

RFID Reading via PN532

by Team Dodo Birds
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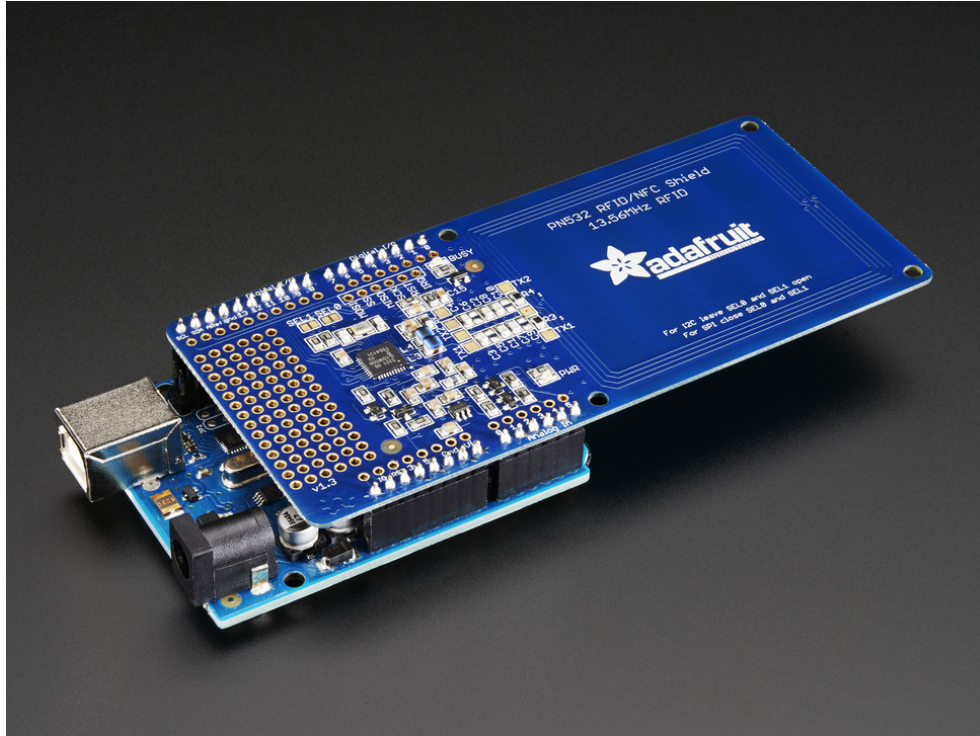


Image Credit: <https://www.adafruit.com/product/789>

Introduction

This guide will guide you into connecting an Adafruit PN532 module onto a Beaglebone Green through SPI. This includes both the hardware component of connecting the PN532 module onto the Beaglebone and configuring the PN532 to use the correct mode, and the software component of installing the drivers and sample code to be able to read card ID from RFID cards.

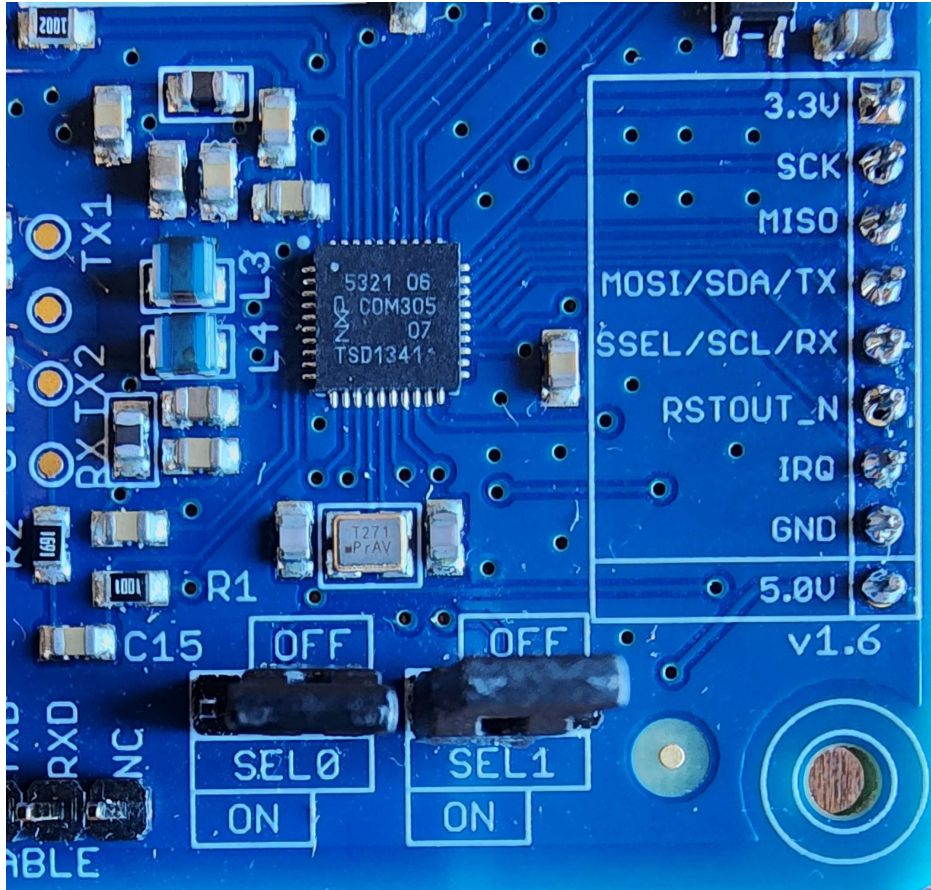
Hardware Connection

Connecting the Beaglebone Green to the PN532 will require several pins to be used. The pins are flexible, but they may require cannibalizing pins being used by the Zencape.

