

# AN ADAPTIVE DATABASE FOR LIBRARY USING COMPUTER VISION

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**Abstract** - How often do you find that the books that are listed in the database are not available in the racks? How often do you find the books getting misplaced in to a different section? This project aims at constructing an adaptive database that would update the name and exact position of a particular book using computer vision. This system also eliminates the need of updating the database when a new book is added to the library as this system can automatically detect a new book and append it to the database. The system will also be capable of performing smart word searches on the book titles to determine which section they belong to.

**Key Words:** Library automation , Computer vision, adaptive database, smart word search.

## 1. INTRODUCTION

The objectives of this project are:-

- To develop a reliable and fully autonomous library automation system
- To be able to develop a cost effective solution
- To utilize existing infrastructure in developing the system.

### 1.1 Possible solutions

- Using barcode based automation
- Using RFid based automation
- Using computer vision

### 1.2 Rationale for choosing LabVIEW Computer vision

Computer vision eliminates the need of pre-stored dedicated database of books. LABVIEW also gives an one touch solution to OCR (Optical Character Recognition) using the NI VISION ASSISTANT.

## 2. BASIC CONCEPT

A camera mounted on a track moves across the book shelf to scan all the books, it then sends the data collected pictures to a processor running LABVIEW. The software with the help of NI vision assistant decodes the images to extract the name of the book and stores it in to an array,

the software then creates an database of available books along with their position in the racks.

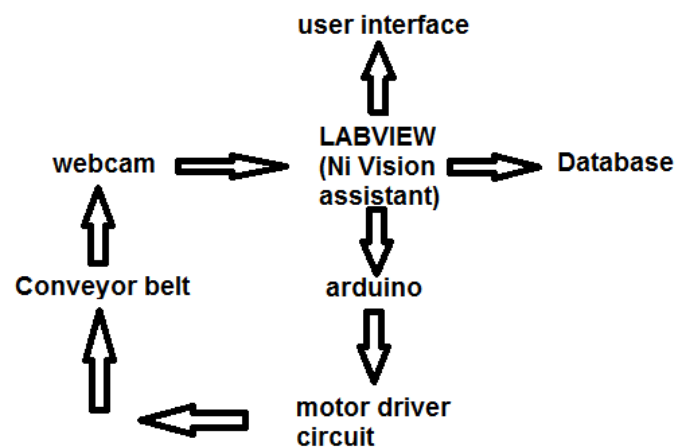


Fig -1: Block Diagram

## 3. LABVIEW(NI VISION ASSISTANT)

NI Vision for LabVIEW is a part of the NI Vision Development Module is a library of LabVIEW VIs that you can use to develop machine vision and scientific imaging applications. It provides an OCR toolkit (optical character recognition toolkit). OCR is used to read text and/or characters in an image. Before you read text and/or characters in an image, you must train the OCR Session with samples of the characters using the NI OCR Training Interface. The output of the OCR block is fed in to an array. This array is then sorted and stored in a database. The contents can be transferred to a database (like mysql) by using labview database connectivity toolkit. For better results use "OCR A EXTENDED" font style.

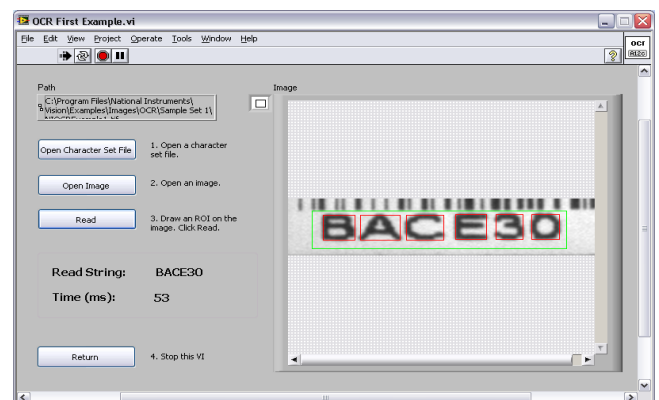


Fig -2: NI visual assistant

## 4. ELECTRONIC COMPONENTS

### 4.1 Microcontroller

The microcontroller is used to operate the dc motor based on the output of the labview software. The microcontroller and labview can communicate by using serial ports. One com port is configured by labview , dedicated only for communication purpose. The baud rate is set at 9600 bps for optimal communication.

### 4.2 DRIVER CIRCUIT

Since the microcontroller cannot drive the motor directly due to power constrains, we can use a motor driver ,for this project we are going to use a H-BRIDGE driver. The H-BRIDGE driver also is also used to run the dc motor in both directions by switching the polarity of the inputs given to the motor.

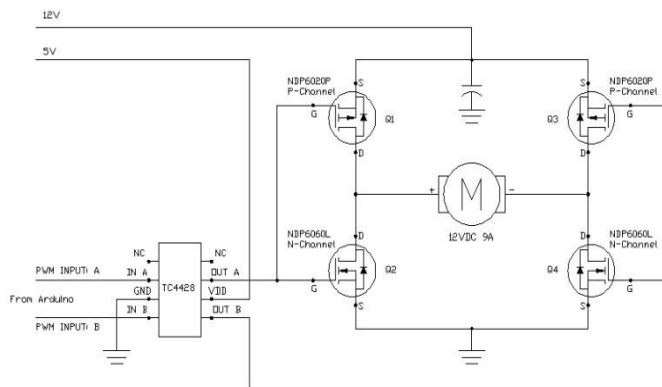


Fig -3: H-Bridge motor driver

### 4.3 IR sensor

The IR proximity sensor is used to detect any obstruction between the camera and the shelf (like human interference). If any interference is detected the proximity sensor sends a signal to the microcontroller and the microcontroller stops the scanning process until the obstruction is cleared. This would reduce misinterpretation of data due to human interference.

## 5. USER INTERFACE

The labview front panel serves as an excellent user interface, the user interface can be designed to provide users the ability to scan the shelf , see the contents of the shelf and also perform word searches on the book titles. The labview front panel is accessible only in a single computer in which the software is running to rectify this we can use windows desktop sharing , to share the desktops across many PC's so that the setup can be controlled from any part of the library .

## 6. CONCLUSIONS

This library automation process is not only limited to library use. It can be used in any shelf like the super marker , medical shops , kitchen racks etc.

### 6.1 Advantages

- Reduces human intervention, there by reducing time, money and labor.
- More accurate than current methods.
- One time investment.
- Highly user friendly and flexible.

### 6.2 Disadvantages

- Human interference during detection can delay the process .
- The OCR works only when the book is properly aligned. Improper alignment leads to errors in reading the title of the book.
- Requires initial investment.

## REFERENCES

- [1] Virtual Instrumentation Using Labview (English) 1st Edition - by jerome ISBN-10 8120340302.
- [2] Image Processing with LabVIEW and IMAQ Vision - by Thomas Klinger ISBN-10: 0130474150.
- [3] <http://www.ni.com/pdf/manuals/371007b.pdf>

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