

Dharmsinh Desai University, Nadiad

Faculty of Technology

Department of Computer Engineering

B. Tech. CE Semester – VI

Subject: (CE – 621) System Design Practice

Project Title:

**Image Processing Applications**

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**Certificate**

*This is to certify that the project work carried out in*

*the subject of* ***System Design Practice***

*is the bonafide work of*

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**1. Abstract**

*Image Processing Applications* project is itself a bunch of projects. Each sub-project is an application of image processing and computer vision.

The main purpose of this project is to perform various operations on an image and to extract some useful information from it.

Using this extracted information, the system can perform various tasks like it can solve a Sudoku puzzle, a mathematical equation, convert image-text into digital text, read aloud the text, translate the text to another language and can also read the captcha and barcode.

**2. Introduction**

*Image Processing Applications* is a collection of various sub-projects. Each sub-project has a common aim i.e. to deal with image processing. So, the main focus of the study is image processing, let’s define it-

***“Image processing is a method to perform some operations on an image, in order to get an enhanced image or to extract some useful information from it.”***

In this system, there is only one end user i.e. one who is going to use this application. Here, the user is required to give an image as input and based on the type of image, the system can perform the following tasks:-

1. Extract text from the image
2. Solves a Sudoku puzzle
3. Solves a mathematical equation (e.g. – quadratic equation, calculus, etc.)
4. Read aloud the text from the image
5. Translate the image-text to some other language
6. Read code from the captcha
7. Provide product name from the barcode

**Tools, Technology and Platform used:-**

1) Programming Languages: Python

2) IDE: PyCharm Community Edition

3) Python Libraries used:-

* + OpenCV
  + NumPy
  + SymPy

**3. Software Requirements Specifications**

**3.1 Product Scope**

The system is designed to perform various image processing operations based on the type of image. Scope of the system is global and open for all users. System provides various functionalities to the users like image to text extraction, translating into other language, solving Sudoku puzzle and mathematical equations.

**3.2 Types of User**

Here, there is only one end-user who is going to use this application.

Image Processing Applications

User

**3.3 System Functional Requirements**

**NOTE:** Here, the functional requirements are listed as module wise

**R1. Image to Text Extraction**

*Description:* This requirement is for converting text from the images into text format/file. System will extract the text from the images and display on the screen.

*Input:* Document Image

*Output:* Highlight the text in the images and display the text on the screen

**R2. Sudoku Solver**

*Description:* This requirement is for solving the Sudoku puzzle problem.

*Input:* Sudoku Image

*Output:* Show the final answer of Sudoku puzzle

**R3. Math Equation Solver**

*Description:* This requirement is for solving the mathematical equations like quadratic equations, integration, differentiation, basic arithmetic operations, etc.

*Input:* Image (containing mathematical equation)

*Output:* Show the answer of the given equation

**R4. Translator**

*Description:* This requirement is for translating the text from the images into some other language.

*Input:* Document Image, Language

*Output:* Show the translated text in the given language fonts

**R5. Text Reader**

*Description:* This requirement is for reading aloud the text from the images.

*Input:* Document Image

*Output:* Machine will read the text from the image

**R6. Captcha Bypass**

*Description:* This requirement is for identifying the code in the captcha.

*Input:* Captcha Image

*Output:* Show the code from the given Captcha

**R7. Barcode to Product Details**

*Description:* This requirement is for giving the product details like product name from the barcode image.

*Input:* Barcode Image

*Output:* Show the product name belonging to the barcode.

**3.4 Other Non-functional Requirements**

**1) Performance**

The application should run efficiently. It must be interactive and user friendly in nature.

**2) Reliability**

The application must ensure that the system is reliable in its image processing operations.

**10. Bibliography**

Following links and websites are referred during the development:-

1. Information about Image Processing – Used for abstract and introduction <https://sisu.ut.ee/imageprocessing/book/1>