CSE522 Assignment 4 Optimization approach Report

TEAM-02

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We have developed a distance sensor channel for HC-SR04 and an I2Cbased EEPROM device driver (a Microchip 24FC256 CMOS EEPROM) in Zephyr RTOS running on Galileo Gen 2. s. When the Galileo board is booted up, two instances of HC-SR04 sensor instances (HCSR0 and HCSR1) and one instance of EEPROM device are created. We are reading the distance via the HC-SR04 sensor and recording the distance and the timestamp in EEPROM. The user is required to enter shell module commands to select the sensor and then to read/write data into EEPROM.

As per the assignment guidelines when we enter 'start p' shell command, our application will first erase all pages and then take distance and timestamp measurements based and will write them in 'p' pages in EEPROM. Now, to optimize or make the distance measurement and writing faster, we have implemented two threads which can execute in parallel. Thread 1, which will store the distance and the timestamp in a buffer (whose size is equal to page size i.e. 512 bytes) and the other thread, Thread 2 will start writing the data as soon as one buffer measurements by thread 1 are ready. To execute this, we have used semaphores to make thread 2 wait until thread 1 has finished storing data in buffer 1. So, thread one gives the semaphore after each buffer to thread 2. So, while the second thread is writing the data into EEPROM, first thread can continue reading values from the sensor and keep storing it in consecutive buffers which will be passed to second thread after completion. By this we are not making the two processes wait for each other as they are running parallelly.

Also, we have minimized the 'printk' statements in the driver and main function to avoid any additional overheads in printing and storing the values. Also, we have put only necessary required delays in the code to make the execution faster. Apart, from this due to time constraint we were not able to apply other optimization techniques.