Jeremy Simanjuntak 14329621
Robot Writer for a 2D plotter

Software Description

User inputs:

- Text File ‘test.txt’ – the text to be written out by the 2D plotter

Other inputs:

- Font data for all ASCII characters ‘SingleFontStroke.txt’ – text file containing the font data for each ASCII characters. Each row of the data represents a single movement, containing information as to whether the pen position is up or down, the x-axis position and the y-axis position

Software description:

1. Begins by checking the RS232 port, which is responsible for sending the G-code to the Arduino and 2D plotter, to ensure that it can be opened and is ready for use
2. Wakes up the writing robot from sleep by sending a new line
3. Sends a few G-code commands to the robot to set it in position, ready to begin writing
4. Receives text file, regardless of length or arrangement of characters
5. Receives Font data, which are font stroke instructions for the robot writer, corresponding to every ASCII character.
6. Reads font data from SingleFontStroke.txt into a structured array, ready for accessing
7. Reads each character from the text file, converts it to ASCII form, then draws out the associated font data and prints it to the buffer in G-code form.
8. Buffer fully loads, with Arduino having sent all the G-code to the 2D plotter, resulting in writing out of text from text file

Project Files

Source code – file written in C programming language.

- Main.c – contains main source code
- Serial.c – for utilising serial port
- Rs232.c – for RS232 library

Header files - allow commonly used functions to be written only once and referenced by other source files when needed

- Serial.h – this program may need to be changed depending on the COM port used. As stated in the file, the number entered into the code as the port number is given as (port number – 1)
- RS232.h – for RS232 library

Functions

Function for reading font data into a structured array

Int ReadFontDataFunction (struct Fontdata *FontArr)

Parameters:

FontArr – structured array which font data will be stored in

Return value – returns 1 if SingleStrokeFont.txt fails to read, 0 if successful

Function for generating G-code

Char GCodeGenerator (struct Fontdata *FontArr, int row, struct Coordinates *Coord, const float sizedown, char *buffer)

Parameters:

FontArr – structured array which font data will be stored in

Row – the row of data within SingleStrokeFont.txt which is being accessed for the letter being inspected

FirstFontDataLine – the row number where the font data for the specific letter begins

FontDataLinesLeft – number of rows of data remaining after the first row, for the relevant letter being inspected

Coord – Array which coordinate offsets for x-axis and y-axis positions are being stored. This ensures letters are written next to each other and that a new line is started from the correct position

Sizedown – a value of 0.278, which scales down the dimensions of the writing for the 2D plotter

Buffer – where G-code is stored before the writing instructions are executed by the robot

