

EE-334

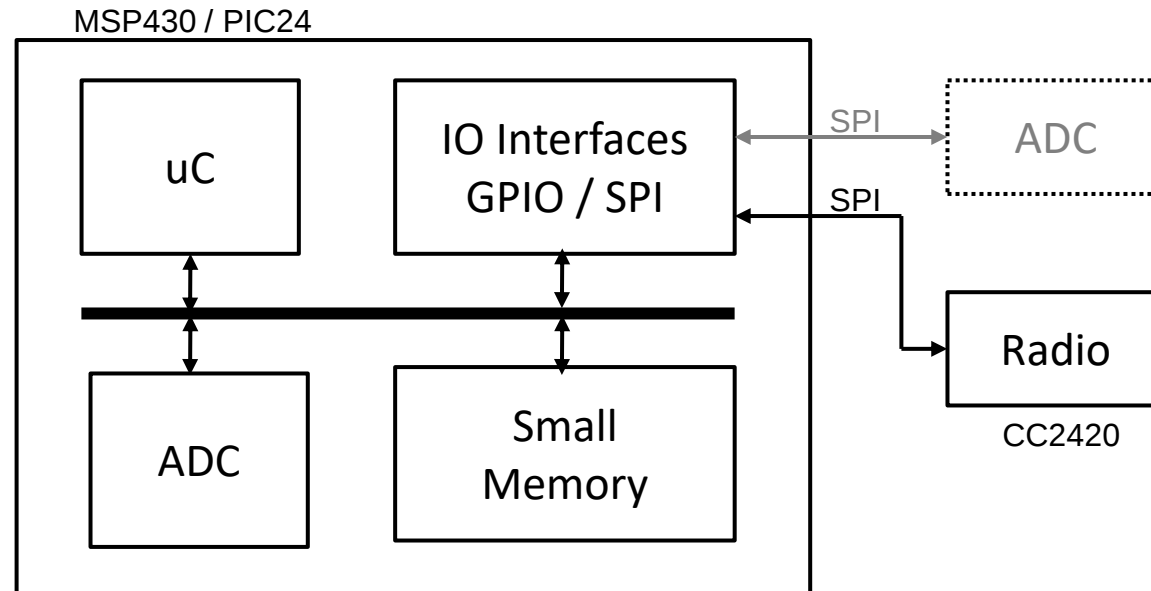
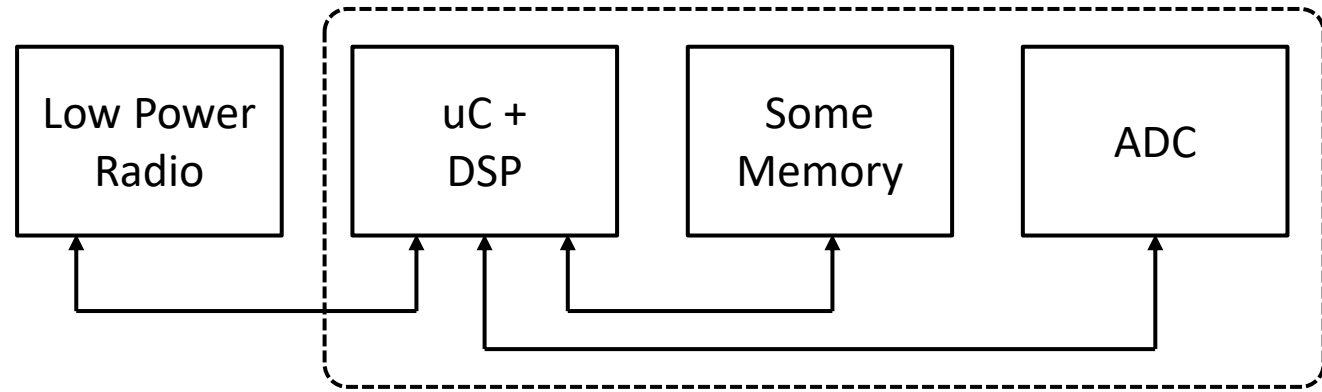
Digital System Design

