Monish Nene

ESD LAB3 Report

Schematic

Questions

a) What operating system (including revision) did you use for your code development?

Answer: Windows 10

b) What compiler (including revision) did you use?

Answer: SDCC 2.6.0

c) What exactly (include name/revision if appropriate) did you use to build your code (what IDE, make/makefile, or command line)?

Answer: IDE -> CodeBlocks for AT89C51 and Code Composer for MSP432

d) Did you install and use any other software tools to complete your lab assignment?

Answer: Tera Term for ARM

e) Did you experience any problems with any of the software tools? If so, describe the problem
Answer: No

Things Learnt in Lab 3

Memory allocation error handling.

Compiling with SDCC.

Writing interrupt handler for AT89C51 in C.

ARM function integration.
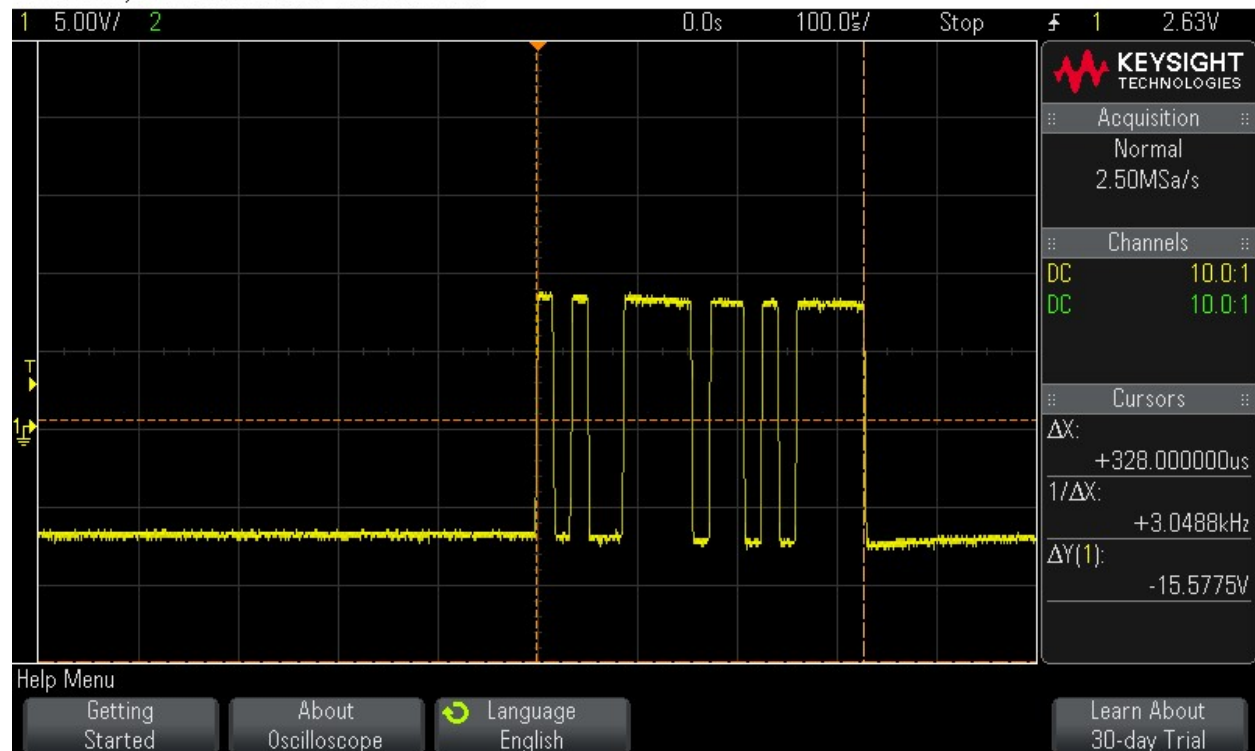
Designing user Interface with UART.

Toughest Thing to do

Designing a good user interface.

Solving Compilation errors.

