Resource Constrained IoT Devices Assignment

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Weight

- 40%

Assignment T1

- Read: “A Survey on Sensor Networks” by Akyildiz et al
- Read either:
  - “Time Synchronization in Sensor Networks: A Survey” by Sivrikaya and Yener
  - “In-network Aggregation Techniques for Wireless Sensor Networks: A Survey” by Fasolo et al
  - “MAC Protocols for Wireless Sensor Networks: a Survey”

Assignment T1

- Describe main challenges of low-power WSNs and resource constrained IoT devices
- Describe for either technique chosen (time synchronisation, in-network data aggregation, or MAC protocols):
  - What challenges does such a technique address
  - What different trade-offs are inherent in providing a solution to the different challenges and various proposed methods
- Provide a written report of not more than 1500 words, and prepare a presentation of between 7-10 minutes.

Assignment T2

- 1. Arduino coding Tasks - provide a report for the following
  - a) Write assembly that moves the value 0x23 into R29
  - b) Write assembly that adds values 0x17 and 0xCE, and places the result in R19
  - c) Write assembly that adds 2 to the contents of R18
  - d) Write assembly that adds values 0x17 and 0xCE, and places the result in memory address 0x400

Assignment T2

- 2.
  - What will be returned from the following code, to a c calling function using the following c signature: extern uint8_t testasm();
  - Explain the assembly code

```
.global testasm
  testasm:
  toret = 24
  mydta = 12
  mymem = 0x164
  rrr = 123
  factor = 0x10
  ldi r19, mydta
  ori r19, factor
  sts mymem, r19
  mov toret, r19
  ret
```

Assignment T2

- 3.
  - Write assembly code that will add two 16-bit numbers and return the result
  - The assembly code must accept parameters from c code and return the value to the c callee.
  - The c signature should be:
    extern uint16_t addasm(uint16_t ia, uint16_t ib);

Assignment T2

- 4.
  - Implement: uart_println() function that takes in a string and send each character followed by **\n** (newline) without using the Arduino Serial library