

# Rallec Railroad

*"Where Technology Meets the Hobbyist"*

## Locomotive Driver

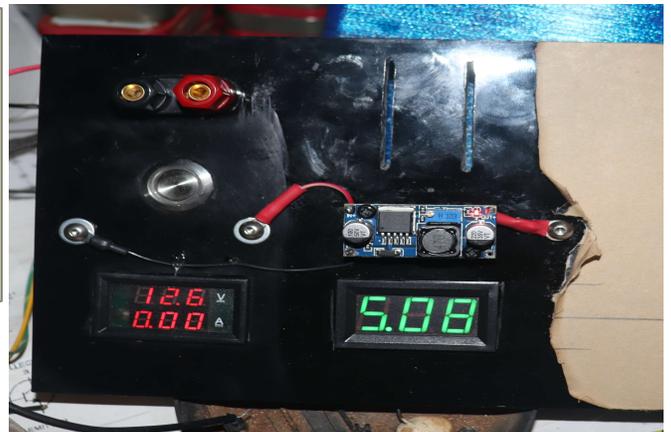
The power supplies and monitors are up and running. Now for the fun stuff. Time to start the software. Since the microprocessor will eventually be embedded, the Over-The-Air (OTA) software will be first. Seemed easy enough but my router has a firewall in it that will not allow the upload over the WiFi of binary files. OK, not a problem. Go out and purchase another router just for the railroad without a firewall. Good luck. They all come with firewalls now. The trick is to know which one you can turn off the firewall. Everyone is frantic though because without a firewall it is easy to break into. It will not be hooked up to the internet so they will have to be nearby to get into the system.

After it is verified that the OTA software works, the motor driver control is next. That will be rather easy because there are tons of code examples out on the internet that one can use. The http code will have to be developed since the locomotive needs to be controlled via phone, pad or computer.

So that is what is next. Just don't know what "bumps in the road" are lurking.

### Note:

This is not a complex electronics project but since we are dealing with Li-Ion batteries, safety is of major concern here. Li-Ion batteries are known to explode or catch fire if not handled properly. I urge everyone that is thinking of using Li-Ion batteries in their next project, read up on how to use these batteries safely. There are many web sites to help you.



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## Garden Plants – Wintersweet

Common names – Wintersweet

Botanical name - **Chimonanthus praecox**

Plant type – Tree

Mature Size – 10-15 feet tall, spreads 8-12'

Sun exposure – Full sun to partly shady.

Soil type – Most, rich, well drained.

Soil pH – slightly acidic (pH 6.5-6.8).

Bloom time – Winter.

Flower color – Yellow with purple-brown centers

Hardiness zones – Zones 7-9.

Native area – China

**Toxicity – Non-Toxic**



Wintersweet is usually grown as a shrub, but using Bonsai techniques it can be trained easily to grow as a small, G scale tree. If not pruned, limbs AND roots, it can reach around 10 to 15 feet tall and 8 to 12 feet wide when mature. The yellow blooms that arrive over the winter are quite fragrant. This tree needs a well drained area. Make sure to keep its soil moist but not soggy.

OK, the YouTube channel is not ready. Hopefully soon, but the holidays are here. Not only we will be starting with Modeling software for 3D printing, the origins of the name Rallec Railroad and a monkey that worked on a railroad.

If you discover grammatical or spelling errors in this newsletter, please accept my apologies and please remember I was an Engineering major not an English major. Also please be advised that I am not a very good photographer.



### **3D Printing – Resin Printers**

Resin printers, better known as Stereolithography Apparatus (SLA) printers, have dropped significantly in price. This type of printer typically has a very small print area, but really high resolution. Therefore, this type of printer is an excellent choice for small volume but highly detailed parts. Print times are longer than with a fused deposition type printer but the tradeoff is the high detail of the parts. The other downside is cleanup can be long and arduous. Good cleanup is necessary for good future prints.