Maximum Baud rate of Paulmon : 57600

Required AT89C51 GUI

```
Monish Nene ESD Spring 2018 Lab 3
Enter the size for buffer 0 and buffer 1 between 32 to 3200 bytes and a multiple of 32:1200
invalid number.
Re-enter number:
Enter the size for buffer 0 and buffer 1 between 32 to 3200 bytes and a multiple of 32:1216
Created Buffer 0 with 1216 bytes
Created Buffer 1 with 1216 bytes
'+' Add Buffer, '-' Delete Buffer, '=' Dump Buffer 0, '?' Buffer Query, '@' Reset Code
Enter the size for buffer 2 between 20 to 400 bytes:200
Created Buffer 2 with 200 bytes
Enter the size for buffer 3 between 20 to 400 bytes:300
Created Buffer 3 with 300 bytes
Buffer number = 3
Buffer Start Address = 2649
Buffer End Address = 2949
Allocated Space= 300 bytes
Used Space = 0 bytes
Unused Space = 300 bytes
Buffer number = 2
Buffer Start Address = 2445
Buffer End Address = 2645
Allocated Space= 200 bytes
Used Space = 0 bytes
Unused Space = 200 bytes
Buffer number = 1
Buffer Start Address = 1225
Buffer End Address = 2441
Allocated Space= 1216 bytes
Used Space = 0 bytes
Unused Space = 1216 bytes
Buffer number = 0
Buffer Start Address = 5
Buffer End Address = 1221
Allocated Space= 1216 bytes
Used Space = 0 bytes
Unused Space = 1216 bytes
```
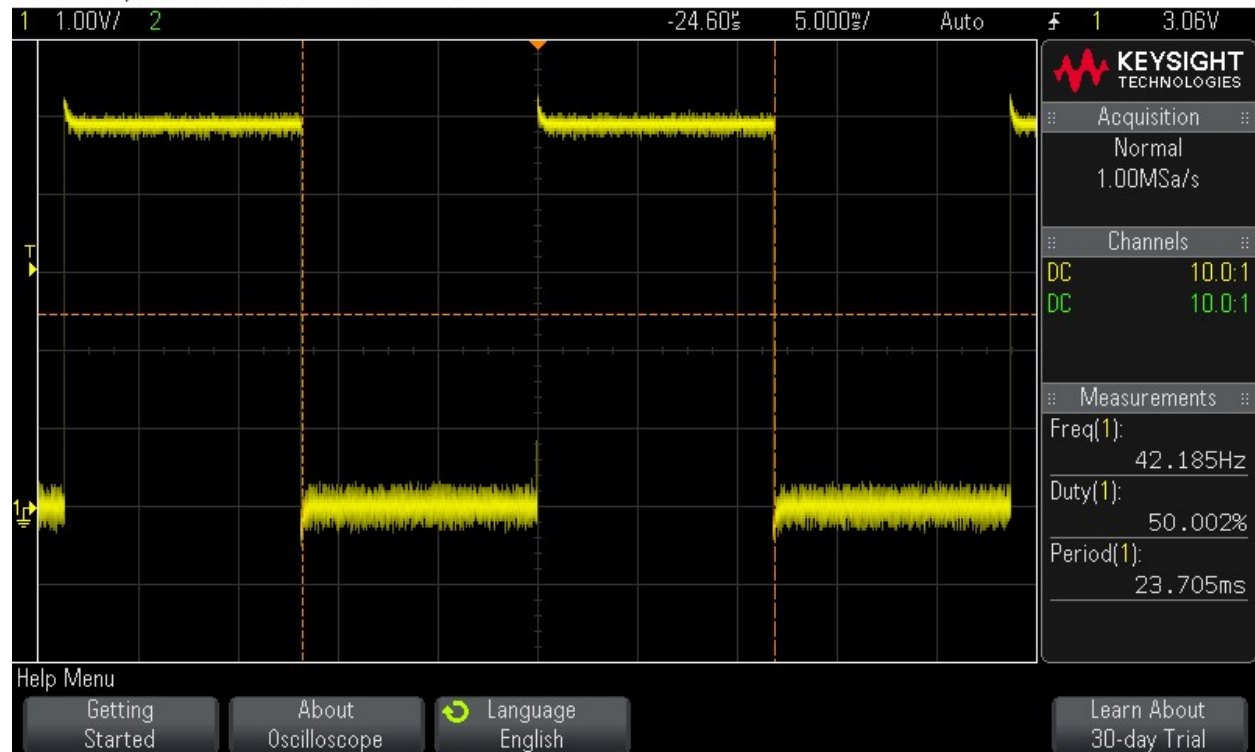
Supplemental AT89C51 GUI

```
COM1 - Tera Term VT                                                          —  ☐  ✕
File  Edit  Setup  Control  Window  Help

Monish Nene ESD Spring 2018 Lab 3 Supplemental
