

Open Traffic Cam Instructions



Materials needed:

- One sheet Polypropylene (50x70cm)
- One sheet of (finn) cardboard (23x27cm)
- Small zip-ties, kind of a lot
- Scotch tape
- Duct tape
- E27 lamp socket (with removable top)
- Nut 1/4" (for tripod)
- Strap
- Some foil or plastic sheet (approx. Ø 5cm)

If you want to use a battery:

- Battery Li-Po 3C (11,1V)
(choose the mAh you need)
- Battery Charger
- D/C Plug 5mm
- Thick cable (2 wires)
- Connector for battery

- Stripboard
- Battery alarm buzzer
- Diode or 10Ω resistor
- $100\mu\text{F}$ capacitor
- Latching relay
- Push button
- PCB header strip

Tools needed:

- Cutter knife
- Cutting mat
- Ruler
- A hole punch or perforator
- Some glue (I used hot glue)
- Pliers

If you want to use a battery:

- Soldering iron and stuff
- Fiber tester
- Li-Po battery charger

Instructions - overall

Print the folding map onto regular A4 paper (or letter size) sheets and tape them together along the marks to get the actual folding map. Make sure you clicked on „actual size“ while printing. You should end up with five folding plans, one consisting of six sheets, one of two and three of one each.

Tape the instructions onto the materials and start cutting them out. The solid lines are cut lines while the dashed lines are folding lines. Cut them as well, but be careful not to cut them fully through, otherwise the case will not be splash proof or even hold.

While folding, do it slowly and carefully to not break the material. It should become solid white on the edges, then you know it went well.

For the holes I used a hole perforator, but it does not matter if you use a hole punch, perforator or just simply cut them out kinda squarish.

If you want to use a battery:

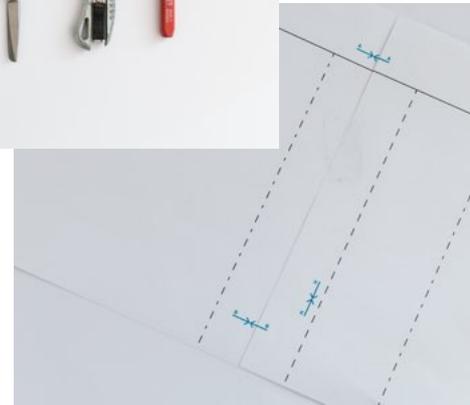
Battery Safety

Since Li-Po batteries are likely to ex or implode if over or undercharged, it is necessary to keep the battery from doing so.

For loading there are already perfect chargers to buy. To prevent it from being undercharged, a low voltage battery cut-off is doing the job. This tutorial explains it really well how to build one yourself: <http://www.instructables.com/id/Make-a-Battery-Protection-Circuit-low-voltage-cut-/>.

I just made some small adjustments by adding plugs to either cable to make it easier to change the battery later.

Put your built PCB in a bag to keep it isolated from the rest and to prevent a short circuit on either boards (e.g. you could use one of the wire zip-bags of the Jetson TX2).



Cardboard Inner

The inner element on cardboard as well as the bottom element for the polypropylene have marks for holes for the ports of the Jetson TX2, just cut the ones you need to keep it as closed as possible.

In my case this will be the DC, USB and Antennas ports.

Cut the camera element depending on the webcam you use. The spot is marked, where the lens center should be, just cut parallel to the dotted lines wherever your webcam holder is located.

Glue the tripod nut in place (I used hot glue, not really beautiful, but does the job). The hole has the size of the outer nut elements so it should not be able to turn.

On folding up, the hatched areas should overlap. This is where you should glue/tape/zip-tie them together.

Put the webcam onto the socket so that the lens is horizontally centered to the axis mark and put the wire around the wire-holder (keep in mind to leave enough wire to still plug it in later). Fixate the camera using some zip-ties.

