Senior Design: Power Supply Module

Hyperloop II: Dashboard

The following slides include screenshots of the web-based dashboard I created to monitor and control our pod for the second hyperloop competition (Summer 2017).

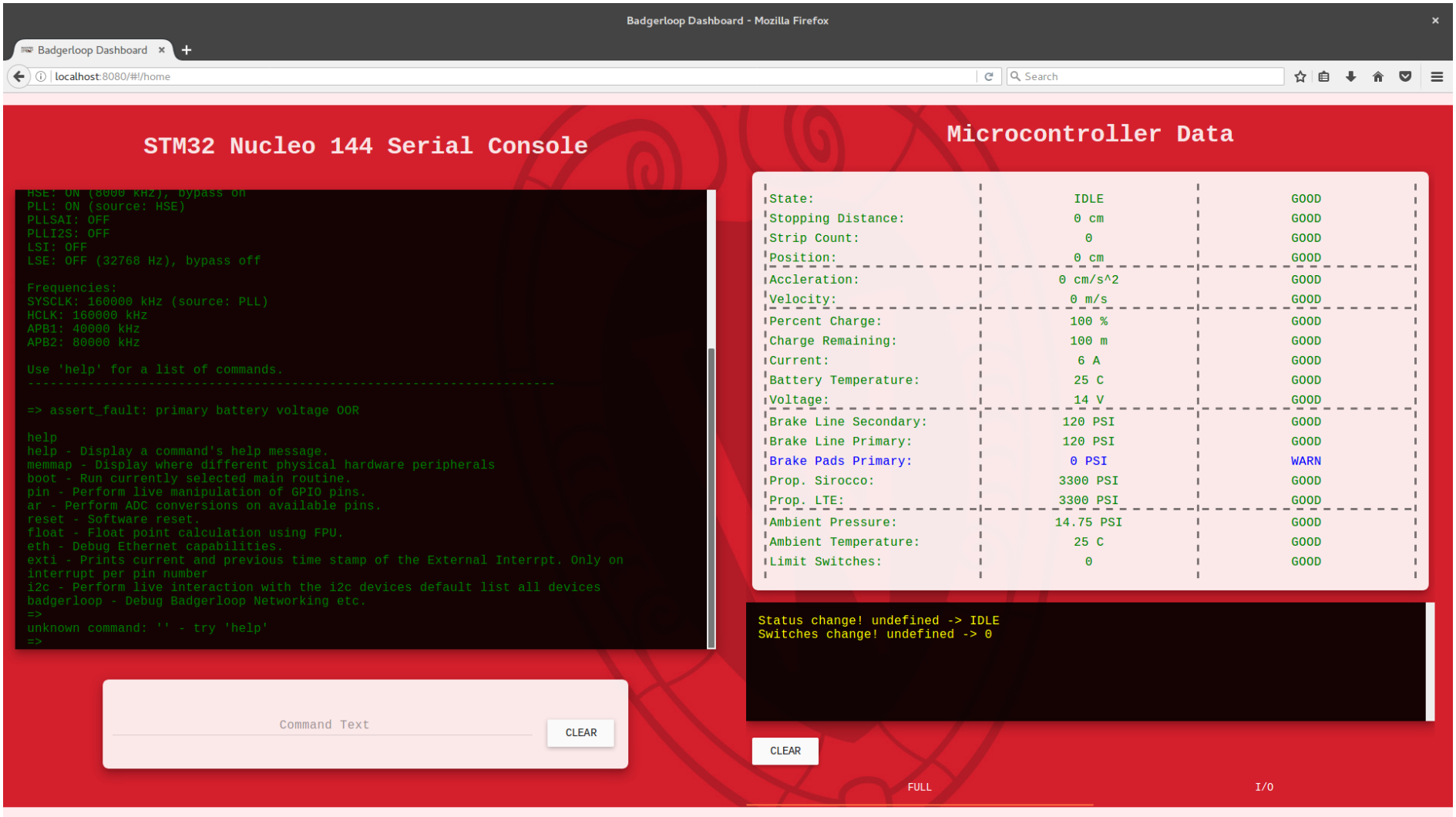
The embedded system is one STM32 Nucleo 144 F767ZI microcontroller development board. We wrote all of the firmware from-scratch and used LwIP to implement the network stack.

The "terminal" shown in the following slides is "redirected `stdout`" from the microcontroller, not an SSH session or userspace Linux program.

Bootstrapping the microcontroller's serial terminal to a web-based UI is the key feature of this UI.