SLA printers have higher maintenance costs. After printing 2-3 liters of resin, the resin tank needs to be replaced. This is because the tank will stain inward over time, making it impossible for the light source to project the image precisely onto the resin. The result is a drastic depreciation on the printing quality. Depending on the manufacturer and the model, a resin tank costs about \$40 to \$80.

The construction platform also needs to be replaced from time to time. This is because it is often damaged when the user removes the printed model. A new platform will cost around \$100.

The resin is also expensive: 1 liter of standard resin costs between \$80 and \$150.

As I mentioned in the beginning of this article, one of the most important differences between SLA vs FDM is the print quality.

With FDM printers, the precision of the machine is determined by the nozzle size and the accuracy of the extruder movements both vertically and horizontally (X/Y axis).

This means that it is of the utmost importance to calibrate the machine properly. Often the quality varies depending on the machine. FDM printers operate from the ground up, which means that the weight of the upper layers compresses the lower layers. This can lead to a number of design errors and printing problems (e.g. warping, misalignment of the layers, shift of the layers and shrinking of the lower parts). This also depends on the material used. There are some thermoplastics that can provide very accurate and strong parts. The layer thickness of an FDM printer varies from 0.5 to 0.127 mm (0.02 to 0.001 inches).

It is possible to achieve extra accuracy and rigidity of the objects with SLA printers because no nozzle is used to create the layers. The resolution is mainly determined by the optical dot size of the light source – which is very small. Less force is also applied to the model during printing, as light is used for polymerisation. This results in much smoother surfaces with a layer thickness of 0.05 to 0.01 mm (.02 to 0.0004 inches).

With FDM printers the printed object is rather easy to remove with a palette knife. However, with SLA printers it is exactly the opposite. The object sticks to the base like glue. It is therefore usually difficult to remove the 3D printed model from the bed. Often a lot of resin remains on the platform that you have to first remove with a palette knife. This takes a lot more effort than an FDM printer so get ready for some hard work there. There are lots of recommended methods like first getting a rectangular razor blade partially under the print, then use the palette knife. Another is more involved and requires additional equipment. (This is the way I would recommend that you try.)

When removing the print from the build plate, be sure to wear nitrile gloves. You do not want to get the wet resin all over your hands. Next wash the 3d print in an Isopropyl alcohol solution. You can wash it yourself or use a cleaning machine (about \$100 to \$200). Rinse for about 2-3 minutes to ensure that the small details of your 3D printed model are retained after curing. It also makes handling the model much easier and safer as it

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removes potentially hazardous non-curing resin. Now put your resin model in warm water (80-90°C or 176-194°F) depending on the size and details of the model. Wait for about 30-60 seconds and remove object. Do not leave the object too long in the hot water to avoid warping of the details. Then you get to remove any of the supports that are attached to the object. Depending on how fragile your object is, you can remove supports by hand, with flush cutters or tweezers. The object has not cured yet so it can be really fragile. With all the supports removed, now it is time to cure the object. There are Ultra Violet cure stations that can be purchased (faster cure times) or let the object hang out in the sun for several hours.

Now you should know most of the ups and downs of resin printing. If you are up too it, it would be a good time to start 3D printing some parts. But watch out, it will grow on you making all those custom parts that no one else has.

Next time, if I find the time, a do-it-yourself cure station and a magnetic stirrer for the curing and cleaning.



## **Time to work on the Railroad**

It is getting just plain cold out there. In the high 50's to low 60's during the day. I know, I know, but this is Southern California and we have to complain about something. Spending some time on the hardware and software for various projects, but need to get back to the YouTube channel then back to laying more track bed and track.



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**Mission Statement:**

We are about education, instruction, products and having fun with G Scale model railroading. We cover such things as photography, video, metal working, 3D printing, electronics and much, much more. At heart everyone here is a maker. That means we enjoy the journey as much as the finished product.

To unsubscribe from this newsletter please send an email to: [support@rallecrailroad](mailto:support@rallecrailroad) and just include the word "stop".

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