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Rotary encoders and their use in WebBrick Systems building automation

This note describes rotary encoders and their use and usability in various customer scenarios

Introduction

Rotary Encoders are in common use in a range of equipment these days. In simple terms a rotary encoder generates a pulse pair as it is rotated. The phase of the pulse pair indicates the direction of rotation.

Rotary encoders don't have end stops, so they can be rotated indefinitely. This is useful in items like volume controls where more than one turn is needed to traverse the complete range. For user 'feel' some have detents which feel like 'clicks' as the user rotates the control. However you need to be aware that these 'clicks' **do not** always match the number of pulses generated.

WebBrick Connections

Connections A+B are made to even-odd adjacent pairs of Digital inputs:

- 0-1
- 2-3
- 4-5
- 6-7
- 8-9
- 10-11

Options need to be set at 4 on both inputs. The centre connection is made to WebBrick ground

WebBrick Actions

The following actions make sense for Rotary Encoders:

- up/down
- next/prev

up/down

These actions are perfect for controlling analogue outputs where each increment is set by the global setting of rotary encoder rate. Good applications are analogue lamp dimming and fan speed control.

next/previous

When applied to analogue outputs this would mean the next and previous configured set points. Since there are only 8 points a rotary encoder based control could traverse these very quickly.

The rate at which one would index the set points would be set by the number of cycles per turn of

the rotary encoder.

A common value is 24 c/turn. In this case all set points would be used within a third of a turn. This would give poor usability.

A 6 c/turn would cycles give 1+1/4 turns for all set points, a far more usable solution.

From the same analysis above it can be seen that driving scenes through a rotary encoder interface could be uncomfortable in usability terms (whilst technically working). This would further be diminished if long fade times are used. It would not be clear to the end user what scene they were at without waiting for the fades to complete.

A practical solution to Scenes with Rotary Encoders

Some end customers are wedded to the 'dimmer' paradigm of control. Of course this works perfectly with a single circuit and using rotary encoders only increases the options (2-n way dimming, full internet control etc).

But what happens when the customer wants a 'dimmer' **and** scenes!

This is where we can examine the dimmer paradigm a little more. As a dimmer is turned clockwise, then more light is made available. We can achieve the customers' goals by using the Rotary Encoder to drive a 'lead' analogue channel, then feed this channel to the analogue inputs (via 4K7 resistors).

The thresholds on the Analogue Inputs then drive Scenes. The only rules are:

- The lead circuit is always 'ignored' in the scene settings (otherwise you'd have a feedback loop)
- Each scene is generally brighter than its predecessor
- You have a maximum of 5 scenes
- Remote 'off' and house sleep functions are directed to the lead channel rather than the scenes

Note that you don't have to connect the lead analogue channel to an output circuit, it can remain in the background as the control ramp.

Conclusions

- **Never** drive scenes directly from a rotary encoder, use the indirect lead channel approach documented here.
- When driving next/prev set-points only use 6 cycle/turn rotary encoders.
- 24 cycle/turn encoders are great for general usage e.g. Lamp dimming and fan speed control.