Not just another Camera Slider

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VIEW IN BROWSER

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Summary

The ultimate Duel Action Camera Slider. Part of the digital Bird camera motion control system

Gadgets > Photo & Video

Tags: camera video wifi slider cameramount wireless arduino control photography film motion dslr thingiverse timelapse cameraslider steppermotor openbuilds pantilt nextion nextiondisplay motorizedslider rotarytable motorised timlapse

More than just another camera slider, this is just one component of the the Digital Bird camera motion control system offering a host of features typically only found on commercially manufactured units costing thousands of dollars. The complete system will consist of the slider, Pan Tilt head, Focus motor, Digital Turntable and Mini Jib all wirelessly linked.

Other than your 3D printed parts you will also require the appropriate component's kits available here:

Component Kits https://digital-bird-motion-control.myshopify.com

Credits: This project makes particular use of two main open source arduino libraries for which I am very grateful

- gin66/FastAccelStepper A great resource for controlling multiple stepper motors with acceleration control on all steppers
- Seithan/EasyNextion Library An easy to use method of setting up and actioning commands from the Nextion displays.

Operating modes:

- A-B straight run
- A-B with acceleration controls (ramp/Ease)
- A-B-A Bounce mode
- Time-lapse mode with built in intervalometer and camera shutter control
- Six key sequencer allowing you to set up to six move positions
- Stop Motion functions
- PTZplus for real-time control of up to 3 camera systems

Features:

- A choice of two WIFI controllers (Compact or PTZplus)
- Links and operates wirelessly with all the other system devices
- Duel or single action slide
- Hot swappable Sony NP style batteries
- Limit switch for automatic setup
- Vertical lifting capability (up to 4KG using counter weights on lower carriage)
- Super silent stepper drivers provide smooth quiet operation in micro stepping mode.
- Magnetic encoder allows hand positioning of the camera.
- Locking mechanism for ease of transportation.
- Compact mono rail with no belts in open space to snag.
- Flip out telescopic feet for speedy setup in single action slide mode
- OLED display for battery monitoring and PTZ status
- Can be built with a longer rail for non Duel action use

System Links:

- **Component Kits**: https://digital-bird-motion-control.myshopify.com
- **Software**: https://github.com/digitalbird01/DigitalBird-Camera-Slider
- **Pan Tilt Head**: https://www.printables.com/model/326746-camera-pan-tilt-head-digital-bird
- **Duel action Camera Slider**: https://www.printables.com/model/326752-digital-bird-motorized-duel-action-camera-slider
- **Slider Vertical mounting base**: https://www.printables.com/model/326747-vertical-camera-slider-tripod-base

- **Focus/ Zoom motor**: https://www.printables.com/model/326749-focus-motor-digital-bird-motion-control
- **Digital Pan Head / Turntable:** https://www.printables.com/model/326745-digital-bird-video-turntable-pan-head
- **Compact WIFI controller:** https://www.printables.com/model/326750-digital-bird-wifi-remote
- **PTZ Plus WIFI Controller:** https://www.printables.com/model/326748-ptz-plus-camera-motion-control

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News Update: 13/01/23

The Digital Bird mainboard has been updated to version2.0. If you are still building your system with kits purchased before this date be assured the new update only adds convenience not additional functionality. The changes are as follows:

- There is no longer any need for a 'Y' cable between the OLED and the encoder. An additional port has been added for the OLED
- The resistor patch is no longer required on the back of the board.
- There are now 2 ports for 2 limit switches on the updated slider again no need to share the single port.

News Update: 30/11/22
Battery bay end has been modified to allow for a second Limit switch. Previously the single limit switch at the motor end allowed for automatic homing but did not prevent crashes if the slider lost its way for some reason. Recent updates to the code help overcome such errors however the single limit switch only stops wayward moves in one direction. Hence the addition of a second limit switch at the battery end also.

An OLED display has been added to the Control box door for battery monitoring and PTZ status display. (Not my first choice of location for the OLED however space in the control box is an issue. Expect the location of this to change over time!)

An issue arose with one builder who built the slider with a 1000mm long rail. While the code can simply be modified to work with longer rails. There is a tendency with much longer rails to push the camera much faster up the rail when you are setting your key positions. The issue we discovered is that the AS5600 Encoder has a speed limit! If you manually push the

camera very fast up the rail the encoder can lose position on the way. This issue becomes more apparent with longer rails since you have further to push the camera. There is no fix for this other than pushing the camera up the rail at a steadier pace! The latest software release now better handles errors if the slider loses position for any reason.

