MCTX3420 Team 4: Progress Report #9

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Work Done:

1. GUI Design
    a. Start redesigning GUI to use multiple pages, less cluttered
    b. Wrote test GUI to provide direct control over pins on the BeagleBone (for testing only).
    c. Started work on documentation
2. Collaboration with Electronics Team
    a. Replaced linux kernel on Electronics' BeagleBone so that they can test PWM
    b. Began work on wiki page describing Server API and shared with Electronics team: https://github.com/szmoore/MCTX3420/wiki/Server-API
    c. Wrote Server API for direct control over pins, to be used with a test GUI (see 1e - for testing only).
    d. Provided a pinout diagram indicating the pins that we can safely control. Some of the locations of PWM pins specified by Electronics (based on existing pinout diagrams) are incorrect. The correct locations were found by trial and error.
3. Collaboration with Sensors Team
    a. C170 webcam arrived. Having issues getting it to work.
        i. Although it is supported by the debian *uvc* driver, it works on a conventional laptop running debian, but not the BeagleBone. Error is "permission denied" to /dev/video0. Running as root doesn't fix this.
    b. Some unspecified USB microscope is being used for the dilatometer.
4. Login and Authentication
    a. Investigated unix style login storing encrypted passwords in a file; wrote a test program to "login"
        i. This option would require a lot of work to add advanced features, eg: "I forgot my password"
    b. Investigated using LDAP as a login system; wrote a test program to bind to UWA's LDAP server
        i. LDAP provides a great deal of flexibility, and a lot of advanced features are already implemented by pheme, eg: Recording who logs in and when.
        ii. However we need to talk to a UWA member of IT staff about using pheme.
    c. Added Login module to server program
        i. Only a single user is allowed to access the system. After a successful login, the server provides a SHA1 key as a cookie.
        ii. UWA's LDAP server is currently used as the authentication mechanism.
    d. Migrated site to SSL (HTTPS) to avoid security issues; with HTTP, username and password would be sent unencrypted.

Work Todo:

1. GUI Design
    a. Continue to redesign GUI layout
    b. High level system diagram; use diagram from week 3 as a starting point.
    c. Help menus and documentation in GUI
2. Collaboration with Electronics Team
    a. Sensor/Actuator code requires refactoring to possibly improve the sampling rate.
    b. A test circuit should be built so that we can calibrate the ADC and get an idea of the ADC noise.
3. Collaboration with Sensors Team
    a. Get the C170 webcam working on the BeagleBone, or we are screwed.
    b. Write dilatometer test program
4. Login and Authentication
    a. Determine how to use LDAP to ensure that only certain students can access the system.
        i. Investigation shows that UWA uses LDAP to store what units you are enrolled in.
    b. Talk to someone from UWA about binding to the UWA LDAP server. Navigate bureaucracy.

