Library Book Barcode Scanner

GROUP-404

Sravan Patchala(group leader)	14D070012
Saurabh Gangurde	14D070009
Nischal Agrawal	14D070049
Yogesh Mahajan	14D070022

Problem Statement

A book placed on the wrong shelf is as good as a lost book.
In a huge library like ours, it is impossible to check manually the shelves for misplaced books.
So we have come up with an automated solution.

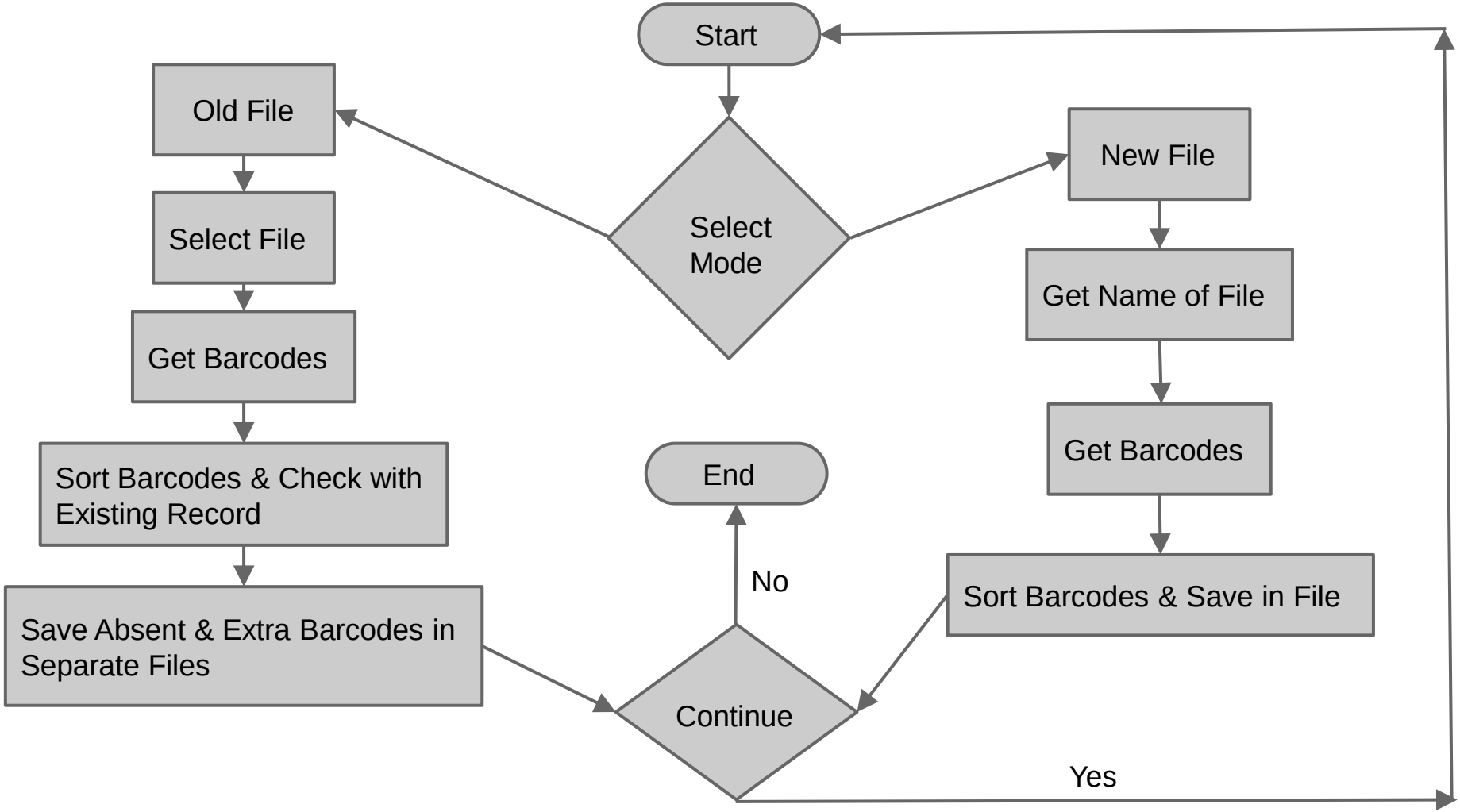
Method of Approach

So the first thing required to be done is to get the details of the books in a shelf.
These details are obtained from the unique barcode sticker on the cover of the book.
This barcode is used to check for the details of the book later.

Method of Implementation

So we mount a camera on our bot and make the bot follow a line drawn parallel to the shelf at a suitable distance.
The inputs from the camera are processed for barcodes using OpenCV libraries and the book is assigned the barcode number.
This number is used to check if the book belongs to the shelf or not.

