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# Title

Developing software for a writing robot

# Outline of the Problem to be Solved

The goal of this project is to develop software for a writing robot. The robot will read text from a file, like “test.txt”, and turn it into G-code commands. These commands will be sent through an RS232 serial connection to control a robotic arm that writes the text on a surface. The robot will use a single-stroke font from “SingleStrokeFont.txt”, with an adjustable text height between 4 mm and 10 mm, set by the user. The text should fit within a 100 mm wide area to prevent words from being cut off. The lines should be spaced correctly, and the robot arm should end with the pen in the up position at the starting point.

# Key Data Items

|  |  |  |
| --- | --- | --- |
| Name | Data type | Rationale |
| fontData | Array/List of Structs | Holds x,y coordinates and pen state for each letter from SingleStrokeFont.txt. |
| textHeight | Float | The text height chosen by the user, between 4 mm and 10 mm. |
| gCodeCommands | String Array/List | Holds the G-code commands that control the robot arm’s movements to draw the letters. |
| currentPosition | Struct(x,y) | Keeps track of where the pen is on the surface, making sure it moves to the right place each time. |
| Rs232Status | Boolean | Checks if the RS232 connection is working to make sure it can communicate with the Arduino. |

Extend table as required

# Function Declarations

**Function to Load Font Data:**

Void LoadFontData (char\* filename);

Parameters: filename-name of the font data file.

Description: Loads font data from “SingleStrokeFont.txt” and stores it in memory for processing.

**Function to Scale Text Height:**

float ScaleHeight (float height);

Parameters: height-desired height for the text.

Description: Scales font data (x, y coordinates) based on user-defined height, between 4 mm and 10 mm

**Function to Convert Text to G-code:**

void ConvertToGCode (char\* text, GCodeCommand\* commandList);

Parameters: text-the text to be written.

commandList- stores generated G-code commands.

Description: Converts text characters into G-code commands based on scaled font data for robotic drawing.

**Function for Serial Communication Initialization:**

Int InitializeSerialPort();

Description: Initializes the RS232 port for communication with the Arduino.

# Testing Information

|  |  |  |  |
| --- | --- | --- | --- |
| Function | Test Case | Test Data | Expected Output |
| LoadFontData | Verify font data loading | SingleStrokeFont.txt | ASCII character data loaded with correct coordinates. |
| ScaleHeight | Scale within valid range | 5.5 mm | Adjusted coordinates reflect 5.5 mm text height. |
| ConvertToGCode | G-code generation for text | “The quick brown fox…” | Correct G-code sequence for input text. |
| InitializeSerialPort | Serial Connection established | COM port (RS232) | Successful initialization, ready to send G-code commands. |

*Extend table as required. Note that ‘Function’ includes main()*

# Flowchart(s)

# A diagram of a computer Description automatically generated

A screenshot of a diagram

Description automatically generated