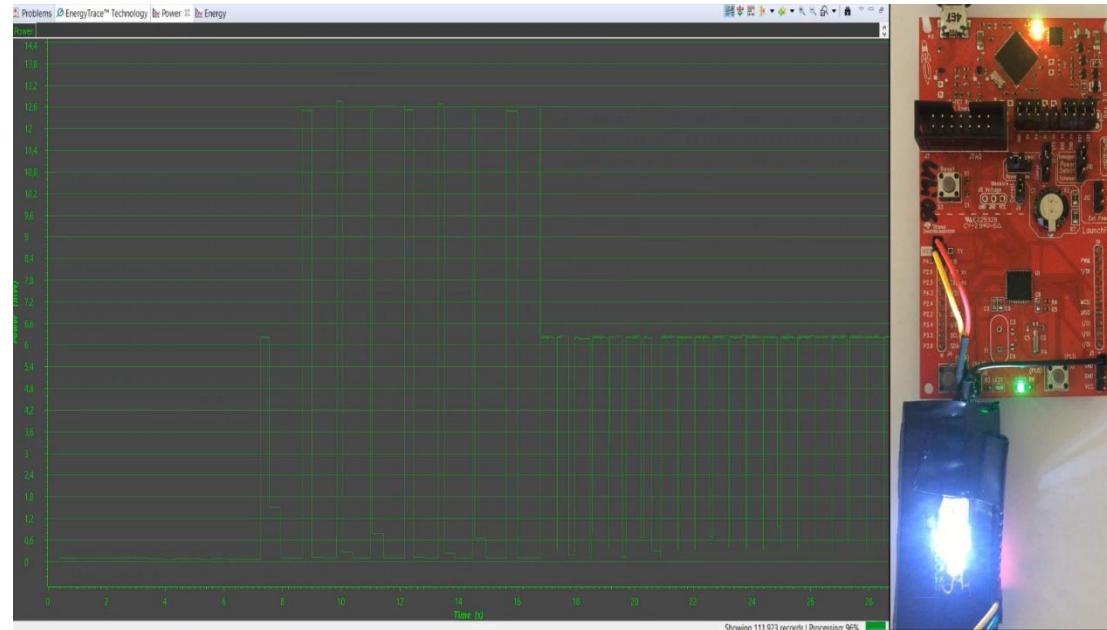


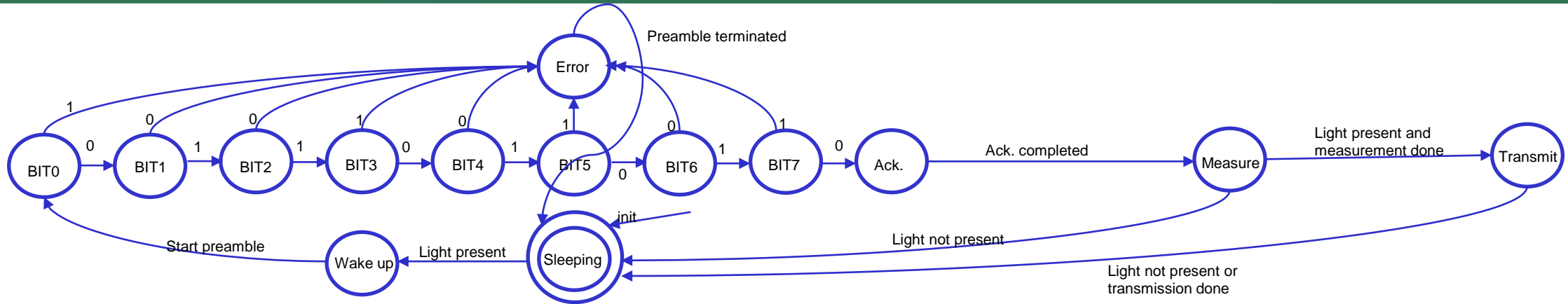
Final Project - Coin cell Challenge



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on

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Sleeping

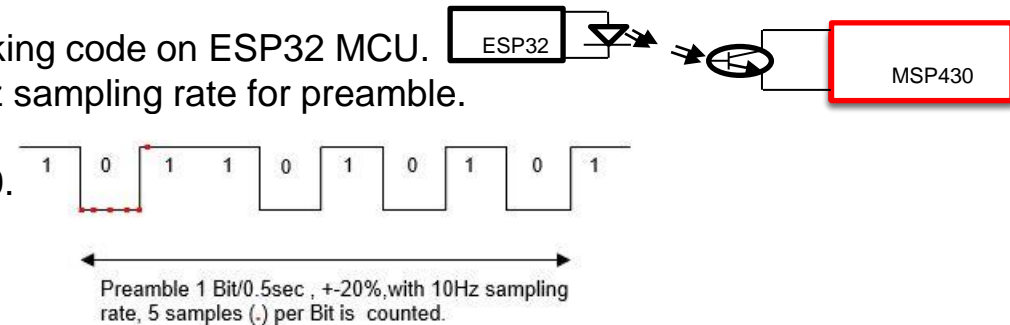
- Reset all flags just before sleeping.
- Just before sleeping turn on LED2 for 1 sec, if terminated abruptly.
- On sleep mode LPM3, ADC on 50Hz sampling using timer TA0 with ACLK 10kHz with prescaler of 4 to get 2500Hz.

Waking Up

- Flashlight and modulation with hand, implemented using a blinking code on ESP32 MCU.
- Light present for 3.27 sec Watch dog timer interval, go to 10Hz sampling rate for preamble.

Preamble

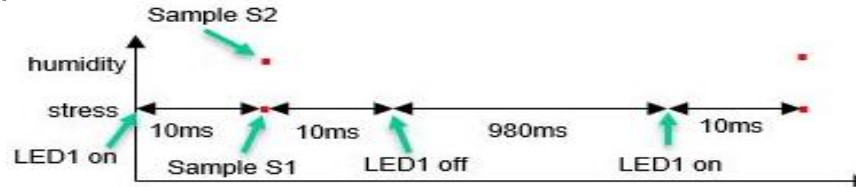
- ADC sampling rate of 10Hz (i.e. 1sample/0.1seconds) with TA0.
- Receiver circular buffer.
- FSM delay with LPM3, until new next bit is received.
- If preamble is correct, set 50Hz ADC sampling rate with TA0.
- On Bit error, quit program and go to Sleeping.



Acknowledgement

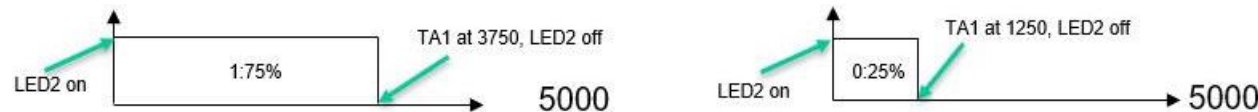
- Turn LED2 on for 250ms using TA1, with LPM3 as delay.

Stress and humidity measurement



- Delay 10 ms with TB0CCR1 and LPM3, then turn off LED1.
- Delay 980 ms with TB0CCR1 and LPM3, then turn on LED1.
