Data acquisition with the AD7705 on the raspberry PI

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Chapter 1

Data acquisition with the AD7705 on the raspberry PI!

The AD7705 is a two channel sigma delta converter which has differential inputs, a PGA and programmable data rates. It's perfect for slowly changing inputs such as pressure, temperature, heart rate etc.

This repo offers the class `AD7705Comm` which does all the low level communications with the AD7705. The user just need to register a callback handler which then returns the samples in realtime.

The class uses the DRDY of the AD7705 connected to Port 22 and waits for a falling edge on this port to read the data. This is done via interrupts / poll so that the ADC process sleeps until new data becomes available.

Github: `https://github.com/berndporr/rpi_AD7705_daq`

Chapter 2

Class Index

2.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

Chapter 3

Class Documentation

3.1 AD7705callback Class Reference

Callback for new samples which needs to be implemented by the main program.

`#include <AD7705Comm.h>`

Public Member Functions

- virtual void hasSample (float sample)=0
  Called after a sample has arrived.

3.1.1 Detailed Description

Callback for new samples which needs to be implemented by the main program.

The function hasSample needs to be overloaded in the main program.

3.1.2 Member Function Documentation

3.1.2.1 hasSample()

```
virtual void AD7705callback::hasSample (
            float sample )  [pure virtual]
```

Called after a sample has arrived.

Parameters

sample	Contains the ADC reading in Volt.

The documentation for this class was generated from the following file:

- AD7705Comm.h

3.2 AD7705Comm Class Reference

This class reads data from the AD7705 in the background (separate thread) and calls a callback function whenever data is available.

`#include <AD7705Comm.h>`

Public Member Functions

- AD7705Comm (AD7705settings settings)
  Constructor.
- ~AD7705Comm ()
  Destructor which makes sure the data acquisition has stopped.
- void registerCallback (AD7705callback *cb)
  Registers the callback which is called whenever there is a sample.
- void unRegisterCallback ()
  Unregisters the callback to the callback interface.
- void start ()
  Starts the data acquisition.
- void stop ()
  Stops the data acquistion.

3.2.1 Detailed Description

This class reads data from the AD7705 in the background (separate thread) and calls a callback function whenever data is available.

3.2.2 Constructor & Destructor Documentation

3.2.2.1 AD7705Comm()

```
AD7705Comm::AD7705Comm (
            AD7705settings settings )
```

Constructor.

Opens the SPI device and waits for to start the acquisition.

Parameters

settings	All AD7705 settings.

3.2.3 Member Function Documentation

3.2.3.1 registerCallback()

```
void AD7705Comm::registerCallback (
            AD7705callback * cb )
```

Registers the callback which is called whenever there is a sample.

Parameters

cb	Pointer to the callback interface.

The documentation for this class was generated from the following file:

- AD7705Comm.h

3.3 AD7705settings Struct Reference

Contains all settings for the data acquisition.

```
#include <AD7705Comm.h>
```

Public Types

- enum SamplingRates { **FS50HZ** = 0, **FS60HZ** = 1, **FS250HZ** = 2, **FS500HZ** = 3 }

  Sampling rates.
- enum PGAGains {
  G1 = 0, **G2** = 1, **G4** = 2, **G8** = 3,
  G16 = 4, **G32** = 5, **G64** = 6, **G128** = 7 }

  Gains of the PGA.
- enum AIN { **AIN1** = 0, **AIN2** = 1 }

  Channel indices.
- enum Modes { **Bipolar** = 0, **Unipolar** = 1 }

  Unipolar or bipolar mode.

Public Attributes

- std::string spiDevice = "/dev/spidev0.0"

  The SPI device in /dev used.
- SamplingRates samplingRate = FS50HZ

  Sampling rate requested.
- PGAGains pgaGain = G1

  Requested gain.
- AIN channel = AIN1

  Requested input channel (0 or 1)
- Modes mode = Unipolar

  Unipolar or biploar.

3.3.1 Detailed Description

Contains all settings for the data acquisition.

The documentation for this struct was generated from the following file:

- AD7705Comm.h

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