Assignment #1 – Hardware

Due 22/11, at 17:00
Please put your printed report in Philippe Bonnets mailbox

When answering the following questions, you should consult the following documents, available from ftp://ftp.diku.dk/diku/users/madsyd/13192EVB/

MC13192 Evaluation Board, Reference Manual
MC13192 Data Sheet
MC13192 Reference Manual
HCS08 Microcontrollers Data Sheet
13192EVB Schematics

Please answer the following 35 questions in a short and concise manner.

The 13192EVB Platform

1. What are the components of the 13192EVB platform?
2. How can the platform be powered?
3. What is the exact name of the MCU?
4. What is the role of the MCU?
5. What is the exact name of the radio chip?
6. How does the MCU/CPU communicate with the radio chip? (Answer the question for both physical and logical communication).
7. What frequency does the oscillator run at? (Hint: It is fixed and connected to the radio chip).
8. What is the purpose of the FTDI chip? (Hint: What is the chip connected to?)
9. What is the purpose of the Maxim chip? (Hint: What is the chip connected to?)
10. What are the antenna options of the 13192EVB?
11. Bonus question: What length would you expect the builtin antenna to have, and why?

The MCU

12. List the most important components of the MCU.
13. What modes of operation (sleep, idle, etc.) are supported, and how are they characterized?
   What are the typical power consumption numbers?
14. What clock frequency range does the CPU run at?
15. What is the relation between the CPU clock frequency and the BUS frequency?
16. What kind(s) of memory does the MCU include?
17. What is the zeropage?
18. In what sizes can the Flash be erased/programmed?
19. What is the role of the watchdog?
20. What kind of serial communication does the MCU support? What can you imagine using serial communication for on a sensor network node?

The CPU

21. What are the registers of the CPU, and what are they (typically) used for? What are their
22. What is the reset status register used for? Give examples of how it can be leveraged.
23. What is the size of the interrupt vector?
24. Are interrupts by default allowed to be nested or not?
25. Describe the interrupt stack frame of the CPU. Explain where the high byte of register X goes. Where would you have put it, if you had designed the CPU? What do you expect the compiler do?

The Radio Chip

26. Characterize the radio chip. Include information about supported frequencies/channels, power consumption, and anything else you find relevant, that is not covered by the following questions.
27. What are the sleep/idle modes supported by the radio chip?
28. The chip includes the ability to timestamp incoming messages, and to use timers to wake up/transmit messages. Characterize these abilities. How could they be leveraged?
29. The chip includes a receive and transmit buffer. What are the sizes of these?

The Connectors

30. What kind of physical connections can easily be made to the platform?
31. What is the BDM port used for?
32. Which ports on MCU drive the leds?
33. Which interrupt(s) are the pushbuttons connected to?
34. What ports are available at the j107 connector?
35. How do you suppose one connects an analog sensor, such as a thermometer, to the 13192EVB?