bag so it matches the markings.
- Make sure the **big squared cutout is on top** and the circular hole is at the bottom.



- Carefully place the bag so it aligns with the hole and the rest of the raft



- Place hot glue around the hole

You can also use contact glue



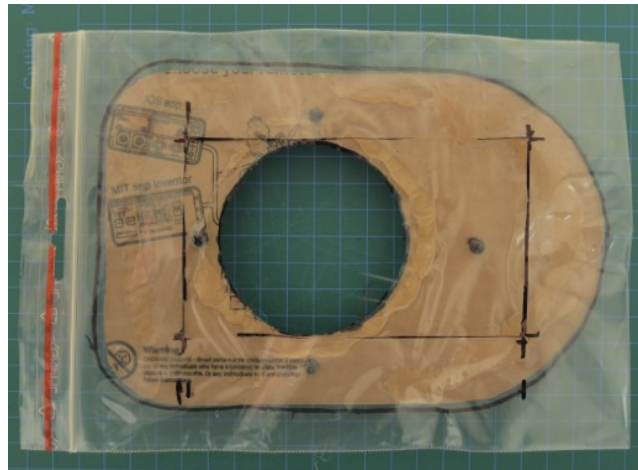
- Put a thin layer of glue around the hole
- Put a similar layer of glue around the hole on the bag
- Wait 2-5 minutes until the surfaces are dry
- Press together
- Other glues might not work on PE plastic bags

Making the raft

Tools:

Hot glue or contact adhesive glue

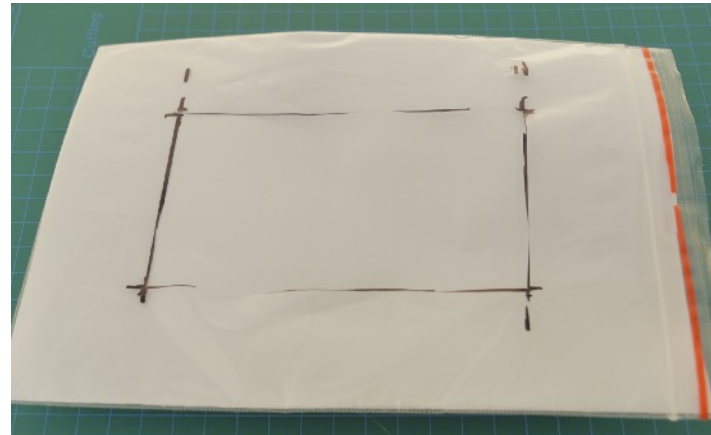
Parts:



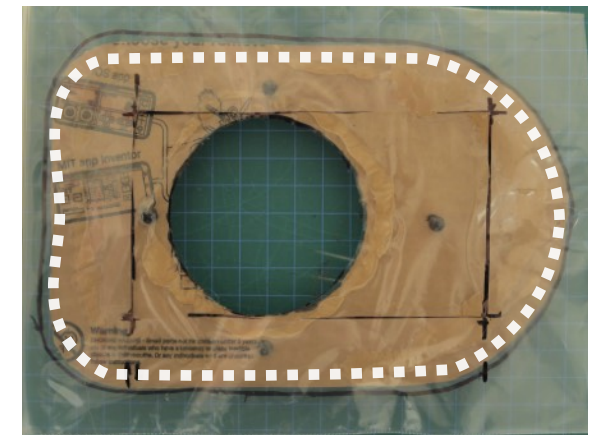
Glued raft



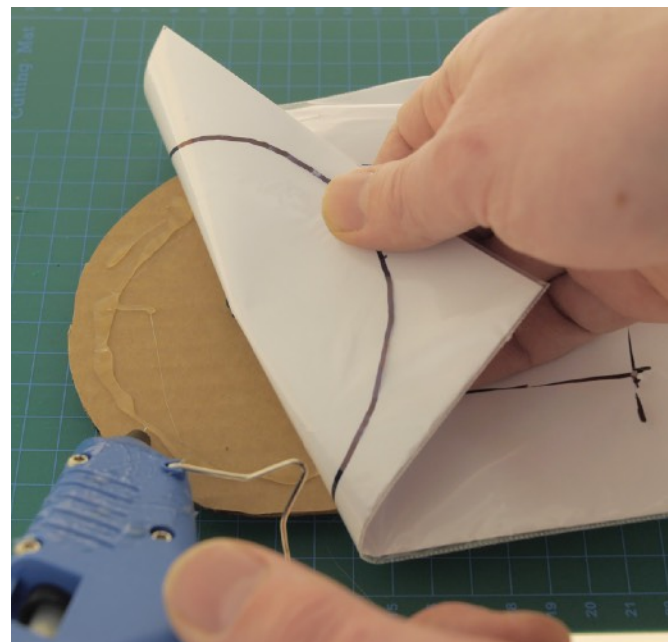
Piece of A4 paper



- To protect the bag from melting, fold a A4 paper and insert into the bag
- This is only needed if using hot glue