News Update: 28/04/22

New PTZ plus WIFI controller is here for those looking to control up to 3 camera systems in real time together with virtually unlimited programmed systems. (By Camera system I mean any combination of camera Slider Pan Tilt head combined as a system). Each system can store up to six poses which the system can move to at the touch of a button. PTZ cameras are controlled using two joysticks with acceleration control to ensure smooth filmic real-time moves.

• The system now stores all of its key positions and recovers them at power up. No more loosing key points when the system is powered down.

• New Stop Motion function for basic stop Motion animation recording.

Disclaimer:

There are a lot of parts to this project which must all work together and a lot of room for error in making this happen. While I am more than happy to offer advice this will be your build, It all works for me! In terms of software this will continue to develop with some additional controls and features on the way. However the project is still under development. There will undoubtedly be bugs in the system along the way which I will work hard to overcome given a little time and hopefully a little help from the community.

Revisions: Keep a close eye on updates as things may still change as the system develops. Please ensure you have a fresh download before printing. This is an active project.

Print Settings

Resolution: 0.2

Infill: Second part of the part number is the recommended % Fill

Filament: Matt PLA Black/ Orange. A word on colour choice! There is a reason most camera gear is predominantly black. REEFLECTIONS!

Notes:

While many parts can be printed with just 30% fill and three layers some more structural parts must be printed 100% for example the rail connectors, Top Camera plate belt ends and the feet.

Originally I used Black carbon PLA for the nice finish but have recently switched over to Tinmorry Matt Black PLA which is more cost effective and gives an equally nice finish.

Bill of materials

I have provided the Kits in order to make this build as accessible as possible. To this end I strongly suggest you go with one of the kits. They are good value for money and will allow you to complete the build with confidence in less than a day. (3D printing time not included!)

For those happy to hunt down all the part themselves this is the bill of materials required.

Nuts bolts screws

- M5 SS Cap head bolts 60mm long x4
- M5 SS Cap head bolts 40mm long x4
- M5 Black Low profile bolts 10mm Long x13
- M5 Black Low profile bolts 20mm Long x6
- M5 Black Low profile bolts 30mm Long x3
- M5 Black Low profile bolts 50mm Long x3
- M2.5 Cap head bolts 30mm long x2
- M3 Cap head bolts 16mm long x2
- M3 Cap head bolts 5mm long x2
- Small screws 1.5mmx 4mm long x4
- Small screws 1.5mmx10mm long x4
- M5 Brass female inserts 6mm long x11
- M5 Washers x20
- 1⁄4 -3/8th Camera screw female inserts x4
- 1⁄4 Camera screw male 11mm long (flip up thumb bar type) x1

Drive System

- 5mm pulley axles 28mm long cut from M5 bolts or SS Rod x4
- 10mm Belt idler pulleys 5mm bore x4
- 10mm Belt Drive pulley 20T 5mm bore x1
- Nema17 Stepper min 40mm long 4Wire x1 (A longer Nema17 can also be used)
- Stepper Anti vibration damper nema 17 x1
- 10mm wide GT2 Timing belt 2m long x1
- Rail Components
- 20x40mm Vrail tapped for M5 bolts 500mm long x1