- Delay 10 ms with TB0CCR2 and LPM3, then read the state of S1 (stress) and S2 (humidity) simultaneously into transmit buffer.
- Repeat process 8 times.

Transmission



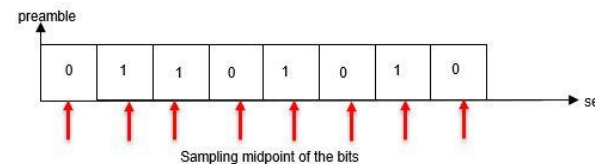
- TA1 in up mode with 10kHz ACLK, TA1CCR0 for 0.5sec bit period, and TA1CCR2 for Duty cycle (1:75%, 0:25%).
- Delay with LPM3.
- In TA1CCR0 ISR, assign TA1CCR2 with appropriate count value to switch LED2, until transmit buffer is empty.
- Quit program and go to Sleeping.

Termination

- If light source absent for 20ms, i.e. one ADC sampling period, set user defined exit flag, quit program and go to Sleeping.

Challenges: Reading the preamble

- Initial approach: +-20% error margin not considered.



- Current approach: +- 20% error margin is considered but error margin realized is 0.45 sec to 0.675 sec bit period.

Problems EnergyTrace™ Technology Power Energy

EnergyTrace™ Profile

Name	Live
System	
Time	0 sec
Energy	0,000 mJ
Power	
Mean	
Min	
Max	
Voltage	
Mean	
Current	
Mean	
Min	
Max	
Battery Life	CR2032: 0 day (est.)



Main benefits of this approach

- User friendly design.
- Ultra low power consumption; Task mode: 0.87 mA, 3.12mW and Idle mode : 14.4 μ A , 51.7 μ W.

GitHub repository for source code : <https://github.com/hodoemelem/MSP430-Coin-Cell-Project>