Return value – returns 0 if successful

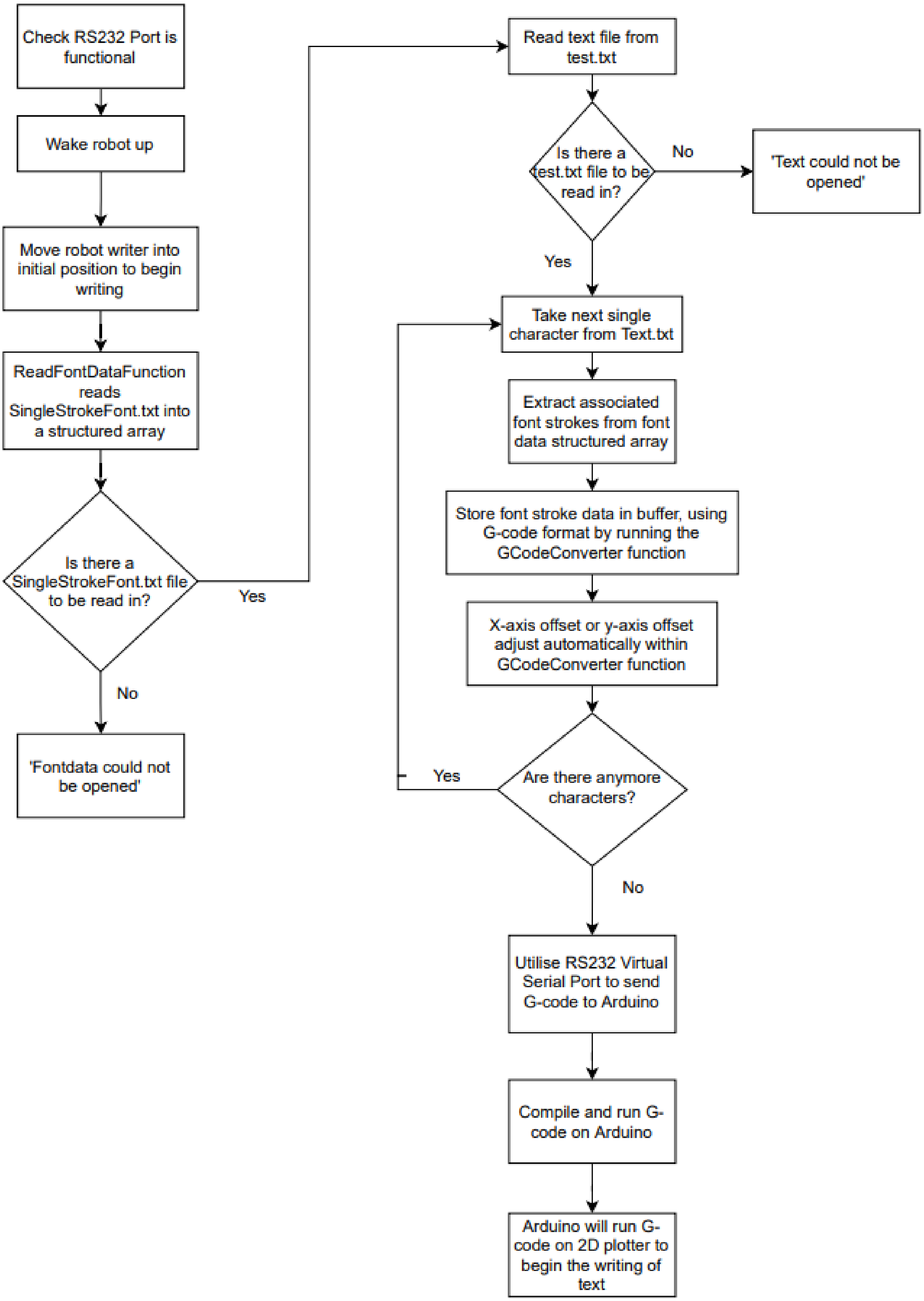
Key Data Items

Name	Data type	Rationale
Text file	Char	Contains the text that will be written out by the robot writer
Font Data	Int	Contains font strokes, in the form of integers
G-code	Char	Font data, written out in the appropriate format that will be received by the Arduino and eventually the robot writer

Testing Information

Function	Test Case	Test Data	Expected Output
Main	Non-existent text file	In project folder, no text file by the name of 'test'	Text could not be opened
ReadFontDataFunction	No font data	In project folder, no text file by name of 'SingleStrokeFont'	Fontdata could not be opened
Main	Empty text file	No text in the 'test.txt' file to be written	G-code for preparing position of robot writer will run, but no text written

Flowchart


Check RS232 Port is functional
Wake robot up
Move robot writer into initial position to begin writing
ReadFontDataFunction reads SingleStrokeFont.txt into a structured array
Is there a SingleStrokeFont.txt file to be read in?
Yes
No
'Fontdata could not be opened'
Read text file from test.txt
Is there a test.txt file to be read in?
No
'Text could not be opened'
Yes
Take next single character from Text.txt
Extract associated font strokes from font data structured array
Store font stroke data in buffer, using G-code format by running the GCodeConverter function
X-axis offset or y-axis offset adjust automatically within GCodeConverter function
Yes
Are there anymore characters?
No
Utilise RS232 Virtual Serial Port to send G-code to Arduino
Compile and run G-code on Arduino
Arduino will run G-code on 2D plotter to begin the writing of text