Objective

Design a driver that can be used to configure an ADXL345 Accelerometer and read data from it using the **SPI** protocol.

SPI API Design

Initializing SPI

SPI Module: SPI1

Alternate function: *AF05*

1. Enable clock access to GPIO A.
2. Set pins to alternate function mode and set the alternate function to AF05.
3. Enable Clock access for SPI1 module. (APB2 bus).
4. Set it to master.
5. Set data size.
6. Set CPOL = 1 and CPHA = 1.
7. Set MSB first.
8. Set clock frequency.
9. Set NSS to software slave management.
10. Enable SPI1.

GPIO Configuration

SPI connection	GPIO pin
NSS	PA4
SCK	PA5
MISO	PA6
MOSI	PA7

SPI Mode: CPOL = 1 and CPHA = 1*(Refer to ADXL345 Datasheet)*

Write function
Arguments

1. Data array.
2. Data size (Number of bytes).

Code design
1. Check if the bus is busy.
2. Ensure that TXE is set to 1.
3. Write first data item to transmit to the DR register.
4. Wait until TXE=1 and write the second data item to be transmitted.
5. After all data items are written ensure that TXE=1, Bus is free and clear OVR flag.

The software must ensure that the TXE flag is set to 1 before attempting to write to the Tx buffer. Otherwise, it overwrites the data previously written to the Tx buffer.

Read function
Arguments
1. Data array.
2. Data size (Number of bytes).

Code design
1. Check if the bus is busy??
2. Wait until RXNE=1 and read DR to get data.

ADXL345 API Design

Initializing ADXL345

1. Initialize SPI1.
2. Set data format to +/- 4g.
3. Reset all bits.
4. Set ADXL to measuring mode.

Writing to ADXL345

Function arguments
1. Memory address
2. Data

Code design:

1. Set the multiple-byte bit, located after the R/W bit in the first byte transfer for multi-byte read/write in a single transmission, (Refer to Figure 37 in ADXL345 datasheet).
2. Pull CS low.
3. Call SPI write function.
4. Pull CS high.

Reading from ADXL345

Arguments:

1. Memory address.
2. Data .

Code design:

1. Set R-bit and multiple byte bits.
2. Pull CS low.
3. Send address.
4. Read data (6 bytes).
5. Pull CS high.

SPI and ADXL345 API interaction sequence diagram