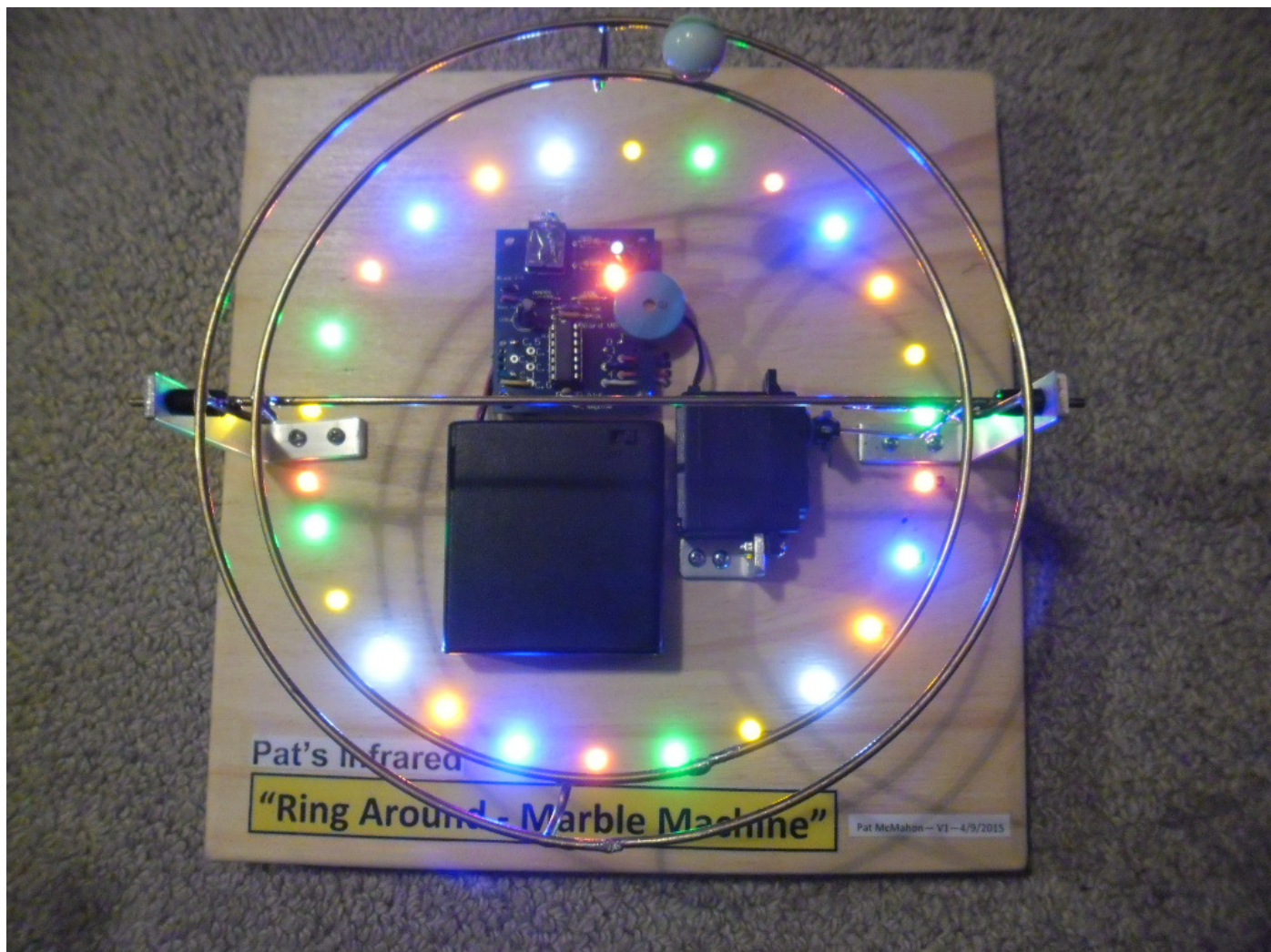# How to build your own Infrared "Ring Around Marble Machine"

**Background Information**- Pictured above is Pat's Version 1 Prototype "Ring Around Marble Machine" which took a lot less hours in development compared to the "Rock & Roll Marble Machine, to get to the final workable design.

The photos and basic instructions attached on this document are for the prototype Version 1, you may wish to vary.

**Assumptions**- My original design worked on the assumption that most marbles are about 16 mm in diameter. Each marble can vary so they will either sit up or down depending on their sizes, in the inside of the Inner & Outer Rings. Instead of having the Rings level on the same plane, my design has the outer ring higher to help with centrifugal forces trying to force the marbles off the rings. I have used my Picaxe 14M2 Infrared Microcontroller and a universal remote to run my Ring Around Marble Machine.  As you could use any other microcontroller and a different universal remote, I haven't included my program code, but it is available. A MetalCraft Rolling Tool, helped greatly in the development stages, although it is possible to build it with just basic handtools in a work shop.

It is a quicker build model than the Rock & Roll Marble Machine but still very challenging ,visually very pleasing and another rewarding model to program to your own outcomes, enjoy,
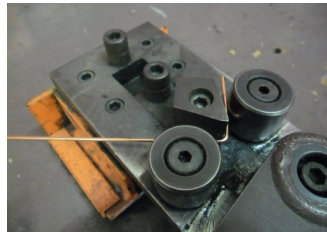
Pat McMahon.