- Open builds style mini gantry plates x4

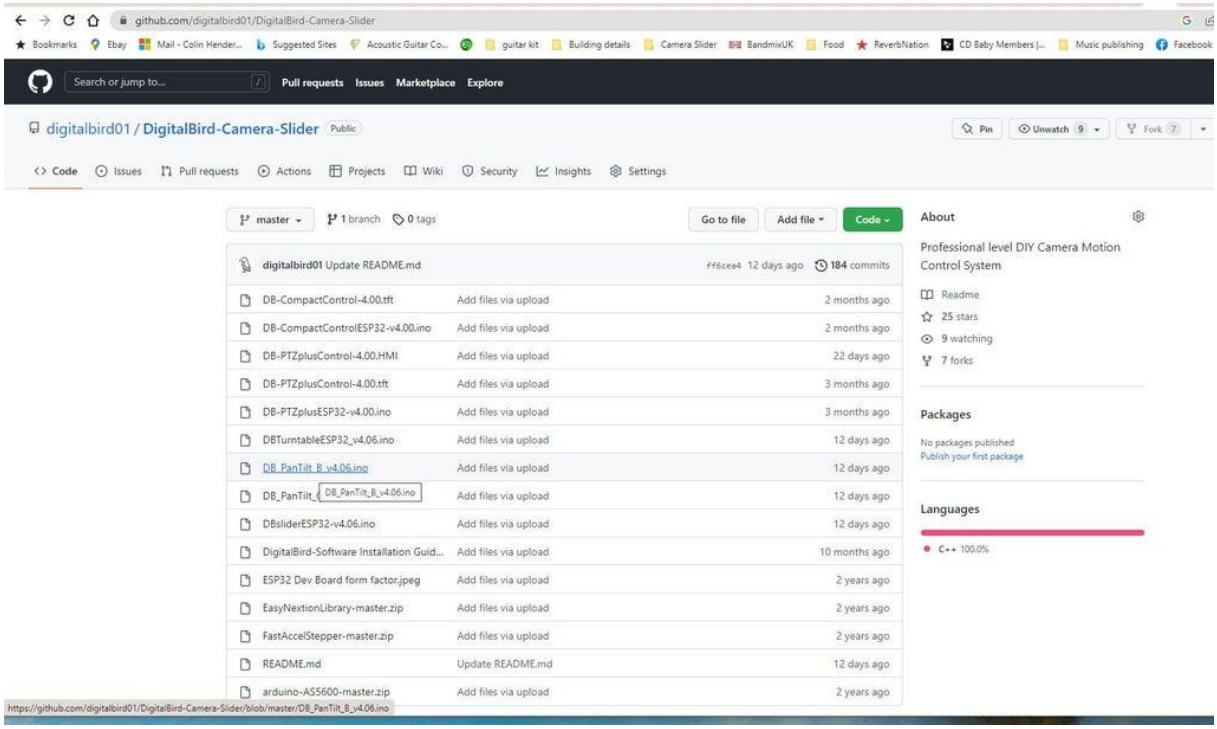
Electronics

- DigitalBird slider main board with ESP32 & 1 TMS driver x1
- DigitalBird Sony NP style battery harness x1
- AS5600 Encoder module with magnet x1 (must be diametrically magnetized. Often not supplied with the correct magnet type)
- Limit switch board same as CR10 boards x2
- Small 8x13mm insert Rocker switch x1
- 2.5mm Stereo Jack Female for shutter x1
- Shutter release cable for your make of camera x1
- Silicon cable 4 core 24AWG and JST mail connectors as required
- OLED Display 0.49 Inch 128x32 res & Cable x1

Sundries

- 40x2.5mm Neoprene tape self adhesive 1m length
- Spirit bubble 13.7mm Diameter 8mm deep x1
- N50 Neodymium Magnets 8x 3mm x30
- 120mm long swiss Plate x1
- Your choice of ball head or other camera mount x1
- Sony NP style batteries x2
- Video tripod Caver or equal is a good choice comes with head x1

Software Installation



If you have purchased the digital bird kit then the main board will come pre installed with the most up to date software.

If however you are building everything up for yourself on the back of a generic Digital Bird main board you will need to download and install the software yourself. In any case it is likely you will want to keep your system up to date with the latest software releases. If you are building the system from scratch make sure you read to step26 for additional wiring and setup information.

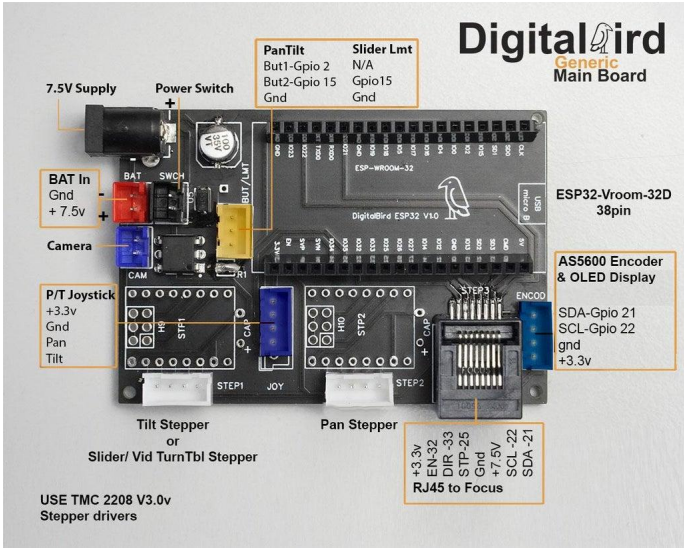
The software for all parts of the system can be downloaded free from the Digital Bird GitHub repository here: https://github.com/digitalbird01/DigitalBird-Camera-Slider