Connect the PN532 to the Beaglebone as follows:

PN532	Beaglebone Green	Notes
3.3V	VDD_3V3 (P9-3 or P9-4)	
SCK	P9-22, the only pin that supports "spi_sclk" mode	This is also used by the speaker, unfortunately no other pins will work here
MISO	Any pin supporting "spi" mode (P9-21 recommended)	
MOSI	Any pin supporting "spi" mode (P9-18 recommended)	
SSEL	Any pin supporting "spi_cs" mode (ex. P9-17, P9-19, P9-20)	
RSTOUT_N	Unused	
IRQ	Unused	
GND	DGND pin (ex. P9-1 or P-2)	
5.0V	Unused	

Afterwards, you will need to configure the PN532 to use SPI mode if it is not already configured. You can do this by setting the "SEL0" jumper to OFF, and the "SEL1" jumper to ON. Follow the guide located on the pins, or see the below picture.



Installing the Software

Adafruit provides official drivers for the PN532. The C version relies on Arduino, but we are using Beaglebone so it will not be usable without significant changes (if you want to do that, you are happy to do that!). Thus, we will focus on the Python drivers.

Follow all these steps on the **Beaglebone**.

First, let's install Python onto the Beaglebone if not already:

```
(bbg)$ sudo apt-get update
(bbg)$ sudo apt-get install build-essential python3-dev python3-pip
-y
```

Next, we will install the generic Adafruit Beaglebone drivers. Unfortunately, due to a bug in the official drivers, we will need to make a fix in the drivers before we install. The next steps are based off this Github issue: <https://github.com/adafruit/adafruit-beaglebone-io-python/issues/362>

First, clone the repo:

```
(bbg)$ git clone https://github.com/adafruit/adafruit-beaglebone-io-python.git
```

Then, as per the Github issue, add the following lines in `py_gpio.c` before line 602:

```
#if PY_VERSION_HEX >= 0x03070000 && !defined(PyEval_ThreadsInitialized)
#define PyEval_ThreadsInitialized() 1
#endif
```

Then, manually install the package:

```
(bbg)$ sudo python3 setup.py install
```

Next, install the other packages:

```
(bbg)$ sudo pip install adafruit-circuitpython-pn532
```

Using the PN532

On each startup of the Beaglebone, you will need to configure the pins. As a reminder, the pin you used for SCK needs to be set to `"spi_sclk"`, the pin used for SSEL needs to be set to `"spi_cs"`.

In addition, the Adafruit drivers do not properly detect the Beaglebone Green, so we must manually force the drivers to use the Beaglebone Green driver. You can do this by setting the `"BLINKA_FORCEBOARD"` environment variable to `"BEAGLEBONE_GREEN"`. This can be programmatically done in Python as so:

```
import os
os.environ["BLINKA_FORCEBOARD"] = "BEAGLEBONE_GREEN"
```

After that, let's write the setup code to allow our Python file to use the PN532:

```
# Import the required libraries
import board
import busio
from digitalio import DigitalInOut
from adafruit_pn532.spi import PN532_SPI

sck_pin = board.P9_22 # if you somehow used a different pin, change
P9_22 as needed
mosi_pin = board.[pin used for mosi] # If you used the recommended
pin, that would be board.P9_18
miso_pin = board.[pin used for miso] # P9_21 if recommended pin used
ssel_pin = DigitalInOut(board.[pin used for ssel])

spi = busio.SPI(sck_pin, mosi_pin, miso_pin)

pn532 = PN532_SPI(spi, ssel_pin, debug=False)

pn532.SAM_configuration()
pn532.listen_for_passive_target()
```

After setting up the PN532 in your Python code, you can read RFID cards by using the `pn532.read_passive_target(timeout=0.5)` method. It will return a bytearray of the cards ID if one is near the reader, otherwise it will return None.

(The above code is adapted from example code provided from Adafruit:
https://github.com/adafruit/Adafruit_CircuitPython_PN532/blob/main/examples/pn532_simpletest.py)

Troubleshooting

PN532 is not detected

If you get an error saying the PN532 is not detected, make sure:

- The wires connecting the Beaglebone to The PN532 are snug and in the correct pins
- The pins are properly configured with config-pin
- The correct pins are set in your Python code

Program crashes after reading RFID

This sometimes happens, and usually occurs due to a loose connection somewhere. In addition, the PN532 does not support reading credit cards, so do not try reading credit cards through the PN532 reader.

RFID cards are not being read after program runs for some time

Due to a bug with the PN532 drivers, after some time it may be possible the PN532 will stop reading RFID cards. There is no fix other than restarting the program.

Conclusion

After completing this guide you will have successfully:

- Connected your PN532 to the Beaglebone
- Setup your PN532 to use SPI mode
- Installed the official Python drivers for the PN532
- Created a Python file to read the card ID's off RFID chips