Tarang Khandpur | Karime Saad
tk8435, ks38728
EE 445L

Lab 1: Prep

fixed.c

```
// filename ******** fixed.c **************
// possible header file for Lab 1 Spring 2017
// feel free to change the specific syntax of your system
// Tarang Khandpur - Karime Saad
// 9/5/17


//imports
#include <stdio.h>
#include <stdint.h>
#include "string.h"
#include "ST7735.h"
#include "PLL.h"
#include "fixed.h"
#include "inc/tm4c123gh6pm.h"

/****************Name: ST7735_sDecOut3***************
 Author: Karime Saad, Tarang Khandpur
 Description: converts fixed point number to LCD
          format signed 32-bit with resolution 0.001
          range -9.999 to +9.999
 Inputs:  signed 32-bit integer part of fixed-point number
 Outputs: Prints exactly a 6 character fixed point number to LCD
       Parameter LCD display
 12345    " *.***"
  2345    " 2.345"
 -8100    "-8.100"
  -102    "-0.102"
    31    " 0.031"
-12345    " *.***"
 */
void ST7735_sDecOut3(int32_t inputNum){

          int32_t fixedNum = 2000000*inputNum;
          fixedNum = fixedNum >> 15;

          if(fixedNum > 9.999 || fixedNum < -9.999){
                    printf("  *.***");
          } else{
                    if(fixedNum < 0){
```

```
                printf(" %i", fixedNum);
            } else {
            printf("  %i",fixedNum);
            }
        }
}


/**************Name: ST7735_uBinOut8***************
 Author: Karime Saad, Tarang Khandpur
Description: unsigned 32-bit binary fixed-point with a resolution of 1/256.
        The full-scale range is from 0 to 999.99.
        If the integer part is larger than 256000, it signifies an error.
        The ST7735_uBinOut8 function takes an unsigned 32-bit integer part
        of the binary fixed-point number and outputs the fixed-point value on the LCD
 Inputs:  unsigned 32-bit integer part of binary fixed-point number
 Outputs: Prints exactly a 6 character fixed point number to LCD
Parameter LCD display
    0       "  0.00"
    2       "  0.01"
   64       "  0.25"
  100       "  0.39"
  500       "  1.95"
  512       "  2.00"
 5000       " 19.53"
30000       "117.19"
255997      "999.99"
256000      "***.**"
*/
void ST7735_uBinOut8(uint32_t inputNum){
        double fixedNum = (double)inputNum/256;
        int temp = 0;

        if(inputNum >= 256000){
            printf("***.**");
        } else {
            if (fixedNum < 10.00){
                temp = fixedNum *100;
                fixedNum = (double)temp/100;
                printf("  %3.2f", fixedNum);
            }
            else if (fixedNum < 100.00){
                temp = fixedNum *100;
                fixedNum = (double)temp/100;
                printf(" %3.2f", fixedNum);
            }       else {
            printf("%3.2f",fixedNum);
            }
```

```
        }
}

/**************Name: ST7735_XYplotInit***************
 Author: Karime Saad, Tarang Khandpur
 Description: Specify the X and Y axes for an x-y scatter plot
        Draw the title and clear the plot area
 Inputs:  title  ASCII string to label the plot, null-termination
       minX   smallest X data value allowed, resolution= 0.001
       maxX   largest X data value allowed, resolution= 0.001
       minY   smallest Y data value allowed, resolution= 0.001
       maxY   largest Y data value allowed, resolution= 0.001
 Outputs: Prints the Title for the shape to be drawn, and Sets the plot area to white background.
       assumes minX < maxX, and miny < maxY
*/
void ST7735_XYplotInit(char *title, int32_t minX, int32_t maxX, int32_t minY, int32_t maxY){
        ST7735_FillScreen(ST7735_BLACK);

        //Draws Title
        ST7735_SetCursor(0,0);
        while(*title != NULL){
                printf("%c", *title);
                title++;
        }

        //Creates White Plot Area
        for (int16_t i = 0; i < 127; i++){
                for (int16_t j = 32; j < 159; j++){
                        ST7735_DrawPixel(i,j,ST7735_WHITE);
                }
        }
}

/**************Name: ST7735_XYplot***************
 Author: Karime Saad, Tarang Khandpur
 Description: Plot an array of (x,y) data
 Inputs:  num    number of data points in the two arrays
       bufX   array of 32-bit fixed-point data, resolution= 0.001
       bufY   array of 32-bit fixed-point data, resolution= 0.001
 Outputs: Draws shape to cleared plot area
       assumes ST7735_XYplotInit has been previously called
       neglect any points outside the minX maxY minY maxY bounds
*/
void ST7735_XYplot(uint32_t num, int32_t bufX[], int32_t bufY[]){
        int16_t xCoor = 0;
        int16_t yCoor = 0;

        if(num == 180){ //Determines Object to be Drawn is a circle
```

```
                        for (int16_t i = 0; i < num; i++){

                                xCoor = bufX[i]/50 + 60;

                                yCoor = bufY[i]/50 +100;
                                ST7735_DrawPixel(xCoor,yCoor,ST7735_BLACK);
                        }
        } else {
                        for (int16_t i = 0; i < num; i++){

                                xCoor = (bufX[i]*2)/7 + 80;

                                yCoor = bufY[i]*2/7 + 80;
                                ST7735_DrawPixel(xCoor,yCoor,ST7735_BLACK);
                        }
        }
}
```

