Project Report

Library Assistant Bot

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1. INTRODUCTION

As in our academic environment we need automation in every department, so it is very important to automate the library arrangement and get rid of the manual work. As we see in our library students give books to librarian to keep in the shelf. We are trying to make a bot to help the librarian.

2. PROBLEM STATEMENT

In our project we aim to make a bot to help the librarian in the arrangement of books in the corresponding shelves. The bot will collect the book from the pre-specified place and then keep the books in corresponding shelf. For identifying the book it will read the QR code of the book and by image processing it will read the QR code and then place the book in corresponding shelf.

3. REQUIREMENT

a) Functional Requirements:

- Robot will place the returned books in the correct location

- Detect the books placed in the wrong place
- Correct the position of misplaced books

b) Non-Functional Requirements:

- Additional Hardware
  - Robotic arm to pick , orient and place the book
  - Zigbee module for wireless communication
  - Camera to read QR code
- Additional Software
  - QR code reader library
  - MATLAB

4. IMPLEMENTATION:

MODULES:

- Image Processing(QR code with zxing Library)
- Zigbee Module
- BotPosition Module
- Servo motor module

5. TESTING STRATEGY:

- Tested with different size of books.
- Tested with 3 department book with 3 shelves.

6. FINAL SYSTEM

Due to hardware constraints we managed to make a library assistant bot that can process the color on the book and place the book to corresponding shelf.

Following are the things we were unable to perform due to hardware restriction:

- We read color instead of QR code, we were able to read the QR code from the image but due to camera quality and some noise from the environment the pixel values sometimes do not give correct results, so we switch over to color processing if camera were of good quality then we can run our code to read QR code.
- We started with the esterel code to trace the path of library but the bot was not responding the exact behavior we want, so later we switch on to C code.
- Since we need the QR code Library to read the QR code and that library is compatible with MATLAB so we started with MATLAB and at the eleventh hour we realized that our camera is not producing the correct result so we switch to color processing but due to lack of time we did not use the scilab.

7. PROBLEMS ENCOUNTERED

- The behavior of bot was unpredictable. The accuracy of bot was not good. The angle rotation was not accurate.
- Camera was not of enough quality so that it can give correct pixel values to read the QR code because a small change in pixel value can change the QR code.
- Handling of book was very cumbersome because the movement of hand is not in our bot. The hand is fixing at one position.

8. FUTURE WORK

The QR code reader module can be implemented with the help of good quality camera.

- Issuing of books can be done by Bot.
- There can be one bot as a master bot and other bot can be slave bot to perform the library functions

9. REFERENCES

- www.mathworks.com
- www.en.wikipedia.org/wiki/esterel
- www.code.google.com/zxing