fixed.c

```
// filename ******** fixed.c **************
// Ali Tejani and Caroline Yao
// amt3639 and chy253
// lab 1 prep
// 1/25/2017
// implementation for functions in fixed.h
// Lab section: Tue/Thur 12:30 - 2 PM

#include <stdint.h>
#include "ST7735.h"
#include "fixed.h"

void ST7735_sDecOut3(int32_t n) {
	if(n < 10000 && n > -10000) { // if valid n
		char out[] = "  .   ";
		if(n < 0) { // if negative, add sign and change to positive
			out[0] = '-';
			n *= -1;
		}
		// create output
		for(uint32_t i = 5; i > 2; i--) {
			uint32_t a = n % 10;
			n = n / 10;
			out[i] = (char)(0x30 + a);
		}
		out[1] = (char)(0x30 + n);
		// display
		ST7735_OutString(out);
	} else { // print error
		ST7735_OutString(" *.***");
	}
}

void ST7735_uBinOut8(uint32_t n) {
	if(n < 256000) {  // if valid n
		char out[] = "   .  ";
		// change to fixed point
		n *= 100;
		n = n >> 8;
		// decimal places of output
		for(uint32_t i = 5; i > 3; i--) {
			uint32_t a = n % 10;
			n = n / 10;
			out[i] = '0' + a;
		}
```

```
                // whole value places of output
                uint32_t i = 2;
                do {
                        uint32_t a = n % 10;
                        n = n / 10;
                        out[i] = '0' + a;
                        i--;
                } while(n != 0);
                // display output
                ST7735_OutString(out);
        } else { // if not valid n
                ST7735_OutString("***.**");
        }
}

int32_t xMin;
int32_t xMax;
int32_t yMin;
int32_t yMax;

void ST7735_XYplotInit(char *title, int32_t minX, int32_t maxX, int32_t minY, int32_t maxY)
{
        ST7735_FillScreen(0);  // set screen to black
        ST7735_SetCursor(0,0);
        ST7735_OutString(title); // print title
        // set globals
        xMin = minX;
        xMax = maxX;
        yMin = minY;
        yMax = maxY;
}

void ST7735_XYplot(uint32_t num, int32_t bufX[], int32_t bufY[]) {
        for(uint32_t i = 0; i < num; i++) {
                // only if within bounds provided by ST7735_XYplotInit
                if( bufX[i] >= xMin && bufX[i] <= xMax && bufY[i] >= yMin && bufY[i] <=
yMax) {
                        // change to pixel values
                        uint32_t j = (127*(bufX[i]-xMin))/(xMax-xMin);
                        uint32_t k = 32+(127*(yMax-bufY[i]))/(yMax-yMin);
                        // display point
                        ST7735_DrawPixel(j,k,ST7735_BLUE);
                }

        }
}
```

fixed.h

```
// filename ******** fixed.h **************
// Ali Tejani and Caroline Yao
// amt3639 and chy253
// lab 1 prep
// 1/25/2017
// Header file for fixed.c
// Lab section: Tue/Thur 12:30 - 2 PM


/****************ST7735_sDecOut3***************
 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: none
 send exactly 6 characters to the LCD
Parameter LCD display
 12345    " *.***"
  2345    " 2.345"
 -8100    "-8.100"
  -102    "-0.102"
    31    " 0.031"
-12345    " *.***"
 */
void ST7735_sDecOut3(int32_t n);


/***************ST7735_uBinOut8***************
 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: none
 send exactly 6 characters to the 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);

/***************ST7735_XYplotInit***************
 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: none
 assumes minX < maxX, and miny < maxY
*/
void ST7735_XYplotInit(char *title, int32_t minX, int32_t maxX, int32_t minY, int32_t maxY);

/***************ST7735_XYplot***************
 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: none
 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[]);
```