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# Title

# Outline of the Problem to be Solved

(Maximum 1 page)

The program must be able to read values from a given text file stored on a memory made by the user. This memory must be dynamic and store any amount of data at any time. The stored data must also be in an appropriate data format.

The next problem to be solved is by creating a function where input values from the user is taken by keyboard which will define the scale of the x and y movements of the letters such as the letter’s height. This will have a range condition between 4 and 10mm so according to measure errors must be considered with it. The original font size of letters is 18 units taken from the font file so user input units must be scaled to a fraction of height/18 so that the robot will draw the letters at the required height.

Then, a series of code needs to be programmed which will read and process a text file of any length. This code will be reading another text file which will contain data on what text is to be drawn. This will be done by first asking the user to input a name by keyboard which is used to search and open the corresponding file. Each word in the file must be processed and outputted to the robot before the next one is read. This can be done by using codes such as for, while, and if loops.

After the program is written, the output must be generated and converted to G-Code language format which will be used to command the Arduino. These commands must be able to raise and lower the pen of the writing robot whilst moving accordingly to the x and y specifications given from the opened text file.

It must be known that a function must be created to measure the offset of each letter in the x direction so that the origin of the next letter corresponds to the end of the previous letter. Each line written must also have a 5mm spacing in between therefore another function is needed that will calculate the required distance for the pen to move to start a new line.

# Key Data Items

|  |  |  |
| --- | --- | --- |
| Name | Data type | Rationale |
| Font Data | structure | Font Data describes how each of the letters will be written. Since we’re reading from a text file and are required to store different types of integers, a structure is therefore needed to store that large amount of data. |
| User inputs | Float & string | There are 2 instances where the user is required to input data and that is at the beginning where a height input is requested from a user which can be considered a float due to having a range to choose from. Second is when the user is asked to input the file name for the text file to which the text data is stored and so this is a string type. |
| text Data | Strings | The text data is the words/sentence that we are using for the robot to write down, therefore the data that will be read from the file are a set of strings. |
| G-Code | Function | G- codes is a sub-program which can be a function data type as it returns a value or procedures that execute instructions. |
| Offsets | Integer/function | Offsets are calculated by doing calculations on a set of numbers; therefore, it is considered an integer type. It can also be considered a function if you were to create a function for calculating offsets |
| spacing | Integer/function | The spacing requirements are 5 mm between each line there for it is an integer data type. Similar to Offsets, can also be considered a function if one were to make a function of it. |

Extend table as required

# Function Declarations

void GCode(G, X ,Y )

void offset(origin, end)

void spacing(Line1,Line2)

*Parameters:*

*G – The value of G will specify whether the pen will move to position X, Y or draw a straight line from last X, Y position.*

*X – This value is the X coordinate taken from the Font data file.*

*Y – This is the Y coordinate taken from the Font data file.*

*Origin – essentially (0,0), used as a reference to the start.*

*End – the x-axis value when the letter ends.*

*Line1 – the y-axis value when the letter ends.*

# Testing Information

|  |  |  |  |
| --- | --- | --- | --- |
| Function | Test Case | Test Data | Expected Output |
|  |  |  |  |
|  |  |  |  |

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

# Flowchart(s)

May be included as separate pdf