1. If you haven't done so already your first step is to download the contents of the Digital Bird code repository from GitHub this is the link.https://github.com/digitalbird01/DigitalBird-Camera-Slider.git
2. Click on the green “CODE” button top right and select **<Download Zip>**
3. Unpack the ZIP file to somewhere you will remember on your system but do not unzip the zip files contained in that top level folder. This folder contains all the Digital Bird specific software you need to install the system but be aware the project is still under development and you should check back for future updates and bug fixes.
4. Read the installation guide provided in the folder and titled 'DigitalBird-Software_Installation_Guide.pdf'

Or click on this link to read it know: Digital bird Installation guide

Digital Bird Generic mainboard

The same generic main board is used on all of the Digital bird Camera Motion Control system devices and is available here: https://digital-bird-motion-control.myshopify.com either as a simple board for you to build up from scratch or as part of a more comprehensive kit.

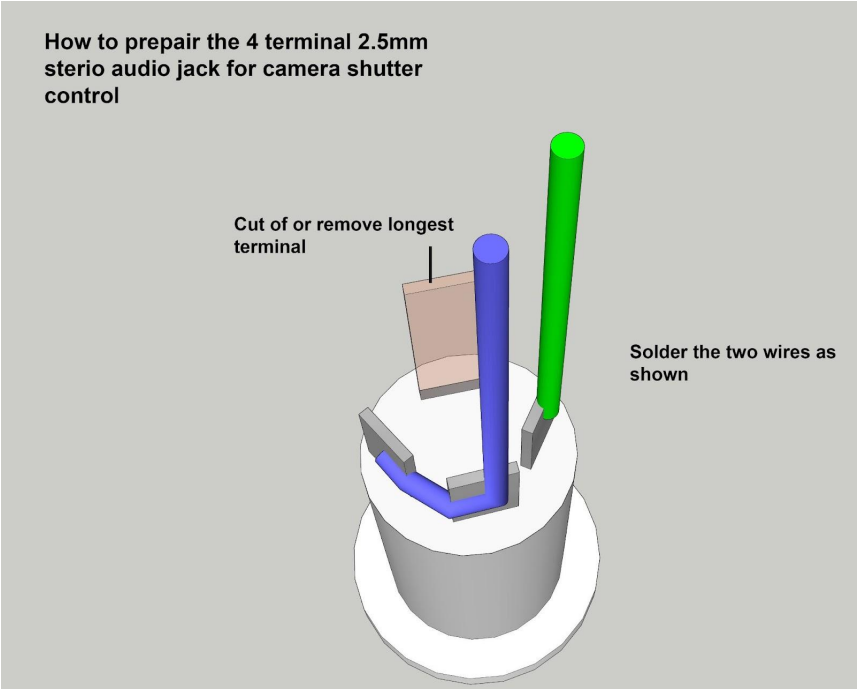


Additional Notes for Scratch Builders

The Digital Bird Kits are good value for money taking a lot of work out of the project for you and removing much of the pain of scratching around the internet looking for the correct small parts. If however you are happy to work from scratch I do provide the Generic main board used on all the project

parts and is the one component which is truly custom to the project. The following notes are for those of you working from just the generic mainboard.

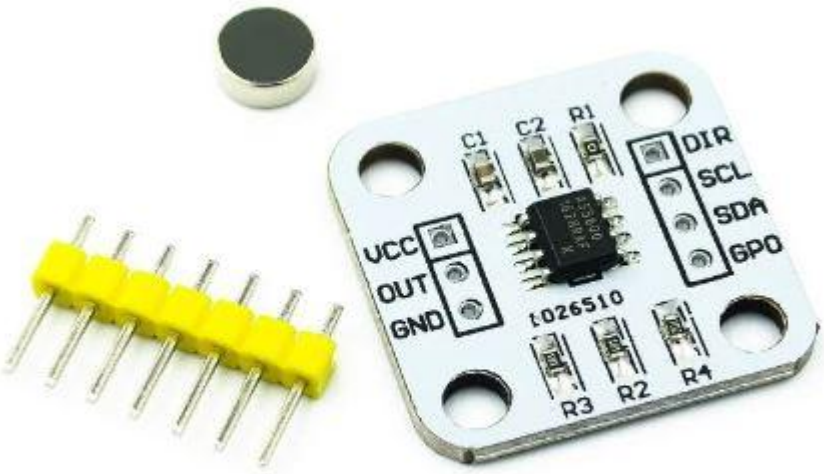
Wiring the 4 pin 2,5mm Shutter Socket



Resistor patch & Board update

Version 1.0 Main boards sold before 13th Jan 2023 were supplied with a resistor patch on the back which allows us to use the OLED display as a battery monitor and PTZ ID status for the device. The resistors used are a 330 ohm and a 220 ohm. Version 2.0 of the board was released on 13th Jan 2023 and does away with the need for this patch. Version 2.0 also has additional ports for the OLED display and a second limit switch on the slider meaning there is no longer any need to share ports and no need for soldering up ‘Y’ cables.