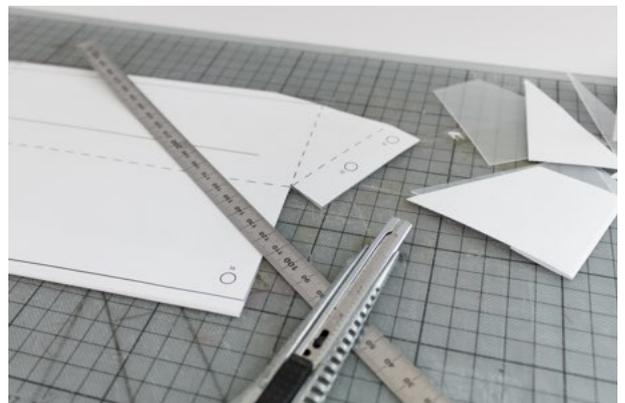
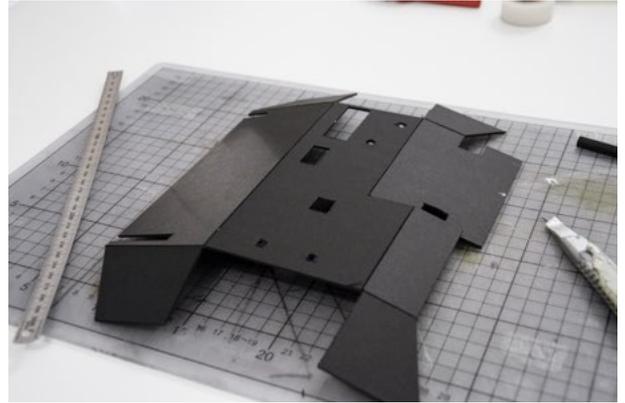
Polypropylene Parts

Cut and fold everything. Do not worry about the round holes. If it is not perfectly cut, it does not matter.

Same as the inner element, just cut the holes for the plugs you need in the bottom part.

If you use a battery, also cut the battery wire slot.

Simply cut and fold the rest.



Assembly

Once everything is cut, it comes to putting everything together. The labels at the holes should help you to locate where everything belongs.

Start with the lid, to understand the concept. Simply fold the sides so the holes lie on top of each other, then put a zip-tie through the holes and pull them tight.

Now the tricky part. Fold the big outer piece like a bag or box of cereals. Fold it up where you made the cuts, the paper folding plan should resemble the inside of the case. Two parts should overlap now, one slightly shorter than the other. Keep in mind to leave the bigger part (the one with the four holes at the top) on the outer side.

Put the bottom part into the main part, having the holes on top of each other. Then, again, pull the zip-ties through and tighten them. On some holes there should be up to four layers of polypropylene.

On one of the upper corners lie also two holes on top of each other. Tighten them as well.

If the two polypropylene layers are assembled, insert the perviously built cardboard inner element. Same here, put a zip-tie through the two double holes and pull them tight.

Finally put the handle with the four holes on the outside of the four holes of the main case and combine them. To be safer regarding the splash proof aspect, put some duct tape on the holes from the inside.

Take the lamp socket and put away the inner elements, since you will not need it. Put it through the hole and use the lampshade holders to fix it onto the case.

Adjust the distance to the camera as close as possible. If you see in the later picture some vignettes you do not want to have, simply cut, saw or sand the socket down a bit, but it will probably not affect your traffic tracking.



For splash safety reasons you could also cut out some plastic and insert it in the socket (e.g. from the packaging of your webcam). You could also take some kitchen foil and a rubber band and put it around.

Insert your prebuilt battery cut-off element. Put the D/C wire through the battery wire hole and just place the rest inside the case.

Put in the Jetson TX2 into the case. The metal distance-holders on the PCB should fit in the cardboard slots on the back to hold it tight in place. Plug in the wires and antennas from the outside.

Finally take the lid and place it on top. The handle should go through the slot in the lid. It will hold in place when you insert the little notch into the slot in the handle.

Bonus: Insert a strap through the vertical slots in the handle to hang it on poles.

