

Lab 3 Report – MECHTRON 3TA4

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This lab implements the i²C EES and an external EEPROM chip along with the STM32's Real time clock in order to implement a clock that can be 1.) Display the Time and Date. 2.) Set the Time and Date and 3.) Record the time when the user button is pressed, write it into the external EEPROM and then read the last 2 times the button was pressed from the external EEPROM.

The way we implemented the code was using a very direct method. Using the given libraries, we set up the circuit as it was given to us and set 2 external buttons connected to our GPIOs and used the internal resistor on pull up mode along with the user button to interact with our program. The 24C EEPROM was connected to our STM32 microcontroller and then we began programming.

Our program runs in 2 states. State 0 is the reset/starting state and within this state, the time is constantly displayed using the RTC. The RTC was initialized along with the 2 external buttons. When the user button is pressed, the EXT interrupt handler sends an interrupt that changes our UB_Pressed constant from 0 to 1, this notifies our main function that the user button has been pressed and as it is held, the date is shown. When the button is released the date disappears along with it. Furthermore, when the user button is pressed and held down, only the instant where the user button has been pressed records the time taken where the user button has been pressed and writes the buffer value of the second, minute and hour into our EEPROM using the SEE_writebuffer function. When the first external button is pressed, the last 6 recordings; second1, minute1, hour1, second2, minute2 and hour 2 are retrieved from the EEPROM using the SEE_ReadBuffer function and displayed on the LCD Screen. Another press of the button will successfully remove the displayed content from the screen.

Now we move on to state 2 of our program, the set state. Pressing External Button2 while in state 0 will move us to state 2. In this state, our program move into the set mode whereby the time and date are frozen and displayed on the LCD. The program starts in the hour mode and pressing external button 1 will continuously increment our hour value up to its maximum value. Pressing the second external button will then move us to the minute mode where it could again be set using the first external button. We then move on to seconds, day, month and finally year. The same button is used to increment all the values where the second external button is used to move between the states and the first external button is used to increment the states, just like an alarm clock. We implemented this using 6 different substates that our second external button can move us between while in state 2.

Finally, pressing the second external button will then return us to our main state where the new set time and date could be displayed.

The code has been fully commented for further information and understanding of our code, please refer to our main.cpp file.