

rudysmodelrailway

THE STORY OF A STEADILY GROWING DCC MODEL RAILWAY

HARDWARE, SOFTWARE

Use an ATtiny with USB as a DCC Accessory Decoder

POSTED BY RUDYB · OCTOBER 15, 2015 · 29 COMMENTS

If we like to have a really small DCC accessory decoder that sets us back just some \$2,50, the ATtiny might just be it.

Of course we could use a plain ATtiny chip and solder it onto a small piece of experiment board together with the optocoupler circuit needed to transfer the track DCC voltage to 5V TTL. But then we'd have to figure out how to program the thing. Not really difficult, but still more work than when we'd use the new ATtiny USB boards that are available nowadays.

This is an example of such a board. The dimensions are just 22×18 mm and it contains the ATtiny, a few LED's, a power converter that allows up to 16V input and a mini USB port. The boot software to make this USB work and allow connection to the Arduino IDE is already baked into the chip. The hardware can be found here.

There is no USB-serial chip on the board, it relies on the software inside the ATtiny. While it worked with both my PC's, there is no guarantee it works with every PC. The process of installing the software and drivers and get it to work with your Arduino software development IDE is described here.

The ATtiny DCC accessory decoder software can be downloaded here. The schematics for the optocoupler circuit needed to transfer DCC track voltage to TTL can be found on the Software page.

The USB driver is included in the zip file, in case the process described at the digistump site did not work (which happened with me with one of the PC's).

The video shows the ESU ECoS sends out a DCC accessory address, that controls pin 1 of the ATtiny, which has the on board LED attached.

RMR045 - ATTiny DCC Function Decoder



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Discussion

29 thoughts on “Use an ATTiny with USB as a DCC Accessory Decoder”

1. hey wold be possible to use this as a loco decoder?

POSTED BY **TIBOR OTTO DETTRUZ (OMGALOF)** | **DECEMBER 1, 2016, 16:47**
REPLY TO THIS COMMENT

- o Nope, much more is needed for that. It can be used as a function decoder inside wagons or loco's, that's about it.

POSTED BY **RUDYB** | DECEMBER 1, 2016, 17:09

REPLY TO THIS COMMENT

- o by "much more" you mean hardware wise or software wise? or both?

POSTED BY **TIBOR OTTO DETTRUZ (OMGALOF)** | DECEMBER 1, 2016, 21:43

- o Both hw and sw. For instance the electronics and sw for controlling the loc motor and also the complete sw for programming cv values. This can't be done with the ATTiny.

POSTED BY **RUDYB** | DECEMBER 1, 2016, 21:53

2. Hello Rudy!

Thanks for a fantastic and informative homepage.

I hope this post is still active, because i'm loosing my hair really fast here 😊

The last couple of days, i've been working on a Attiny85 solenoid project for turnouts. I have a working Arduino Uno setup, but want to make it smaller – and because my fascination of, what that tiny chip is able to do.

To begin with, I started out with your DCC Accessory Decoder. The code is working fine with the Arduino uno, but with the Attiny85 I get the same problem as posted by Leo January 26, 2016, 15:31.

With only one DCC address it works like a charm, with one more, nothing works.

Do you have any idea where to start?

Best regards

Michael

POSTED BY **MICHAEL** | AUGUST 18, 2016, 19:52

REPLY TO THIS COMMENT

- o Hi Michael. I'm sorry to hear that as soon as there's more than one address configured nothing works. I don't know if I have time but if you can send me the file I may have a chance to look into it. I sent you an email.

POSTED BY **RUDYB** | AUGUST 19, 2016, 09:42

REPLY TO THIS COMMENT

3. Hi Rudy, I was hoping this function decoder would allow me to use a IR sensor together with Train Controller to sense a train passing a given point on the track, but then I realized that your decoder has to have an address provided to it to work, in other words opposite to what I need. Could you give me any suggestions as to how I could use a simple IR sensor to detect movement and then convey this to Train Controller Silver. any help would be greatly appreciated.
StewMac (From Train Controller Forum).

POSTED BY **STEW MCMANUS** | JULY 30, 2016, 16:01

REPLY TO THIS COMMENT

- Sensors usually are fed to the command station via an interface like S88. The command station then sends sensor data to TC. This is the way to go for your sensor too.

POSTED BY **RUDYB** | JULY 30, 2016, 17:47

REPLY TO THIS COMMENT

4. Hello, I have a question I want to build a Minidecoder for a servo for my garden railway, it would be ideal if I could take the protokol Attiny for this servo incl . DCC . Have ye here a hint that sketch I could use ?

Olaf from Dortmund (Gemany)

POSTED BY **OLAF REIS** | MARCH 10, 2016, 20:21

REPLY TO THIS COMMENT

- Unfortunately the servo library does not work well on the Attiny, at least as far as I have seen. Have not had any time yet to look into that any deeper.

POSTED BY **RUDYB** | MARCH 10, 2016, 20:40

REPLY TO THIS COMMENT

5. Dear Rudy,

What I don't see in your post is the arduino alimentation. In your video the arduino is power by the USB but in the wagon we have only DCC signal.

Thanks in advance for your help.

Manu

POSTED BY **EMMANUEL CORDIER** | MARCH 6, 2016, 07:51

REPLY TO THIS COMMENT

- Correct, when used inside rolling stock, a lil power supply will be needed, can be made using a diode bridge rectifier, a capacitor and a resistor between diodes and C to limit the power switch on current.

