The final project is to be a USB controlled Electronic DC load, with the following features:

1. Current range of "5A -15mA".( to be verified)
2. Voltage range of "50V-1mV".( to be verified)
3. Connecting to a USB port as a serial device.
4. Controlled via an application GUI throw the serial port.
5. Powered via USB. (to be verified)
6. Has the four basic modes: CC, CV, CR, and CW.
7. Data logging in any mode.
8. External triggering.
9. Output functions, initially square wave.

Communications of data internally between functions and externally:

1. Static :
   1. Average rate
   2. Maximum rate
   3. Peak rate
2. Dynamic(FIFO):
   1. Average rate
   2. Maximum rate
   3. Peak rate

Timing:

1. Total execution time of the main function.
2. Rate of execution with a tolerance of ….+-. (to be added to the function list)
3. Response time with a tolerance of ….+- . (to be added to the function list)

Preliminary list of system modes with short description:

1. Powered down:
2. Idle:
3. Constant current:
4. Constant voltage:
5. Constant resistance:
6. Constant power:
7. External triggering:
8. Output functions:
9. Error :

Priority list: (for function execution)

1. Powered down:
2. Idle mode:
   1. High priority:
      1. …….
      2. ………
   2. Medium priority:
      1. …….
   3. Low priority:
      1. …….
3. Constant current:
4. Constant voltage:
5. Constant resistance:
6. Constant power:
7. External triggering:
8. Output functions:
9. Error :

Mode execution based on the following triggering events table:

|  |  |  |
| --- | --- | --- |
| Original Mode | Next Mode | Triggering Event |
| Powered down | Error | Initial power up |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

Housekeeping functions (has no particular priority and execution time)

Error handling : ( a list with how it will be detected and how the system should respond to it)

1. Soft errors.
   1. Fault ……
      1. Test:
      2. Response:
2. Recoverable errors.
   1. Fault ……
      1. Test:
      2. Response:
3. Unrecoverable errors.
   1. Fault ……
      1. Test:
      2. Response:
4. Hard errors:
   1. Watch dog timer
   2. Brownout reset
   3. Program data corruption
   4. Fault ……
      1. Test:
      2. Response:

Task list: (list of tasks contains a set of functions, combining tasks is desirable if compatible, if not, a separation of incompatible tasks in timing or peripherals or has any conflict in any aspect, is easier to manage and less overhead)

1. Task1:
   1. Function1.
   2. Function2.
   3. …….