Project 2 - Report

Advanced Practical Embedded Software Development

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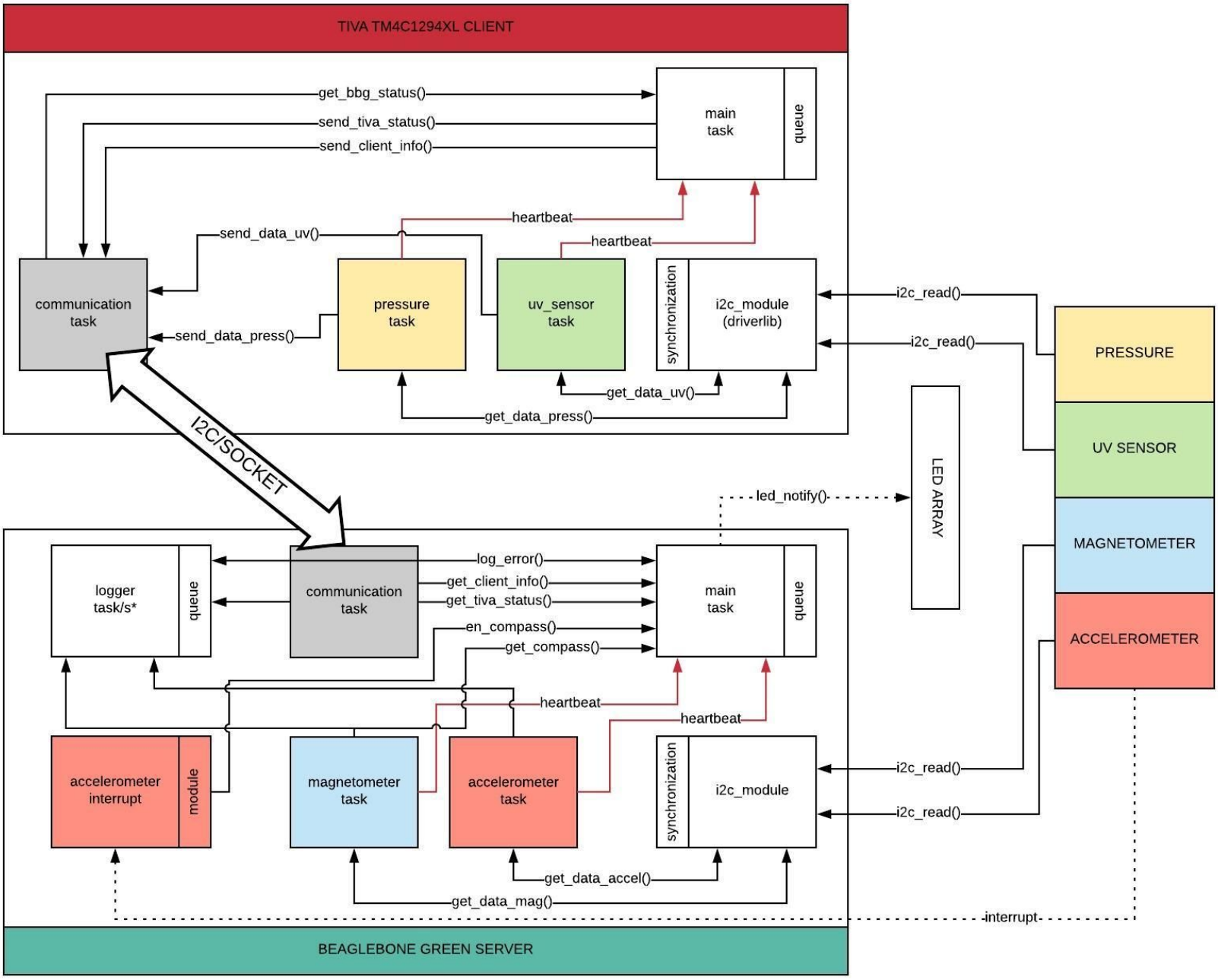
Software Architecture Diagram



SOFTWARE STRUCTURES

Structure for communication task- includes message and message type

Error notification - error level and module causing error

TASK NAMES AND RESPONSIBILITIES

Communication task - used as an interface to send and receive messages from BBG to TIVA or vice versa and to check for the validity of sent data (checksum) Can be implemented using I2C or sockets or UART

Logger Task - Present only on the BBG it is used to log messages from various clients into files and to log operations within the BBG itself. It is also used to log data and error codes.

Pressure task - For the pressure sensor to initialize and configure and collect pressure sensor data

Compass task - For the magnetometer sensor to initialize and configure and collect direction data

Accelerometer task - For the accelerometer sensor to initialize and configure and collect accelerometer sensor interrupt to wake up the processor and display compass direction

UV task - For the UV sensor to initialize and configure and collect UV sensor data to indicate night/day

Main task - Initializes all the other tasks and modules and this communicates with the logger task and the communication tasks. Check for heartbeat and error notifications from the sub-tasks in the system.

API FUNCTIONS

log_error()- Logger task logs all error notifications through this API
get_client_info()- TIVA boards info like UID to save in a log file by BBG

get_tiva_status()- Get status of the TIVA board
get _compass()- read magnetometer data
get_data_accel()- read accelerometer data
get_data_uv() - read value from ultra-violet sensor
get_data_press()- read pressure sensor data
send_bbg_status()- forward data of BBG to main task
send_tiva_status()- forward status of TIVA to main task
send_client_info()- TIVA clients status and information to the BBG Server
led_notify()- Control leds based on the message received

USER SPACE

Main task, UV Task, Accelerometer task, Compass task,Pressure task, Logger task, communication task

KERNEL SPACE

Interrupt modules for the accelerometer and I2C device drivers for Beaglebone green and TIVA board

NOTES

TIVA-Client and BBG- Server.

TIVA- timer interrupt initialized in main task should serve as heartbeat within the sensors in TIVA itself

Multiple comm interface between TIVA and BBG- UART or SOCKET or I2C**.** Specify at compile time.

Communication task should have checksum- Example TIVA sends “THIS STRING” and the md5sum of the message. BBG will receive “THIS STRING” ,calculate its own md5sum and compare with the value it received. If error, it’ll send to the logger. The logger will communicate to main task for errors and main task will blink LEDs.