CS 3410 Final Project Part 3 Write Up Timothy Lytkine, Lian Showl, Simon Patel

The communication protocol of our system was extended by adding an environment sensor that outputs readings for temperature and humidity. The SI7021 environment sensor was added and configured using the I2C communication protocol. A difference between this sensor and the heart rate sensor and real time clock is that it uses 3.3V rather than 5 so this had the be adjusted accordingly. In order to accommodate multiple processes (and to assure the simultaneous functionality of multiple sensors) running at once, our program needed to be forked. A child process and parent process were created.

The parent process takes commands from the terminal. These commands can send data to the Arduino, print existing stored data to the console as well as receive information to the Arduino and call functions that use this received data. The list of expanded commands includes showX, pause, resume, rate, env, hist1, histX, reset and exit. The new and/or improved commands include rate, env, hist1, histX, reset and exit. The rate command is simply a modification of a functionality present in the previous implementation of the system. It sends a command for the Arduino to send the current heart rate which is then printed to the console. The env command sends a command to the Arduino to query the temperature and humidity values from the environment sensor which are then printed to the console. The hist1 command simply prints the histogram of the current time block heart rate to the console. The histX command requests a time block number from the user in the console and prints a histogram for the heart rate values stored in virtual memory. The reset command clears all data from the backing file in virtual memory space in order to set the system up to read and store new values from the sensors. Finally, the exit command, kills the child and parent processes and exits the host program.

The child process simply requests the heart rate values from the Arduino every second. This process needed to be separate from the parent process so that the parent and child processes can wait on each other and there are no conflicts in sending and receiving data. Another distinction between the code for part3 and part2 is that two separate functions now exists. One for sending a command to the Arduino to request data from the heart rate sensor and a second one to request data from the environment sensor. The purpose of this is to allow the histogram for the heart rate values to be stored in the histogram as soon as this data is received and to differentiate the variable names for BPM, temperature, humidity and timing information. Further implementations however, would separate some of the corresponding code in the send command functions into separate functions and consolidate the send command functions into one.