Discussion for Exercise 1a
System Design

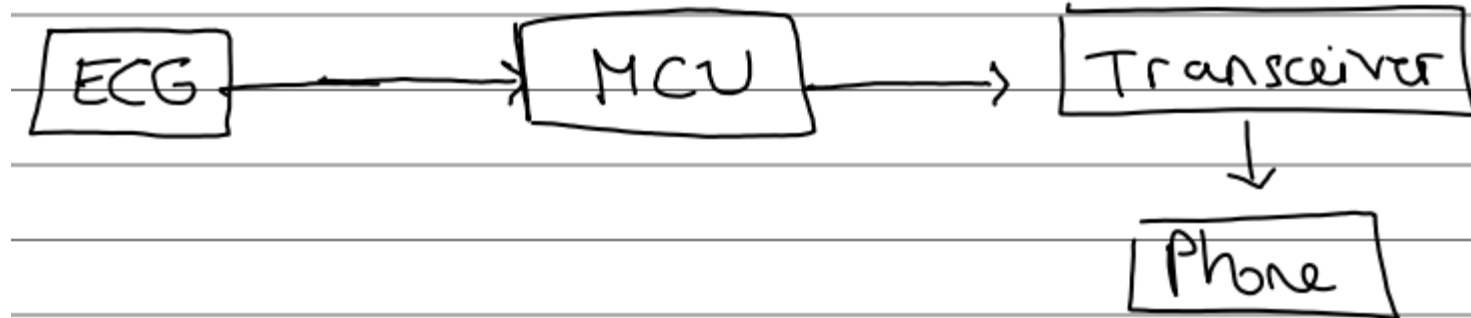
Andreas Burg
2021

IoT Sensor Node

- Slow ADC
- Some on-board DSP and Control: uC
- Low-power radio
- Low-power

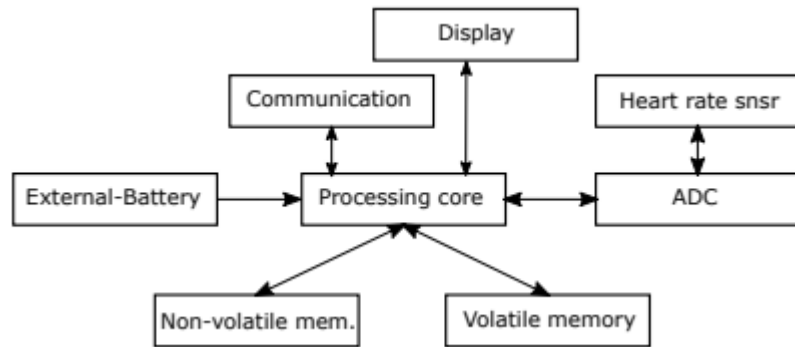


IoT Sensor Node: common mistakes

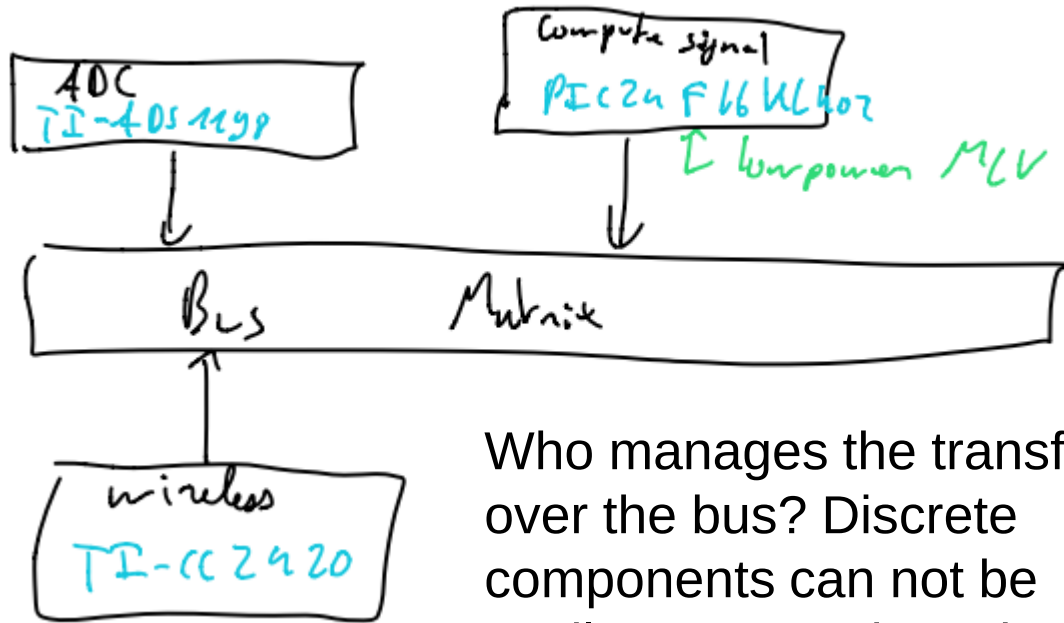


Too simple.
Need more details