The AS5600 Encoder



The AS5600 Encoder board uses the ESP32 i2C function and is plugged into the blue 4pin port just below the RJ45 port on the board marked ‘Encode’ The purpose of the encoder is to read the rotation of the small special Diametrically magnetized magnet which needs to be mounted on the motor shaft at the rear of the stepper. In software we can then calculate how many steps the motor has taken even when the motor has been powered down for positioning key points.

The same board mounted AS5600 is used on all kits where an encoder is required bar the focus motor kit which has its own AS5600 built onto board.

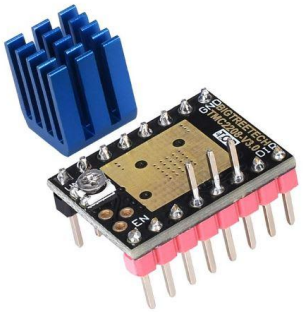
If you purchased your kit before 13th Jan 2013 and are working with Version 1.0 main boards then the encoder shares the 4pin encoder port with the OLED. You can run multiple peripheral I2C devices from the same port provided each device has its own unique address. Thankfully the OLED and the AS5600 do not share the same address and can therefore be wired together in a Y configuration and plugged into a single 4 pin port. Version 2.0 of the main board provides an additional port for the OLED and so no need for ‘Y’ cables.

Only 4 pins are used on the AS5600 board namely:

- Gnd
- VCC
- SCL
- SDA

The OLED only has 4 pins also marked as above. Simply solder like pins together to form a Y cable ending in a single 4 pin plug.

TMC2208 v3.0 stepper drivers



Important note:

If you are building the board up to be used on one of the pan tilt heads these drivers should be soldered directly to the main board with no pin risers. This is because space in those devices is at a premium.

All the other devices using only one driver can be mounted on the single set of pin risers supplied with the boards.

The two capacitors provided loose with the generic main board should be installed one for each driver with the negative side facing in towards the ESP32 board. When Risers are being used on the single stepper configuration this capacitor can be bent over on its side below the driver.

Tuning the drivers Vref to the motor

Stepper drivers need to be tuned to the requirements of the motor they are driving. Otherwise they may become very hot in operation and reduce the life of the driver and the motor This is achieved using a simple Voltage meter.

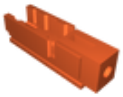
1. Install the drivers on the board ensuring that the small adjustment screw on the top is alongside the capacitor position. Do **not** plug in your stepper motors. Use a 7.5v NP style battery to power the board. Do **not** power the board using the USB port on the ESP32.
2. Power up the board and carefully place your black meter probe to the board's earth. (I use the earth on the Auxiliary power port) And the red probe on the small screw on top of the stepper driver. On the meter you can now read off the Vref voltage the driver is set up for by default typically around 1.2v.
3. Using a small flat head screwdriver Turn turning the small screw clockwise in very small steps will reduce the Vref voltage down to the voltage we require to drive our steppers. For the **Nema17** steppers this should be about **0.9v** The **Nema11** stepper should be set for **0.6v**

This remix is based on

Digital Bird Motorized Duel Action Camera Slider

by colinh3D

Model files



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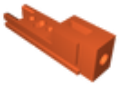

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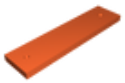

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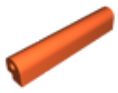

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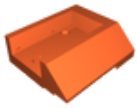

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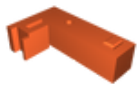

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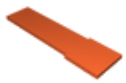

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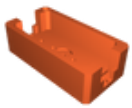

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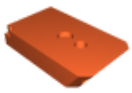

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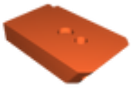

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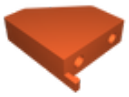

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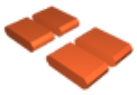

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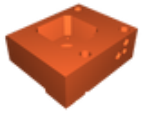

30_25_100.stl

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