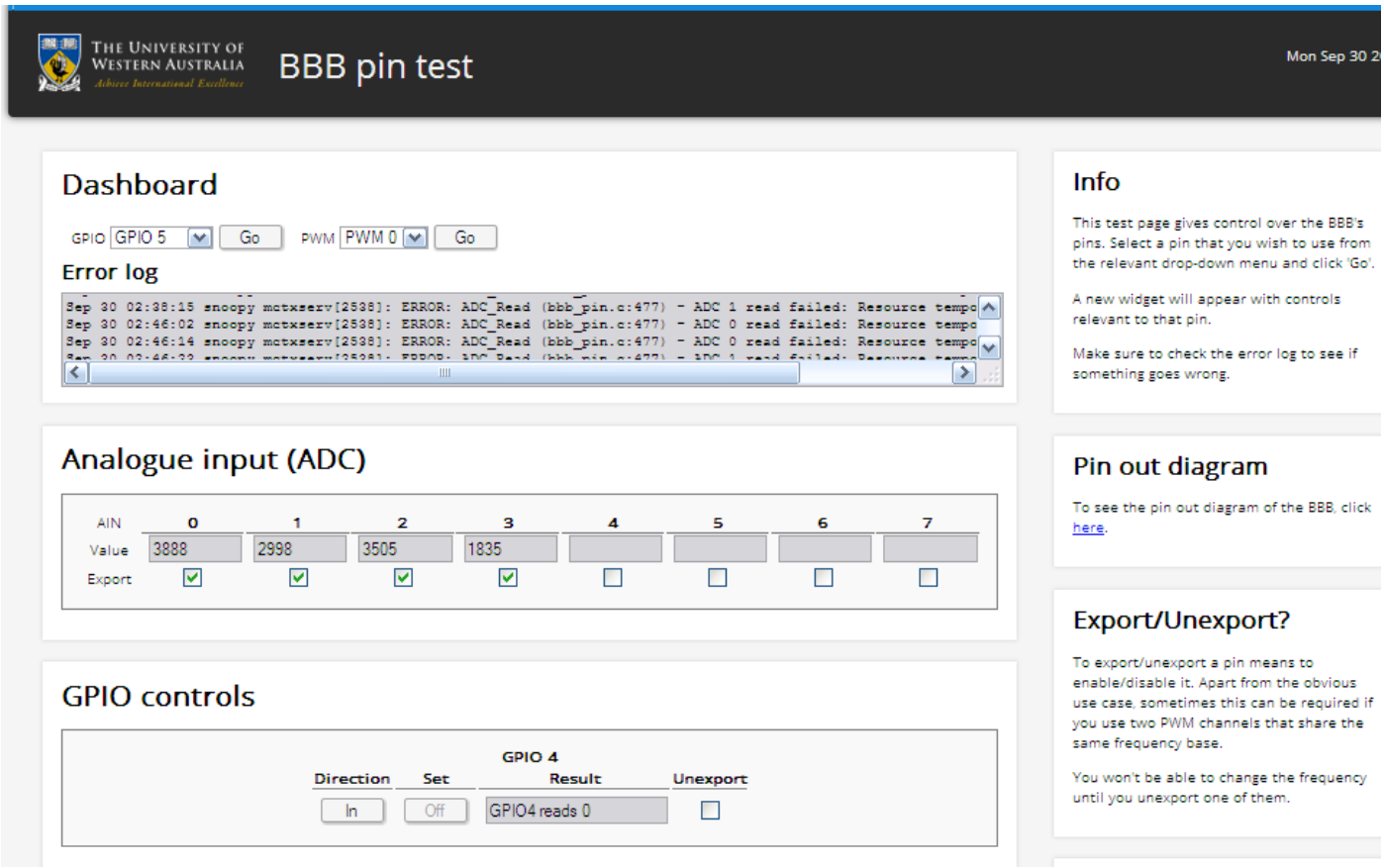

Figure 1. A pin control test page for debugging purposes

Simplified Beagle Bone Black Pin out Diagram

P9

GND	1	2	GND
DC_3.3V	3	4	DC_3.3V
VDD_5V[1]	5	6	VDD_5V[1]
SYS_5V	7	8	SYS_5V
PWR_BUT	9	10	SYS_RESET
GPIO 30	11	12	GPIO 60
GPIO 31	13	14	EHRPWM1A (PWM3) [5]
GPIO 48	15	16	EHRPWM1B (PWM4) [5]
GPIO 5	17	18	GPIO 4
I2C	19	20	I2C
EHRPWM0B (PWM1) [5]	21	22	EHRPWM0A (PWM0) [5]
GPIO 49	23	24	GPIO 15
MCASP0	25	26	GPIO 14
GPIO 115	27	28	ECAP2/MCASP0 (PWM7)[3]
MCASP0	29	30	GPIO 112
MCASP0	31	32	VADC (1.8V)
AIN4[4]	33	34	AGND
AIN6[4]	35	36	AIN5[4]
AIN2[4]	37	38	AIN3[4]
AIN0[4]	39	40	AIN1[4]
CLKOUT2 (?)	41	42	ECAP0 (PWM2) (?)[3]
GND	43	44	GND
GND	45	46	GND

P8

DGND	1	2	DGND
EMMC2 (SD card)	3	4	EMMC2 (SD card)
EMMC2 (SD card)	5	6	EMMC2 (SD card)
GPIO 66	7	8	GPIO 67
GPIO 69	9	10	GPIO 68
GPIO 45	11	12	GPIO 44
EHRPWM2B (PWM6) [5]	13	14	GPIO 26
GPIO 47	15	16	GPIO 46
GPIO 27	17	18	GPIO 65
EHRPWM2A (PWM5) [5]	19	20	EMMC2 (SD card)
EMMC2 (SD card)	21	22	EMMC2 (SD card)
EMMC2 (SD card)	23	24	EMMC2 (SD card)
EMMC2 (SD card)	25	26	GPIO 61
GPIO 86[2]	27	28	GPIO 88[2]
GPIO 87[2]	29	30	GPIO 89[2]
GPIO 10[2]	31	32	GPIO 11[2]
GPIO 9[2]	33	34	GPIO 81[2]
GPIO 8[2]	35	36	GPIO 80[2]
GPIO 78[2]	37	38	GPIO 79[2]
GPIO 76[2]	39	40	GPIO 77[2]
GPIO 74[2]	41	42	GPIO 75[2]
GPIO 72[2]	43	44	GPIO 73[2]
GPIO 70[2]	45	46	GPIO 71[2]

[1]: VDD_5V is available only when DC jack is connected
[2]: These GPIO pins are unavailable if HDMI is connected and the HDMI capes are enabled
[3]: It is unknown if these pins are reserved or not (they seem to work)
[4]: **ADC** pins are **1.8V MAX (DO NOT EXCEED)**
[5]: PWM channels *x*A/*x*B *must* share the same period. To change the frequency if both are activated, the other has to be unexported.

All **GPIO** pins operate at **3.3V levels**. Current source/sinking capacities are limited - **4–6mA out and 8mA in (DO NOT EXCEED)**

Figure 2. BeagleBone Pinout Diagram - Don't use red or dark blue pins