IoT Sensor Node: common mistakes

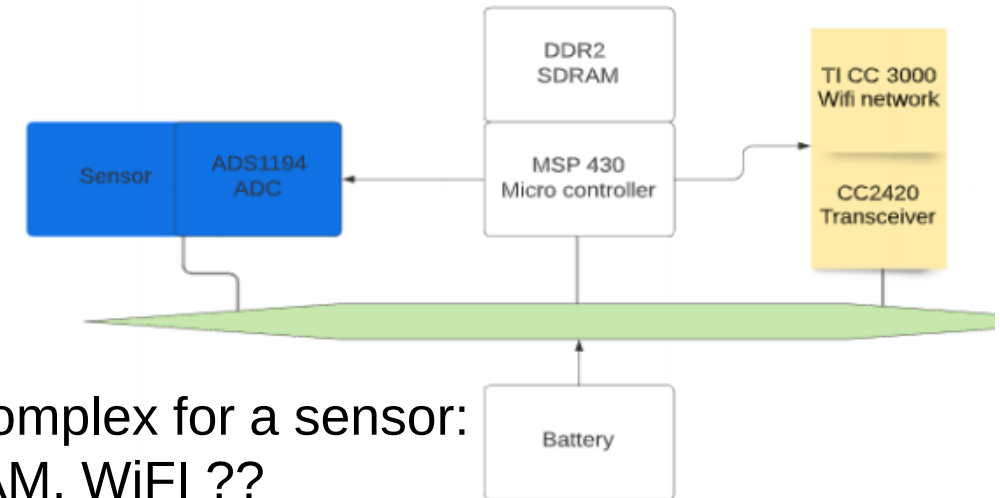
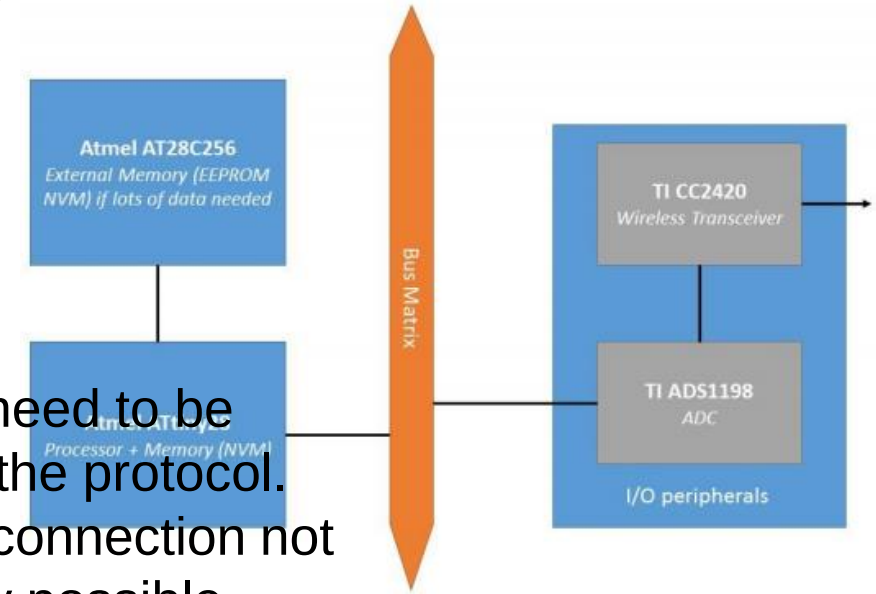


Too generic & connectivity not shown



Who manages the transfers over the bus? Discrete components can not be easily connected to a bus

Components need to be compatible in the protocol.
Data transfer/connection not always directly possible