- Notice the “glue line” where the glue should be placed



- Start placing glue at the edges on one side of the raft
- Press the bag down to attach
- Move on to another part until the bag is glued all around the edge of the raft.
- If using contact adhesive, you can glue everything at the same time



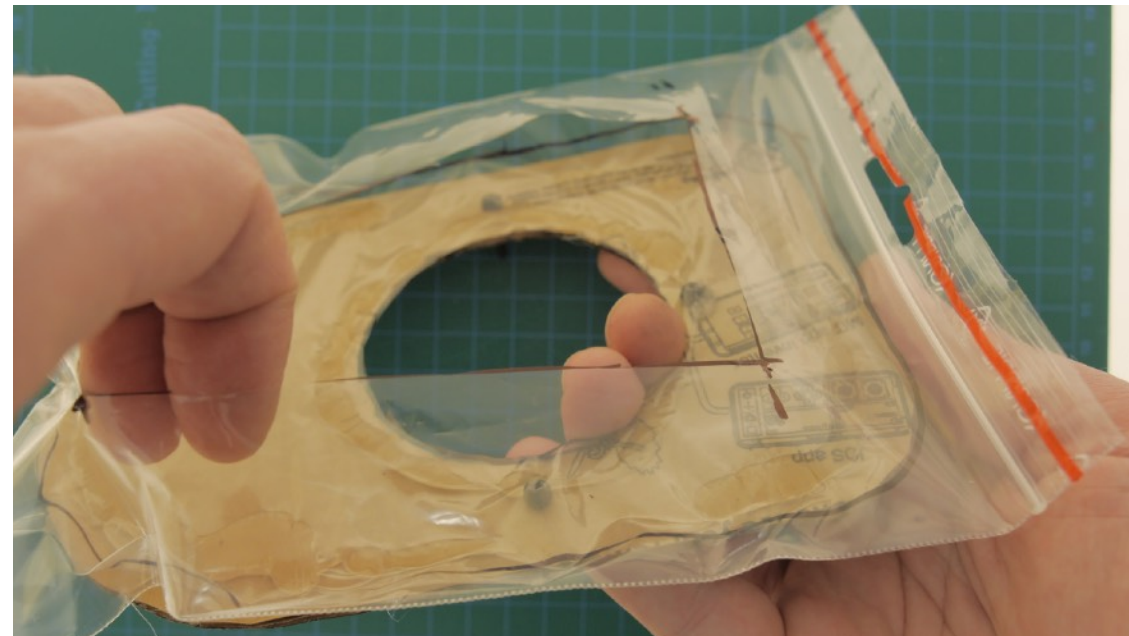
Making the raft

Tools:

Parts:



Glued raft



- Your raft should now look like this!



- Zip the bag together to keep the air pressure inside when drifting

Assembly

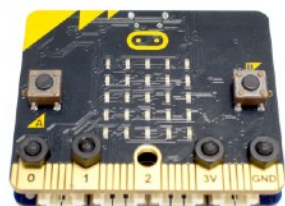
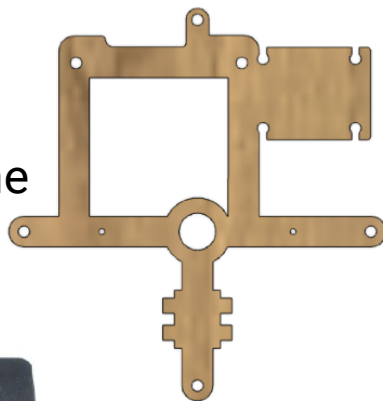
Tools:

Parts:



Glued raft

Base frame



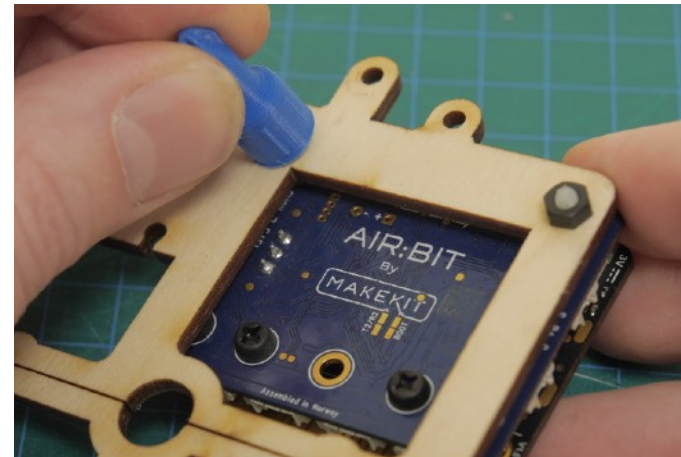
Control board assembly



8 spacer rings



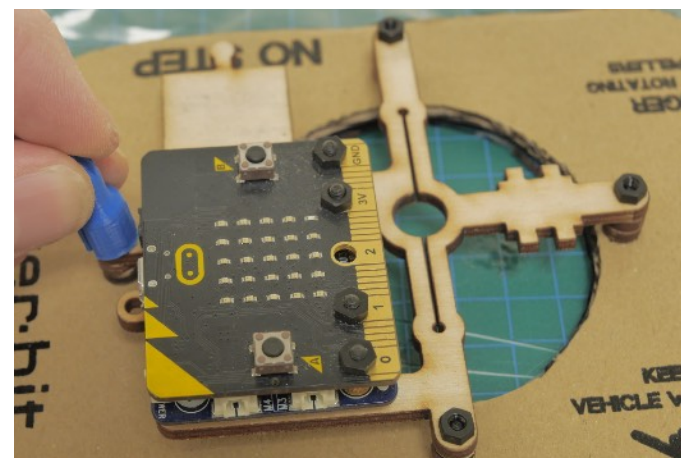
6 nylon bolts



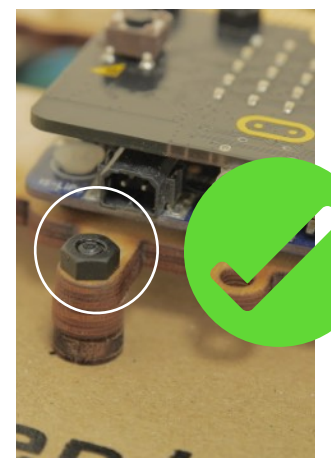
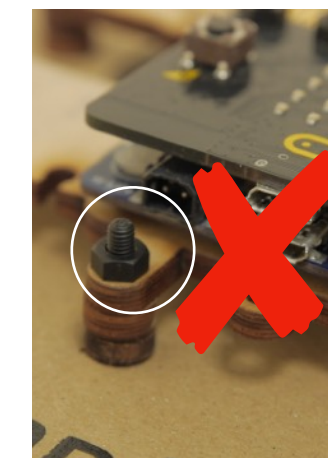
- Mount the control board with 2 nuts to the base frame



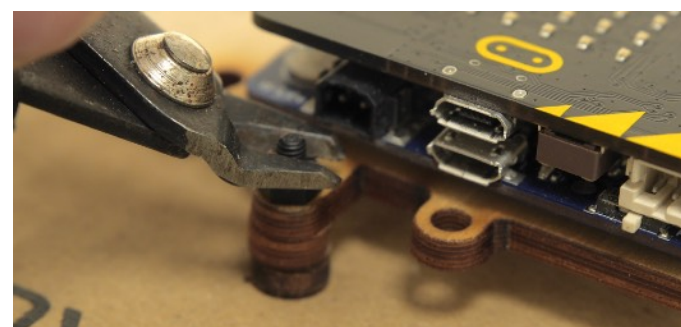
- Place two spacer rings on each screw



- Screw on all four bolts



- The screw can not go above above the nut as this can block the battery plug.



- If the screw is too long, cut it with pliers.

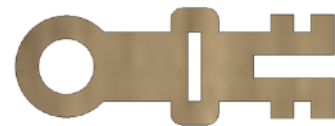
Assembly

Tools:

Parts:



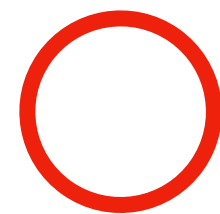
2 angle connectors



Motor holder



Servo



Large o-ring



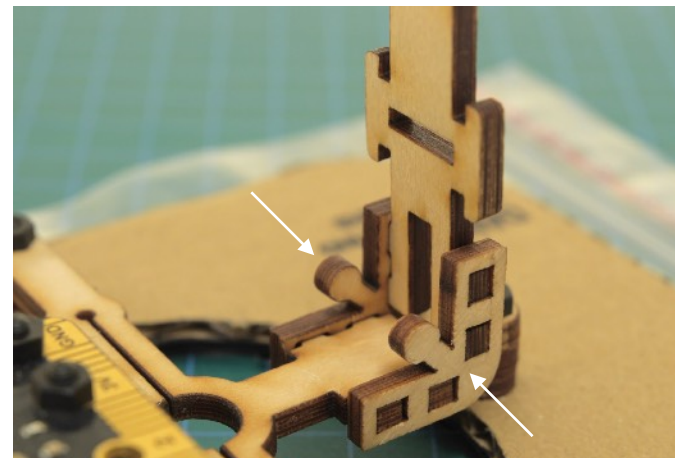
Servo horn



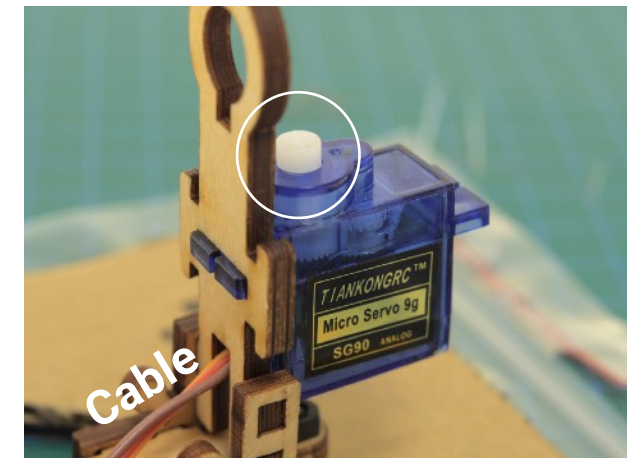
Small o-ring



Tail fin holder



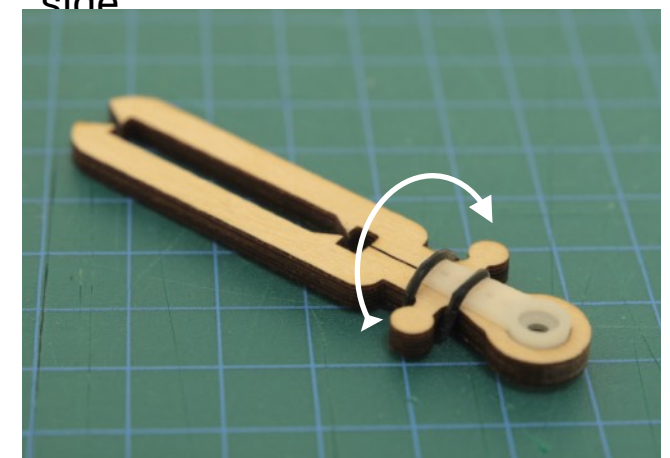
- Use the angle connectors to mount the motor holder to the base frame



- Insert the servo and pull the cable trough. The servo head (white circle) should be on the left side



- Secure the servo with the large o-ring



- Insert the servo horn into the tail fin holder
- Secure with a small o-ring

Assembly

Tools:

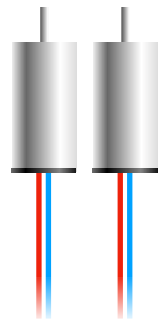
Parts:



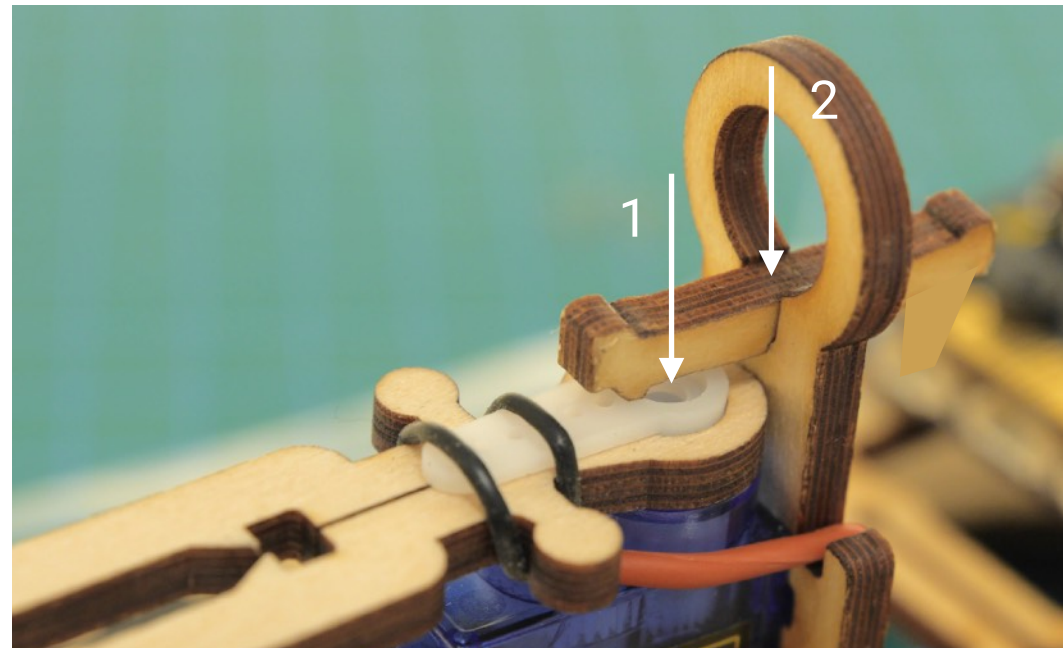
Tail fin assembly



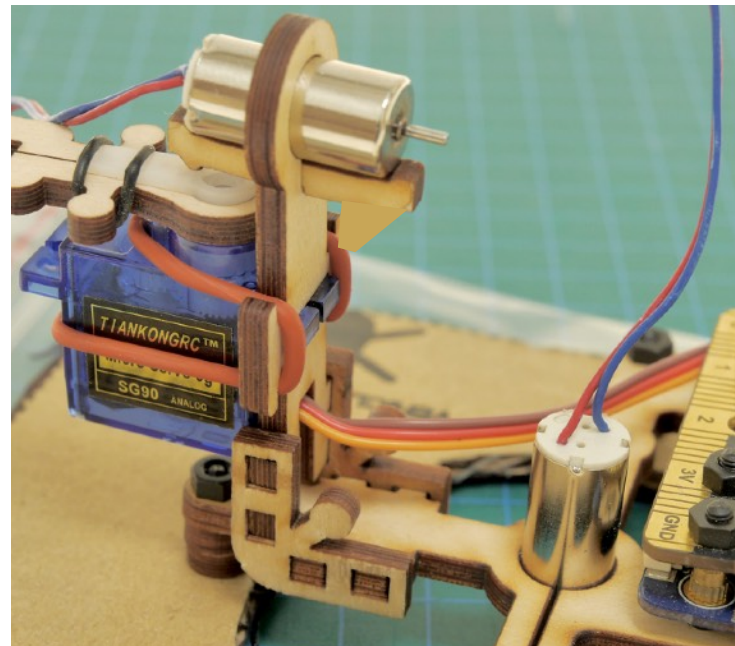
Wedge



2 motors



- Press the tail fin assembly onto the servo head (1). Make sure it sits firmly
- Insert the wedge (2)



- Insert the 2 motors so they sit firmly



- Underneath, make sure the motor is flush with the base frame and doesn't stick out too much.