Press 'R'-> run PWM, 'S'-> stop PWM, '+'-> Maximum Frquency ,'-'-> Minimum Frequency,'I'-> Enter Idle Mode, 'P'->Enter Power
Down Mode, 'W'-> Watchdog Switch, 'L' -> LED toggle, 'H' -> High Speed Toggle
Monish Nene ESD Spring 2018 Lab 3 Supplemental
Press 'R'-> run PWM, 'S'-> stop PWM, '+'-> Maximum Frquency ,'-'-> Minimum Frequency,'I'-> Enter Idle Mode, 'P'->Enter Power
Down Mode, 'W'-> Watchdog Switch, 'L' -> LED toggle, 'H' -> High Speed Toggle
Watchdog is off.
Watchdog is on.
Is the LED blinking?
Monish Nene ESD Spring 2018 Lab 3 Supplemental
Press 'R'-> run PWM, 'S'-> stop PWM, '+'-> Maximum Frquency ,'-'-> Minimum Frequency,'I'-> Enter Idle Mode, 'P'->Enter Power
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Down Mode, 'W'-> Watchdog Switch, 'L' -> LED toggle, 'H' -> High Speed Toggle
Watchdog is off.
Watchdog is on.
Is the LED blinking?
Monish Nene ESD Spring 2018 Lab 3 Supplemental
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Down Mode, 'W'-> Watchdog Switch, 'L' -> LED toggle, 'H' -> High Speed Toggle
Power Down Mod
Monish Nene ESD Spring 2018 Lab 3 Supplemental
Press 'R'-> run PWM, 'S'-> stop PW=
Monish Nene
Monish Nene ESD Spring 2018 Lab 3 Supplemental
Press 'R'-> run PWM, 'S'-> stop PWM, '+'-> Maximum Frquency ,'-'-> Minimum Frequency,'I'-> Enter Idle Mode, 'P'->Enter Power
Down Mode, 'W'-> Watchdog Switch, 'L' -> LED toggle, 'H' -> High Speed Toggle
Idle Mode. Press /INT0 switch to Wake up.█
```
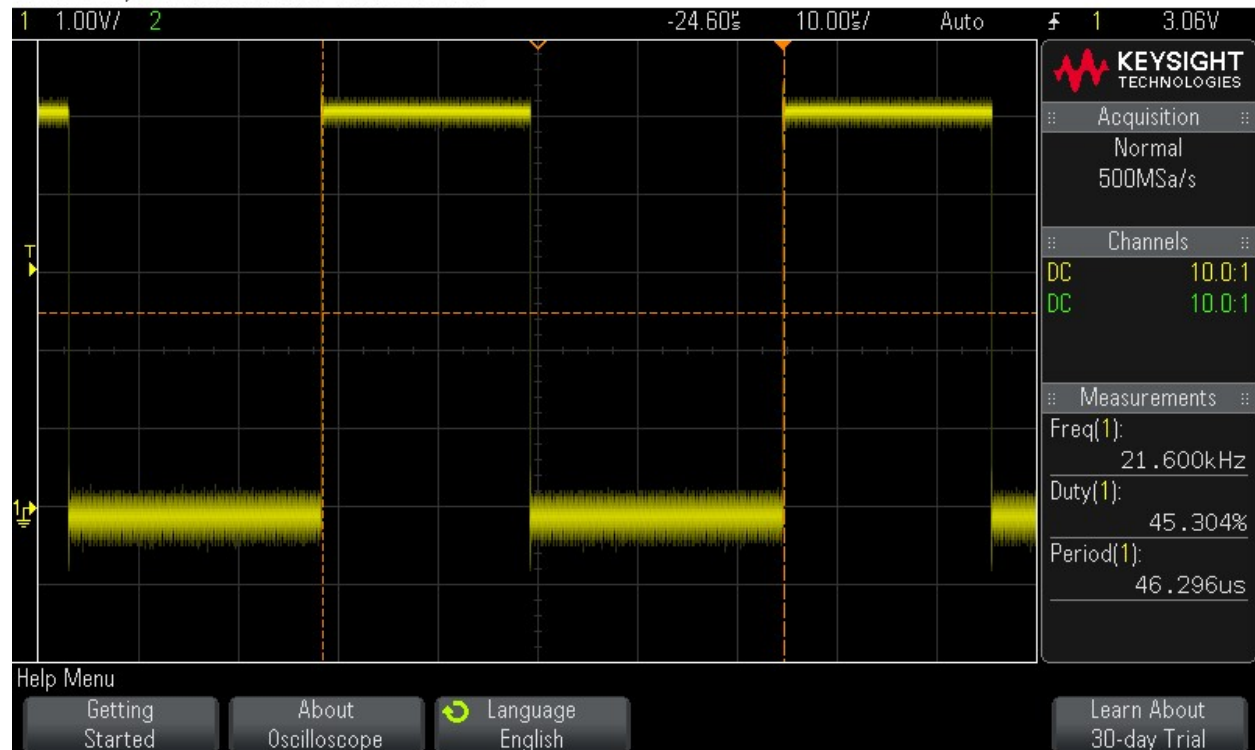
High Speed Output PCA