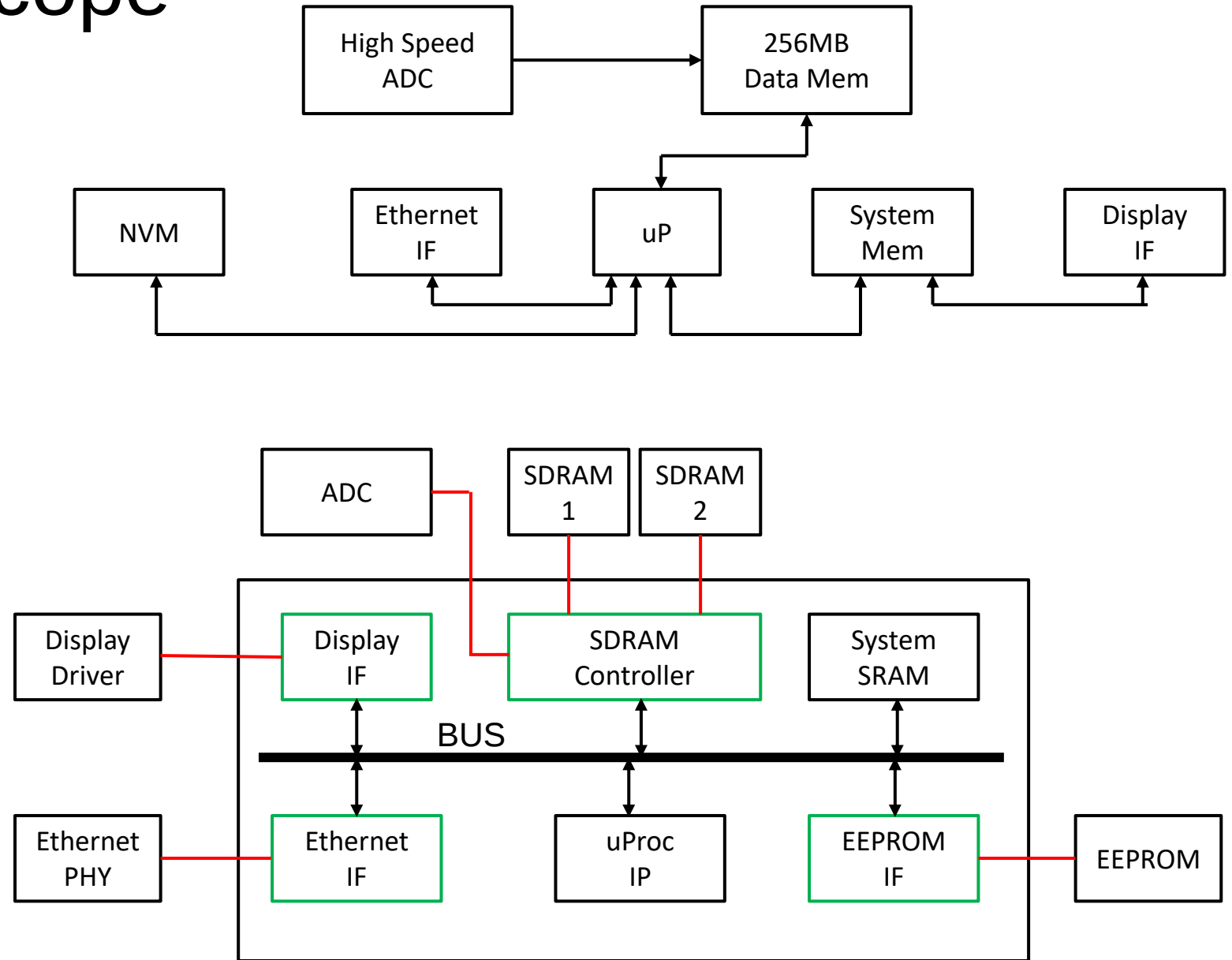


Too complex for a sensor: SDRAM, WiFi ??