Overall Algorithm


Start
Old File
Select File
Get Barcodes
Sort Barcodes & Check with Existing Record
Save Absent & Extra Barcodes in Separate Files
Select Mode
New File
Get Name of File
Get Barcodes
Sort Barcodes & Save in File
End
No
Continue
Yes

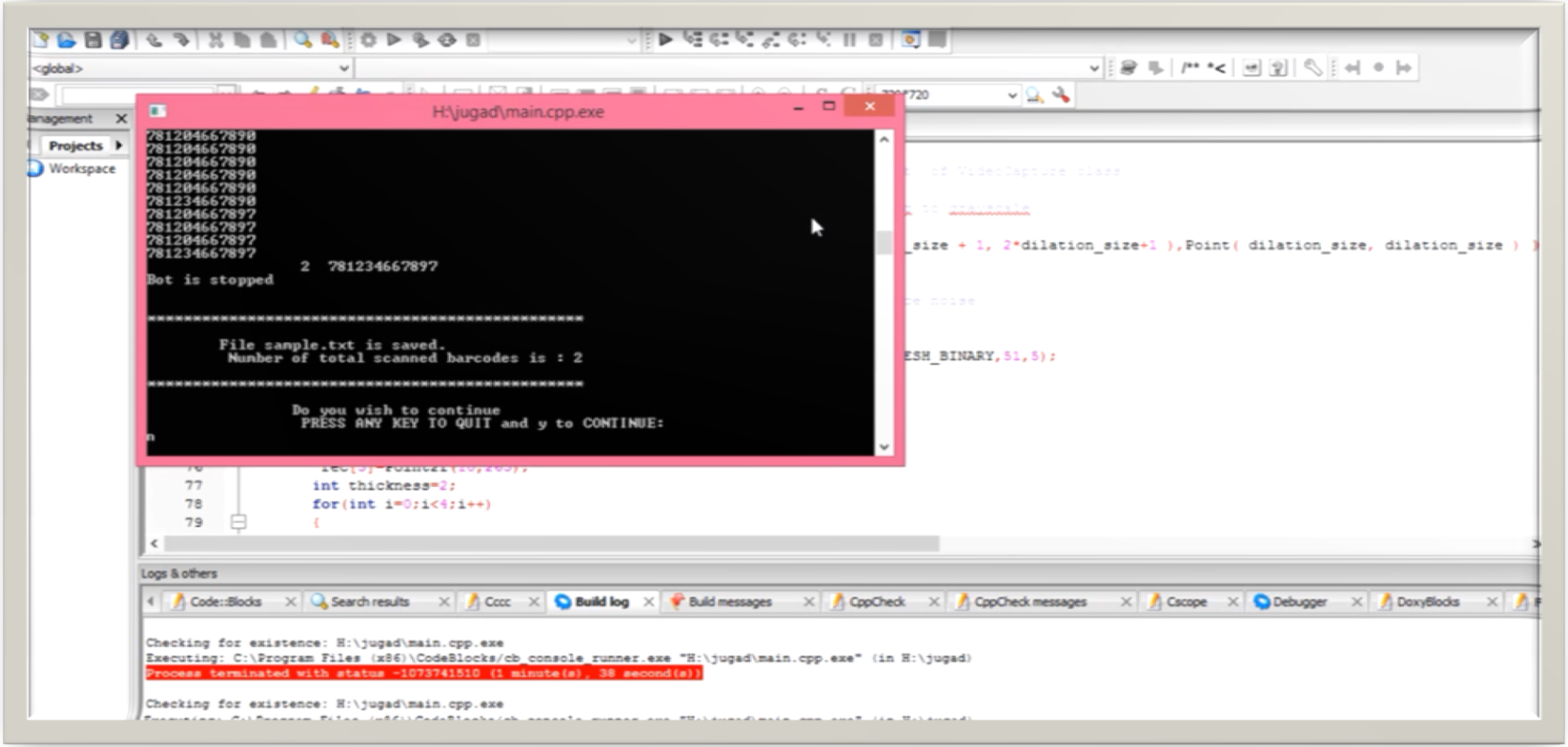
Screenshots

Firebird V as line follower

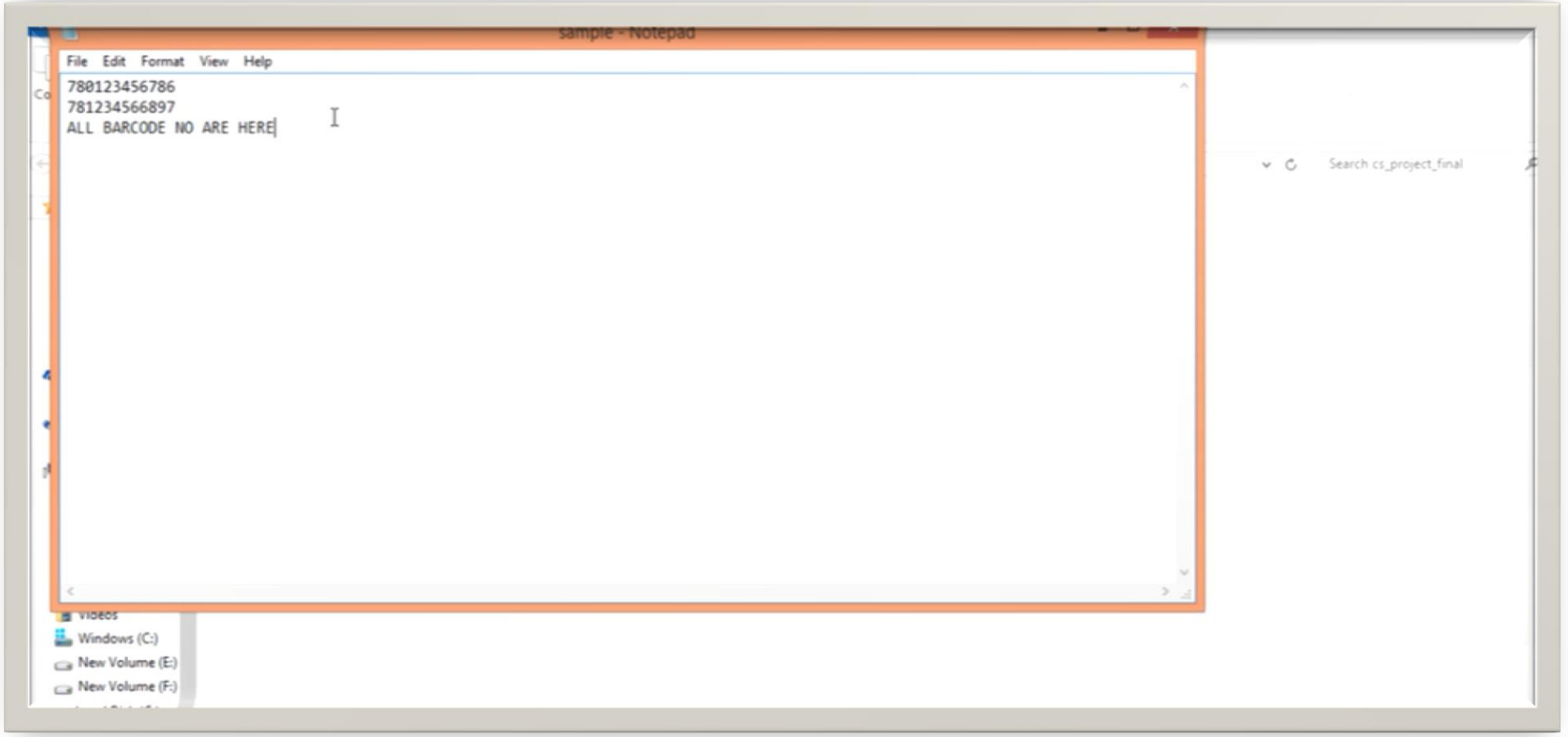
Firebird V reading barcode

Main program run through snapshot

After barcode detection and decoding



Storage of scanned barcode as .txt file



Challenges

Till now, one of the toughest challenge we faced was converting the input from the camera into a auto-thresholded image.
A thresholded image is one in which each pixel is assigned a binary value(‘0’ for black and ‘1’ for white) depending upon the pixel’s RGB values.

Challenges

This problem arises because of various factors like colour variations, variations in brightness, reflections, etc.

Overcoming the challenges

We have successfully overcome this challenge by using the method of Adaptive Thresholding. In adaptive thresholding, the threshold value for a given pixel will be mean or the weighted average of the RGB values of the surrounding pixels.
So we will not have to worry about the differences in the properties of the image.

Future work

We have mainly focussed on the non-mechanical part of the project.
If an efficient mechanism is made to lift the bot across the shelves, this can be implemented successfully in big libraries.
If grippers for holding the books can be made, then the library can be made fully automated.

Future work

If the code can be appropriately modified, the bot can also be used in supermarkets.
Code may be modified to detect multiple barcodes in single frame,which is not possible now.
By reading the barcode, they can replace misplaced products to the place they belong and also take counts of the stock thus making the process fully automated and error free.

THE END