fixed.c

// filename \*\*\*\*\*\*\*\* fixed.c \*\*\*\*\*\*\*\*\*\*\*\*\*\*

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// 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

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// 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[]);