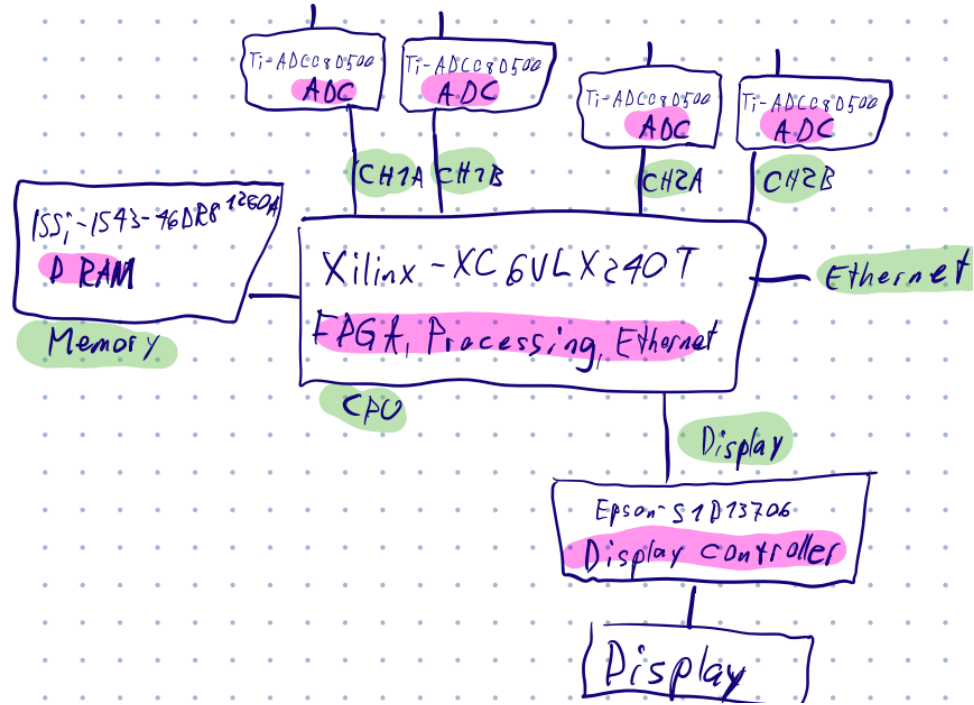
Sampling Oscilloscope

- 256 Mbyte Memory
- 2 channel ADC 1GSPS
- Small NVM
- LCD Display, some system memory
- Ethernet: analog PHY & controller
- Some form of Capable uPprocessor with some system memory

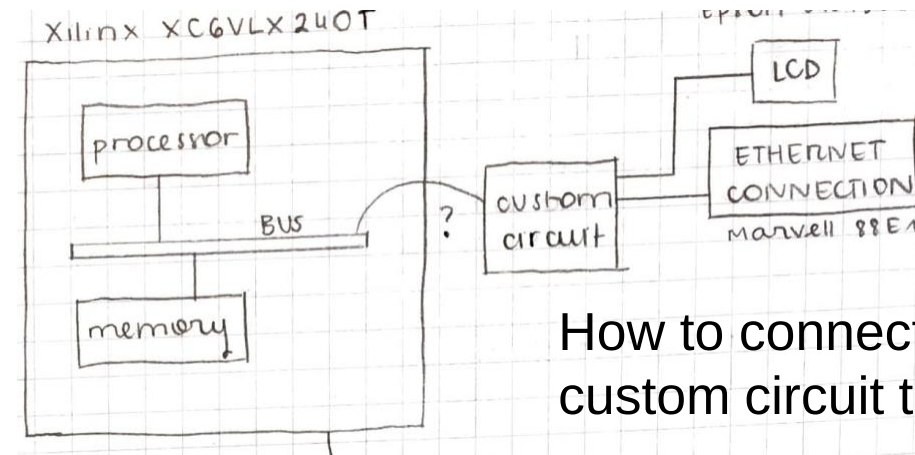
— custom protocol
 [] custom component



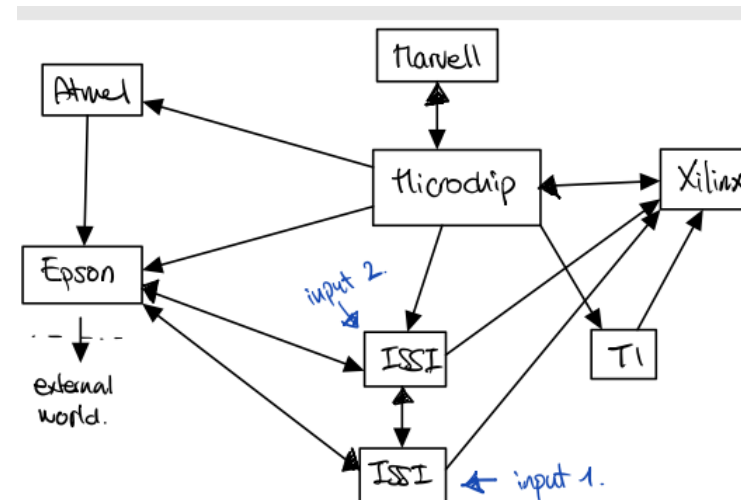
Sampling Oscilloscope: common mistakes



FPGA Details Missing



How to connect the external custom circuit to the bus?



All talks with all?
Blocks have too many interfaces

Parts List

- Atmel ATtiny28 : Tiny uC, GPIO
- TI MSP430F149 : uC with ADC and interfaces
- Microchip PIC24F16KL402 : uC with ADC, peripheral interfaces, data EEPROM
- Atmel AT28C256 : Small EEPROM NVM
- ISSI IS43-46DR81280A : 128MB SDRAM
- Epson S1D13706 : LCD controller (custom interface)
- Marvell 88E1111 : Ethernet PHY (needs some control)
- TI ADC08D500 : High Speed ADC
- TI ADS1198 : Low power ADC
- TI CC2420 : Low Power Radio
- TI CC3000 : High Perf WiFi
- Xilinx CoolRunner-II : Small CPLD
- Xilinx XC6VLX240T : Large FPGA