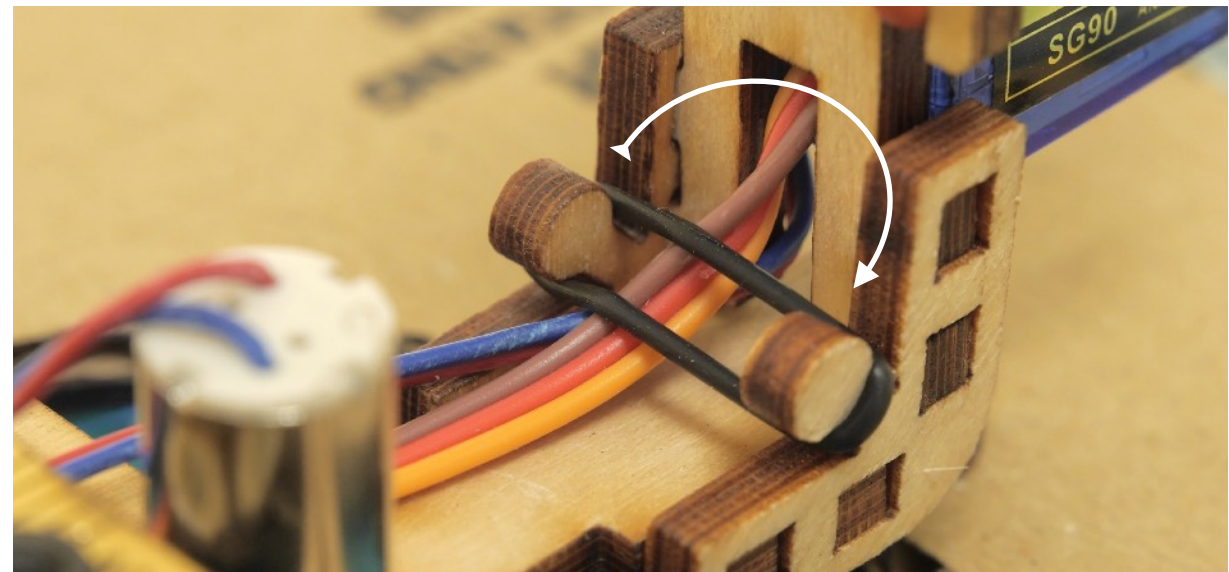
Assembly

Tools:

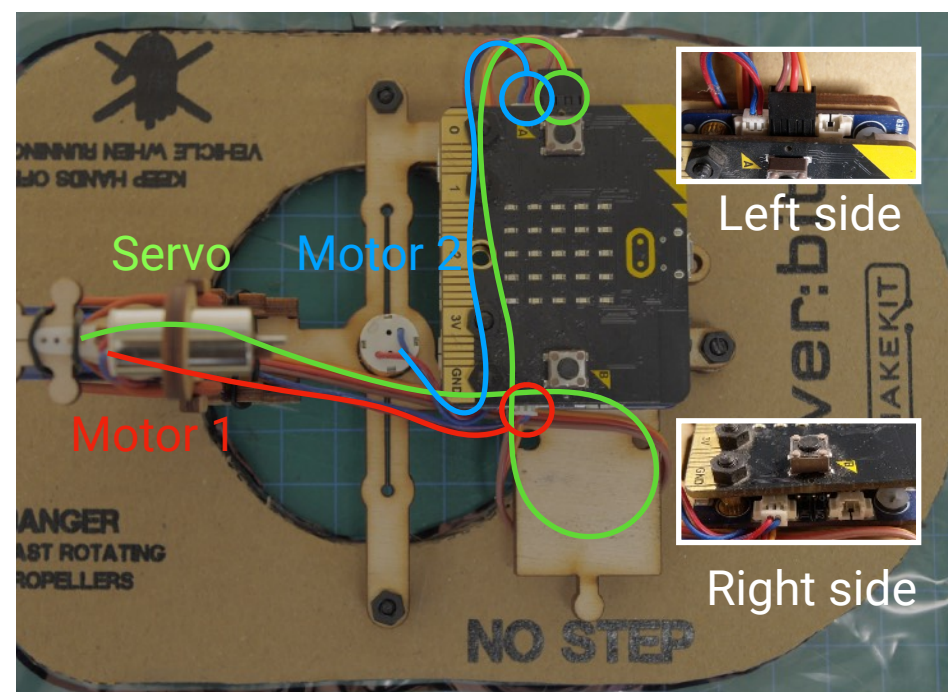
Parts:



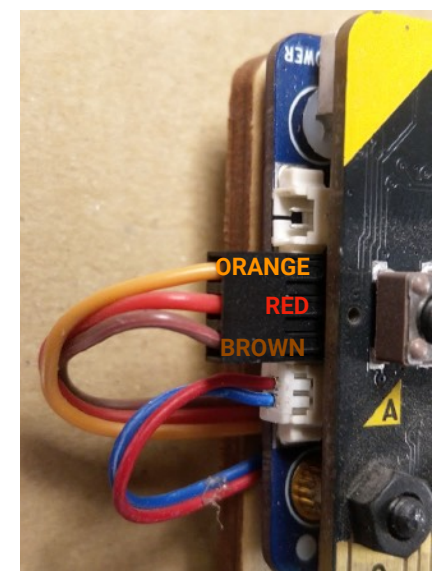
Small o-ring



- Pull the small o-ring over the motor cable and the servo cable to keep them away from propeller motion



- Organise and tidy up the cables.
- Plug motor 1, motor 2 and servo according to the illustration



- Make sure to plug the servo plug the correct way regarding the colors on the cables.