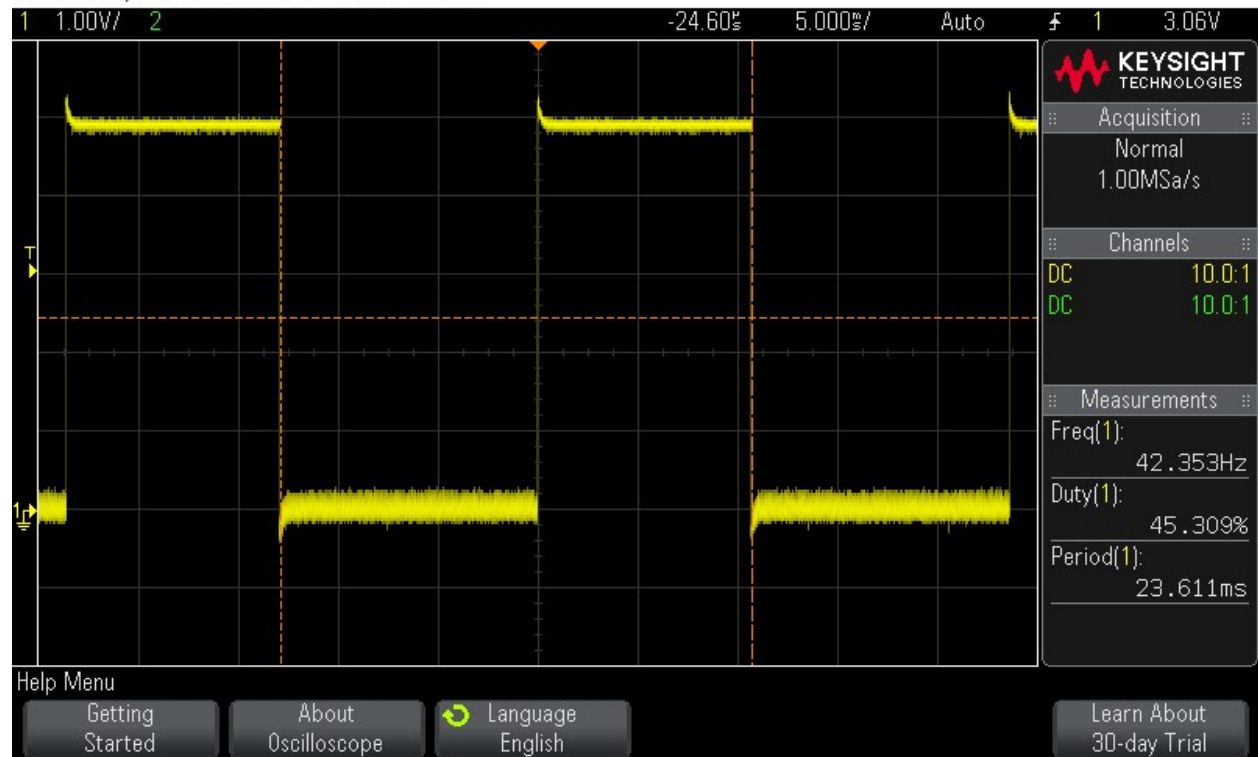DSO-X 2022A, MY52160893: Sat Mar 17 07:04:35 2018