# How to build your Infrared "Ring Around Marble Machine"
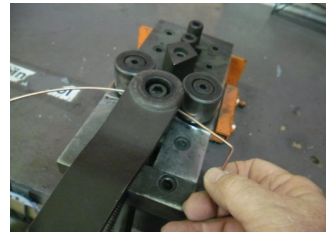
Pat McMahon—8/9/2015
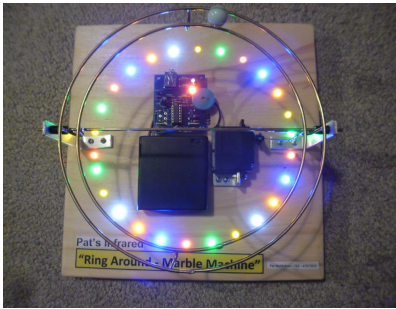
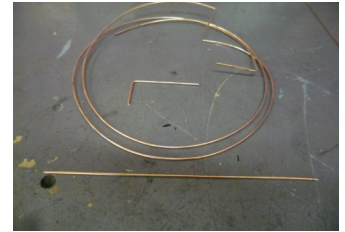

**1 – <u>Design Brief</u>**

Design and build your own Infrared "Ring Around Marble Machine".



**2 – Get 3 lengths of 2.5 mm diameter Bronze Welding Rod or Steel equivalent. Put a small 90 degree bend on two ends.**



**3 – Hold the bent rod in the horizontal position, as you roll down the rod in the Metalcraft Rolling Machine, to keep it in the same plane.**



**4 – Keep rolling and overlap the rings to get away from the flat ends. Outer = 200 mm Diam, Inner = 175 mm Diam.**
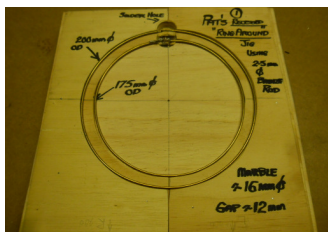


**5 – Overlap the rings in the Recessed No 1 Ring Jig, carefully marking and cutting with a hacksaw, file flat then solder to join the ends.**



**6 – Use the Raised No 2 Ring Jig to lift the Inner Ring and drop the larger Outer Ring, ready for soldering on the spacer supports loops.**



**7 – Use some of the offcuts from the rings to bend up with pointy nose pliers, 4 uneven leg spacer supports loops, to suite the gap.**



**8 – Solder at 90 degrees spacings, joining the Inner & Outer Rings. This will give ~ 12 mm gap for the ~16mm diameter marbles.**
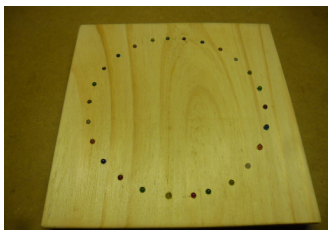


**9 – Cut a 12mm thick, piece of 5 ply , 250 mm x 250 mm base, sand & seal. Scribe a 100 mm radius, drill 5 mm top ,6 mm bottom holes for LED's at 18 mm centres.**
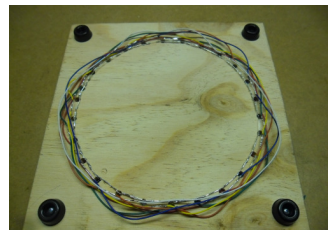


**10 – Insert the various coloured LEDS patterns with the negatives facing inwards. Bend to touch each other & solder . Link up same coloured Positives.**
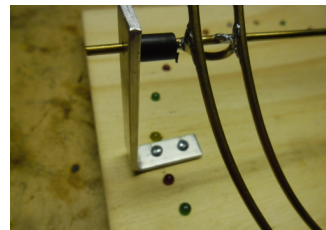


**11 – Bend up 2 Aluminium 12 mm wide x 3 mm thick x 100 mm long flat bar. Drill 2 , 3mm holes for base screws and one 3mm up the same height above the base for the pivoting rod.**
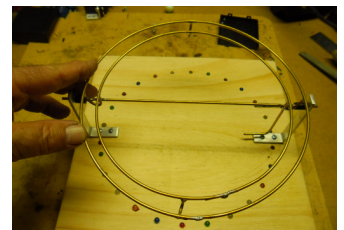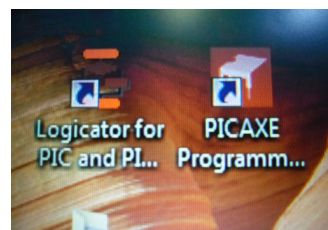


**12 – Solder on a 245 mm straight pivoting rod to the Ring Assembly loops plus a thin tilting arm to go into the servo motor arm.**



**13 – Drill 2mm holes for the black negative and all the positive coloured wires to go up through the base to the microcontroller on top.**
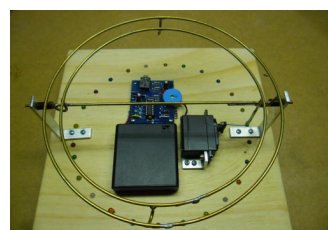


**14 –Carefully, mount the Ring Assembly to the base, attach the servo motor, microcontroller and battery pack.**



**15 – Using Picaxe Programming Editor, program your desired outcomes. Forward Tilt -servo 130 Centre Balance —servo 120 Backwards Tilt— servo 110 See Pat's sample Ring Around Program.**
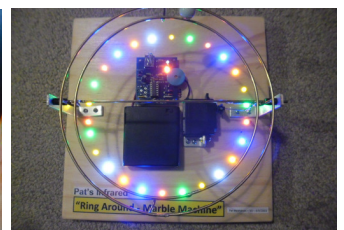


**16 – Test and adjust the connecting arm to the servo to get it balanced & level. Try a single marble then add multiple marbles and see what happens. Enjoy your design!**