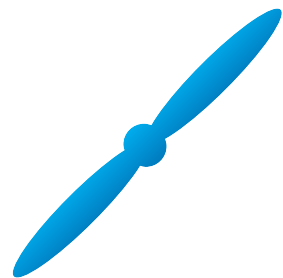
Assembly

Tools:

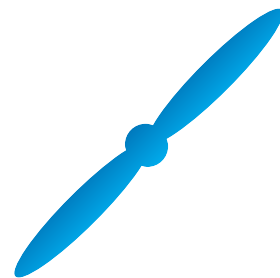
Parts:



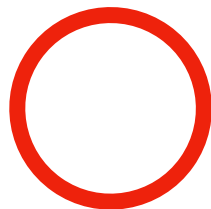
Tail fin



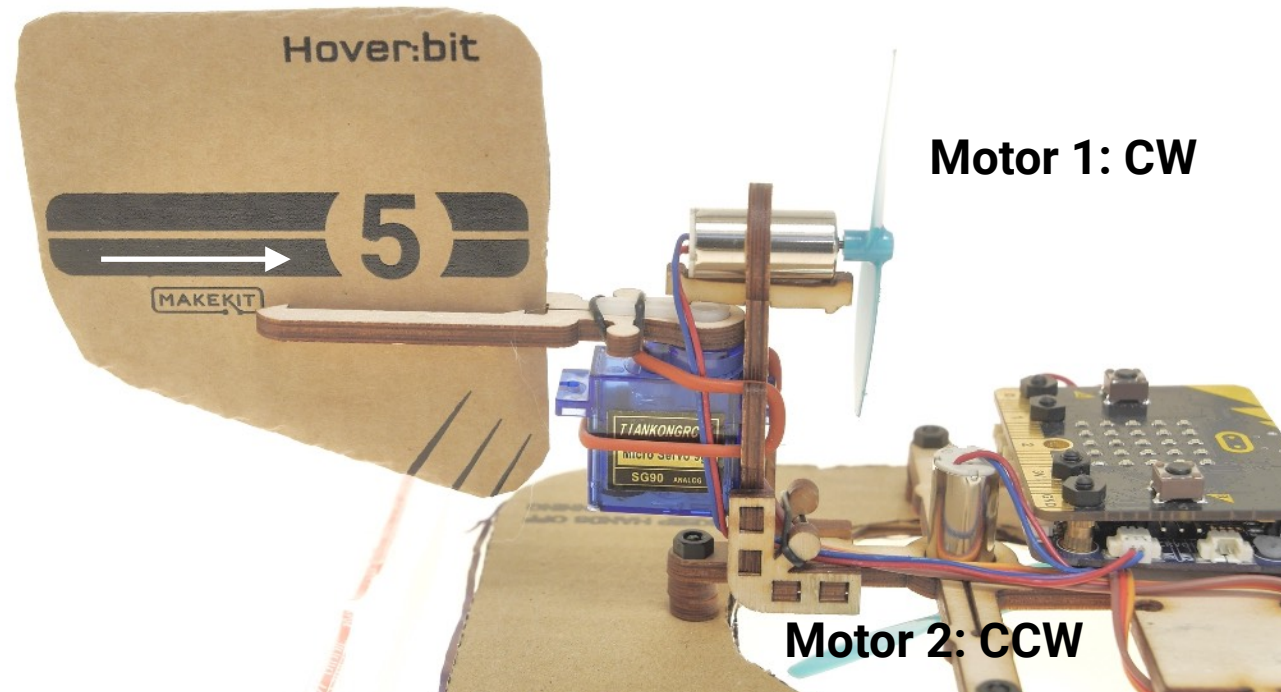
1 CW
propeller



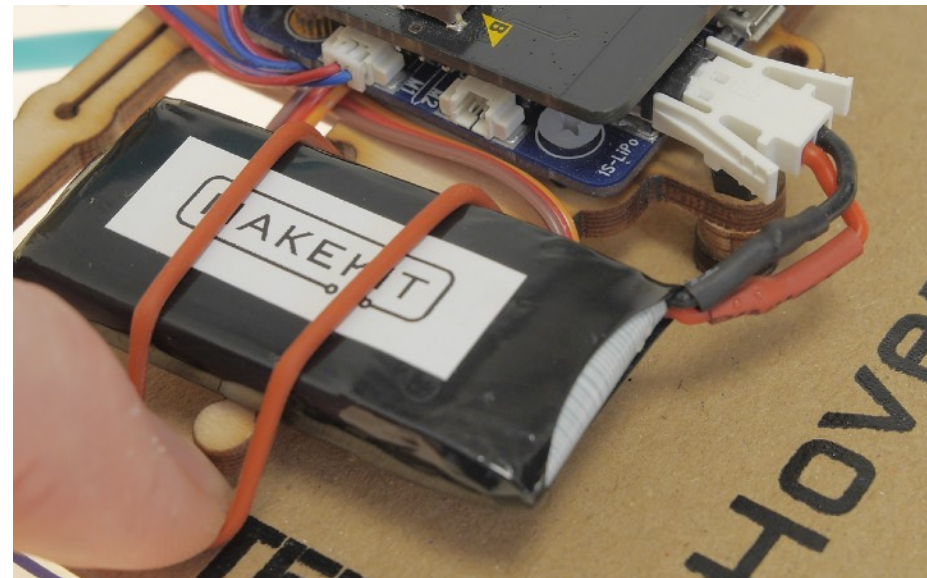
1 CCW
propeller