Measurements:
Freq(1): 42.185Hz
Duty(1): 50.002%
Period(1): 23.705ms

Maximum Frequency PCA

DSO-X 2022A, MY52160893: Sat Mar 17 07:04:16 2018

Measurements:
Freq(1): 21.600kHz
Duty(1): 45.304%
Period(1): 46.296us

Minimum Frequency PCA

MSP432 GUI

MSP432 PWM

DS0-X 2022A, MY52160893: Fri Mar 16 06:47:40 2018
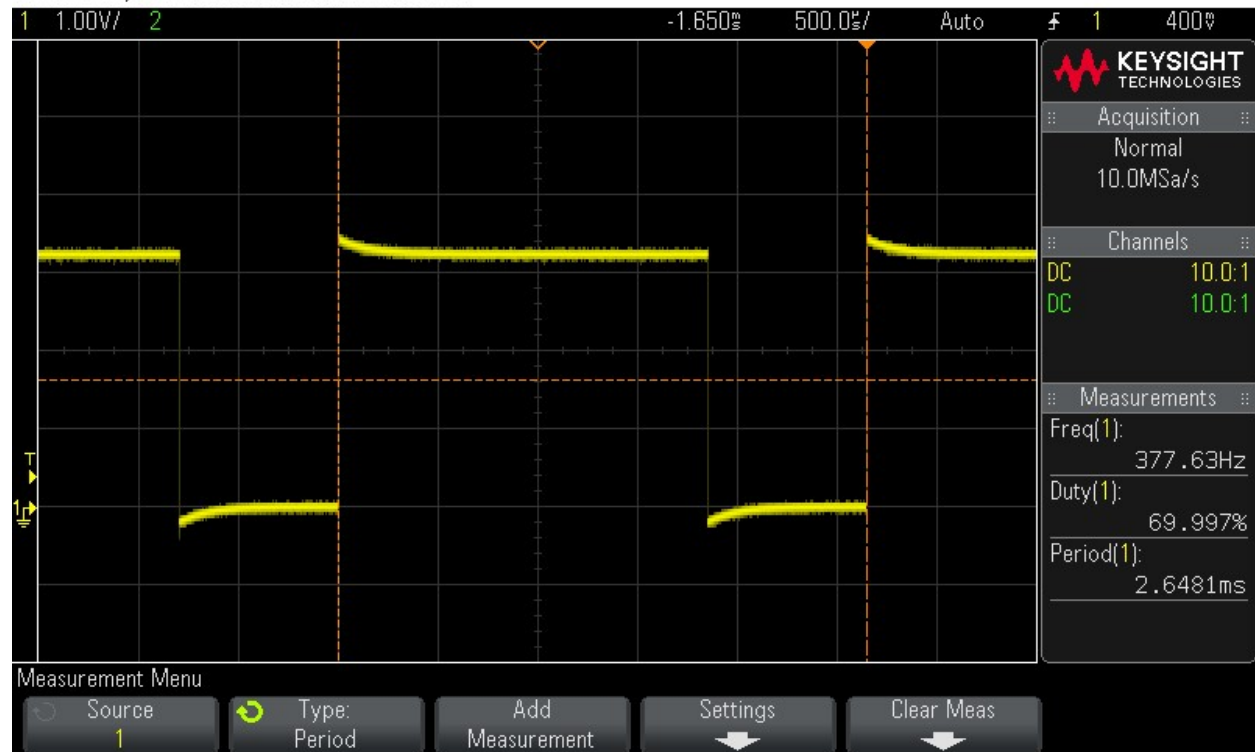
Inline Assembly Challenge


```
param1=100
param2=-7
param3=4
The operation performed is Result = param1*(param2%param3)
Result = 100
Monish Nene ESD Spring 2018 Lab 3
Press 'T' for Temperature, 'P' for Dutycycle,'C' for challenge operation.
All other characters will be echoed.

param1=100
param2=5
param3=3
The operation performed is Result = param1*(param2%param3)
Result = 200
```