fixed.h

```
// filename ******** fixed.h **************
// possible header file for Lab 1 Spring 2017
// feel free to change the specific syntax of your system
// Tarang Khandpur - Karime Saad
// 9/5/17


/****************Name: ST7735_sDecOut3***************
 Author: Karime Saad, Tarang Khandpur
 Description: converts fixed point number to LCD
          format signed 32-bit with resolution 0.001
          range -9.999 to +9.999
 Inputs:  signed 32-bit integer part of fixed-point number
 Outputs: Prints exactly a 6 character fixed point number to LCD
       Parameter LCD display
 12345    " *.***"
  2345    " 2.345"
 -8100    "-8.100"
  -102    "-0.102"
    31    " 0.031"
-12345    " *.***"
 */
void ST7735_sDecOut3(int32_t n);


/**************Name: ST7735_uBinOut8***************
 Author: Karime Saad, Tarang Khandpur
Description: unsigned 32-bit binary fixed-point with a resolution of 1/256.
```

```
          The full-scale range is from 0 to 999.99.
          If the integer part is larger than 256000, it signifies an error.
          The ST7735_uBinOut8 function takes an unsigned 32-bit integer part
          of the binary fixed-point number and outputs the fixed-point value on the LCD
 Inputs:  unsigned 32-bit integer part of binary fixed-point number
 Outputs: Prints exactly a 6 character fixed point number to LCD
Parameter LCD display
    0       "  0.00"
    2       "  0.01"
   64       "  0.25"
  100       "  0.39"
  500       "  1.95"
  512       "  2.00"
 5000       " 19.53"
30000       "117.19"
255997      "999.99"
256000      "***.**"
*/
void ST7735_uBinOut8(uint32_t n);

/**************Name: ST7735_XYplotInit***************
 Author: Karime Saad, Tarang Khandpur
 Description: Specify the X and Y axes for an x-y scatter plot
          Draw the title and clear the plot area
 Inputs:  title  ASCII string to label the plot, null-termination
        minX   smallest X data value allowed, resolution= 0.001
        maxX   largest X data value allowed, resolution= 0.001
        minY   smallest Y data value allowed, resolution= 0.001
        maxY   largest Y data value allowed, resolution= 0.001
 Outputs: Prints the Title for the shape to be drawn, and Sets the plot area to white background.
        assumes minX < maxX, and miny < maxY
*/
void ST7735_XYplotInit(char *title, int32_t minX, int32_t maxX, int32_t minY, int32_t maxY);

/**************Name: ST7735_XYplot***************
 Author: Karime Saad, Tarang Khandpur
 Description: Plot an array of (x,y) data
 Inputs:  num    number of data points in the two arrays
        bufX   array of 32-bit fixed-point data, resolution= 0.001
        bufY   array of 32-bit fixed-point data, resolution= 0.001
 Outputs: Draws shape to cleared plot area
        assumes ST7735_XYplotInit has been previously called
        neglect any points outside the minX maxY minY maxY bounds
*/
void ST7735_XYplot(uint32_t num, int32_t bufX[], int32_t bufY[]);
```