POSTED BY **RUDYB** | MARCH 6, 2016, 12:15

REPLY TO THIS COMMENT

6. Hello,

i wanted to use your program for the attiny accessory decoder on a attiny45 to switch leds on and of. i tryed with a schematic without optocoupler but with a 2k2 resistor like here: http://www.mikrocontroller.net/attachment/10896/DCC-Decoder_t15.jpg is there anything i must change in the sketch? because no dcc input is recognized.

best regards leo

POSTED BY **LEO** | JANUARY 25, 2016, 19:40

REPLY TO THIS COMMENT

- It's really hard to tell if there's no reaction to the DCC what the cause is. Maybe best build the opto coupler circuit for test purposes and try from there if you can solve the issue?

POSTED BY **RUDYB** | JANUARY 25, 2016, 20:11

REPLY TO THIS COMMENT

- Hey, me again,

i made some progress, i now can use the attiny as a accessory decoder for 1 LED, means just 1



if i just configure one accessory everything works fine (except that i have to switch it on and off with my roco multmouse saying address 5 even if i said address 1 in the sketch...) but as

soon as i try more than just one address and accessory nothing works, even the first one that previously worked, does nothing anymore...
the function decoder sketch does nothing at all... 😞
perhabs you could give me some hints?

greetings leo

POSTED BY **LEO** | JANUARY 26, 2016, 15:31

- o I've sent you an email so we can try solve this mystery.

POSTED BY **RUDYB** | JANUARY 26, 2016, 17:12

7. Hello Rudy, it is so good to see a skilled engineer bringing new opportunities to the model railway hobby, it is the software that brings the hardware "to life" after all!. You are providing so many projects for us to experiment with its quite hard to keep up with your progress! I want to try all of them

Regards

MartinK

POSTED BY **MARTINKIRKBY** | NOVEMBER 9, 2015, 21:10

REPLY TO THIS COMMENT

- o Thanks for your kind feedback Martin, it's appreciated.

POSTED BY **RUDYB** | NOVEMBER 9, 2015, 21:59

REPLY TO THIS COMMENT

8. Hi Rudy,

Slight error in line 6 regarding mode numbers with reference to line 27 in RB_DCC_Decoder_Accessory.ino

Alex

POSTED BY **ALEX** | OCTOBER 21, 2015, 19:12

REPLY TO THIS COMMENT

9. Very nice application. I have developped something similar for bigger Arduinos (<https://git.framasoft.org/locoduino.org/UniversalAccessoryDecoder>), but my version of the Mynabay's hardware is a lot bigger than yours. How have you collapsed all the components of the DCC hardware interface in such a small volume ?

POSTED BY **TRUSTY** | OCTOBER 21, 2015, 07:53

REPLY TO THIS COMMENT

- o Ehh, I really don't know ... I haven't changed anything in the Mynabay library. I was not even aware there are different versions around. Actually this version still is much too big. I'm now working on code that is really small and only has the bare necessities for an accessory- or a function decoder.

POSTED BY **RUDYB** | OCTOBER 21, 2015, 15:37

REPLY TO THIS COMMENT

- o Good news, but I was speaking on the hardware part, the Optocoupler and other compenents of the mynabay circuit which seems to just have the size of the optocoupler itself !

POSTED BY **TRUSTY** | OCTOBER 22, 2015, 06:50

- O, haha, yes, I see now I misread your question. Well, the ATtiny is a PCB, bought as such at a size of 22×18 mm. The optocoupler, diode and 2 resistors are mounted on a PCB, twice the size of the opto. All and all maybe still a bit too large to build into an N scale wagon.

POSTED BY **RUDYB** | **OCTOBER 22, 2015, 07:34**

10. leuk projectje
ik ga het proberen

POSTED BY **DICK KONING** | **OCTOBER 16, 2015, 10:27**
REPLY TO THIS COMMENT

11. Hoi Ruud,

Mooi project. Ik heb er net een paar aangeschaft om random LED te programmeren, maar dit project is helemaal geweldig.

Hoe kom ik overigens aan de library ?

Via Mynabay zie ik geen mogelijkheid om deze te downloaden.

Groeten,
Pieter

POSTED BY **PIETER BRUINSMA** | **OCTOBER 15, 2015, 17:20**
REPLY TO THIS COMMENT

- De library zit bij eerdere downloads van de Arduino DCC decoder. Die is te downloaden vanaf de Software pagina van de blog. Ik zal hem ook bij deze link bijvoegen, da's wel zo handig.

POSTED BY **RUDYB** | **OCTOBER 15, 2015, 21:07**
REPLY TO THIS COMMENT

- Ruud,

Bedankt voor je reactie, maar klopt het dat ik nog geen link zie ?

Groeten,
Pieter

POSTED BY **PIETER BRUINSMA** | **OCTOBER 17, 2015, 08:53**

- Pieter, de link in deze post, of anders op de Software page zou het moeten doen.

POSTED BY **RUDYB** | **OCTOBER 17, 2015, 09:58**

12. Very good Rudy. Off to the shop's to buy one or two cheers

Jim

POSTED BY **JIM HARDIE** | **OCTOBER 15, 2015, 12:47**
REPLY TO THIS COMMENT

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