PV198 - SPI II

One-chip Controllers

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Intro

- Switch the branch to *Week_09*!
- Discussion of HW8

Context

- In some cases it is necessary to serve not to rule.
- Goal is to implement SPI slave functionality:
  - Instead of driving SPI bus, react to master device.
- Data should be prepared in advance, goal is to react to requests:
  - You will be provided an interface with 3 features in **blocking mode**
  - and you will implement these features **non-blocking mode**.

Goal

SPI slave will be able to react to two types of messages, type of message is deduced from first byte:

1. `WRITE`: print all subsequent bytes to UART.
2. READ: report latest measured ADC value.

First byte in slave's reply is a counter - number of correct communications completed.

Template

Template uses a non-blocking polling method:

1. `DSPI_SlaveUserCallback`
   This function is called after a transfer is finished (similar to interrupt).
2. `while (!isTransferCompleted)`
   This while loop keeps you blocked, remove it with caution.
3. The rest of implementation is up to you.

Wiring

Rpi pico	FRDM-K66P
GND	GND
GP2	PTD1
GP3	PTD3
GP4	PTD2
GP5	PTD0

Counter

Counter header:

1. Every time you finish either `WRITE` or `READ` operation, count increases.
2. Count is represented by 8bit unsigned number. It can overflow.
3. Repeated comunication with neither `READ` nor `WRITE` does not affect the counter.

READ

Read ADC value:

1. Read values from ADC1 `SE_13`.
2. Read command is identified by value `0x55`.
3. Expected ADC value is Big Endian, 12bit long.
4. Prepare ADC value in advance.

WRITE

Transmit 16 recieved bytes recived by SPI to UART:

1. Configure PTB11 as `UART3_TX`.
2. Write command is identified by value `0xCC`.
3. You will recieve a chunk of 16 bytes. After you get them all, print your data to UART.
4. Beware: blocking transmit on UART might give you problems in callback.

Homework

Finish assignment for the lesson.

Scope of lesson is deliberately larger.

Bonus

Recieve chunks of 3 bytes.

1. Configure PTB10 as `UART3_RX`.
2. Write command is initialized by value `0x37`.
3. You will be asked to return 3 bytes stored, that you recieved by `UART3_RX`.
4. If there were no data stored, return random data but do not increment counter.
5. Make internal memory 64messages long. If more massages recieved, overwrite the oldest one.

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