You will need to obtain the signature of your instructor or TA on the following items in order to receive credit for your lab assignment. This assignment is due by **Friday, March 9, 2018 (Part 1 Required Elements) and Friday, March 16, 2018 (Part 2 Required and Supplemental Elements)**.

Print your name below, sign the honor code pledge, circle your course number, and then demonstrate your working hardware & firmware in order to obtain the necessary signatures.

Student Name: Monish . H. Nene

Honor Code Pledge: "On my honor, as a University of Colorado student, I have neither given nor received unauthorized assistance on this work. I have clearly acknowledged work that is not my own."

Student Signature: _Monish_

Signoff Checklist

Part 1 Required Elements
- ☑ Schematic of acceptable quality (all components shown)
- ☑ Pins and signals labeled, decoupling capacitors, and two 28-pin wire wrap sockets present on board
- ☑ Very good knowledge of a terminal emulator
- ☑ Demonstrates all 32KB of XRAM in memory map are functional, including monitor block fill command
- ☑ Using PAULMON2, demonstrates highest baud rate as: 57600
- ☑ Knows how to use SDCC [IDE or make optional]
- ☑ Knows how to analyze output files (.RST, .MEM, .MAP) for correct addresses
- ☑ C serial program and virtual debug port functional and code commented
- ☑ Hex display of buffer contents

TA signature and date — 3/10/18

Part 2 Required and Supplemental Elements
- ☑ ARM code integration and execution
- ☑ 8051 PWM control works correctly, X2 mode
- ☑ Correctly enters Idle mode and exits via external interrupt 1
- ☑ Correctly enters Power Down mode
- ☑ All other PCA software menu items function correctly
- ☑ Good understanding of PCA modes
- ☑ Good user interface; program is easy to use

TA signature and date — 3/16/18

Instructor/TA Comments: ☐ ☐ ☐

FOR INSTRUCTOR USE ONLY Part 1 Elements	Not Applicable	Below Expectation	Meets Requirements	Exceeds Requirements	Outstanding
Schematics, SPLD code			✓		
Hardware physical implementation			✓		
Part 1 Required Elements functionality			✓		
Sign-off done without excessive retries				✓	
Student understanding and skills			✓		
Overall Demo Quality (Part 1 elements)				✓	

FOR INSTRUCTOR USE ONLY Part 2 Elements	Not Applicable	Below Expectation	Meets Requirements	Exceeds Requirements	Outstanding
Part 2 Required Elements functionality				✓	
Supplemental Elements functionality				✓	
Student understanding and skills			✓		
Overall Demo Quality (Part 2 elements)					

Comments:
- ☐ Optional Challenge: PAULMON2 RUN command
- ☐ Optional Challenge: ISP API calls
- ☑ Optional Challenge: C and Assembly interfacing H|E (03|22)
- ☐ Optional Challenge: Serial ISR
- ☑ Optional Challenge: SDCC heap memory management analysis M|E

+ Good User Interface

+ Good user "   →   Part 2