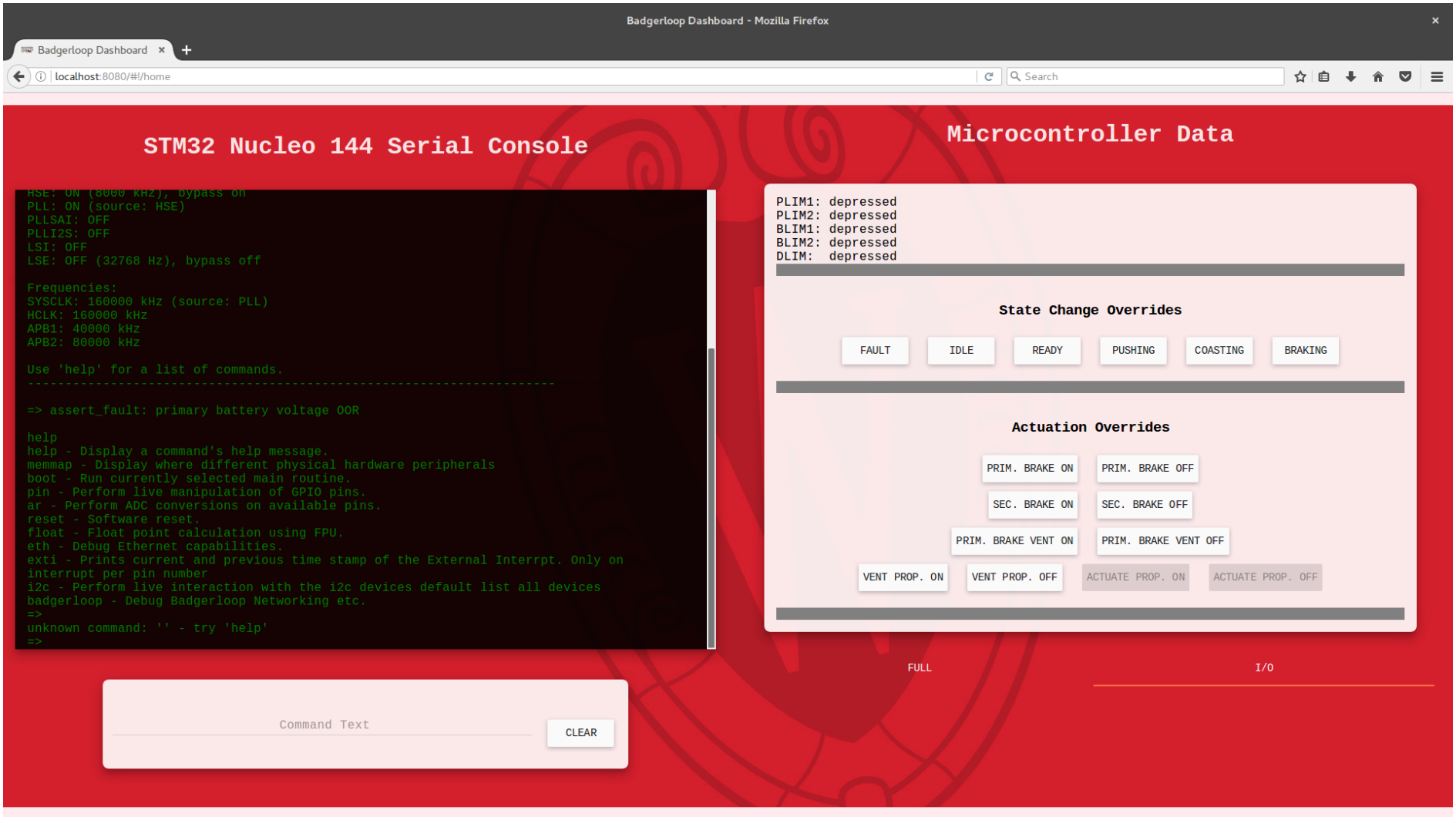
Hyperloop II: Dashboard

Console left (showing boot post and `help` command), data table right



Hyperloop II: Dashboard

Console left (showing post and `help` command), manual IO menu right



Hyperloop II: Dashboard

`memmap` output and `badgerloop` sub-commands

```
APB1 UART5 40005000 1023 bytes
APB1 UART4 40004c00 1023 bytes
APB1 USART3 40004800 1023 bytes
APB1 USART2 40004400 1023 bytes
APB1 SPDIFRX 40004000 1023 bytes
APB1 SPI3/I2S3 40003c00 1023 bytes
APB1 SPI2/I2S2 40003800 1023 bytes
APB1 CAN3 40003400 1023 bytes
APB1 IWDG 40003000 1023 bytes
APB1 WWDG 40002c00 1023 bytes
APB1 RTC & BKP rgstrs 40002800 1023 bytes
APB1 LPTIM1 40002400 1023 bytes
APB1 TIM14 40002000 1023 bytes
APB1 TIM13 40001c00 1023 bytes
APB1 TIM12 40001800 1023 bytes
APB1 TIM7 40001400 1023 bytes
APB1 TIM6 40001000 1023 bytes
APB1 TIM5 40000c00 1023 bytes
APB1 TIM4 40000800 1023 bytes
APB1 TIM3 40000400 1023 bytes
APB1 TIM2 40000000 1023 bytes

=> help badgerloop
Debug Badgerloop Networking etc.
Usage: badgerloop
DBTO - Don't brake timeout
MBTO - Must brake timeout
BCT - Braking count threshold
ACCEL - Accelerometer impulse cap
TEP - Target end position
CMPS - Centimeters per strip
override [ on | off ] - stop DAQ and override sensor data
fault - print current fault message
=>
```

Hyperloop II: Dashboard

`ar` (analog read) command output, raw 10-bit ADC

```
badgerloop - Debug Badgerloop Networking etc.
=> ar
IBATT: 279
Analog2: 279
Analog3: 280
PRP2: 274
VBATT: 284
PRP1: 282
BRP2: 285
BRP1: 287
BPR3: 282
ACCEL: 284
TH1: 293
TH2: 280
Analog13: 286
TH3: 271
TH4: 274
=> ar
IBATT: 278
Analog2: 278
Analog3: 279
PRP2: 274
VBATT: 284
PRP1: 282
BRP2: 286
BRP1: 287
BPR3: 282
ACCEL: 284
TH1: 294
TH2: 281
Analog13: 284
TH3: 270
TH4: 273
```

Hyperloop II: Dashboard

Development on the Dashboard on the road to the competition from Wisconsin