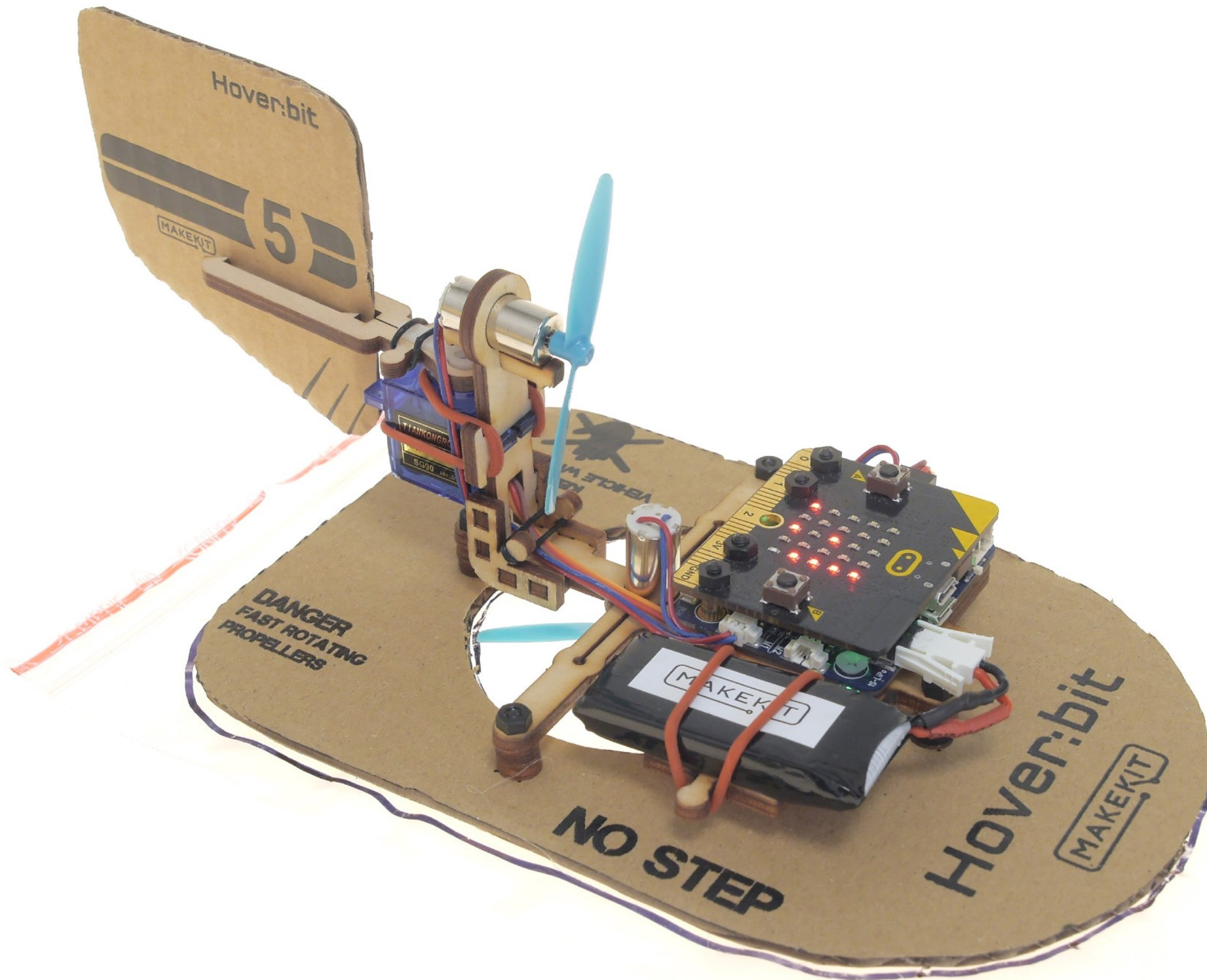
Large o-ring



- Slide the tailfin into the tail fin holder
- Attach a CW propeller at motor 1
- Attach a CCW propeller at motor 2



- Connect the battery into the grey plug
- Secure the battery with the large o-ring



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