



DLIP Final Project

Camera-Based System for Automatic Pin Mapping on Breadboards

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Introduction

Background

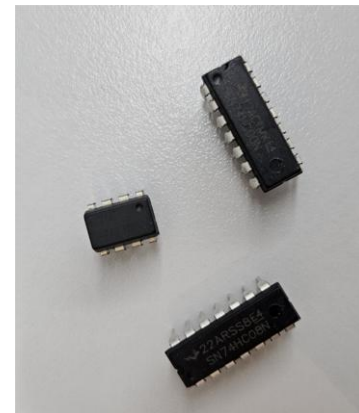
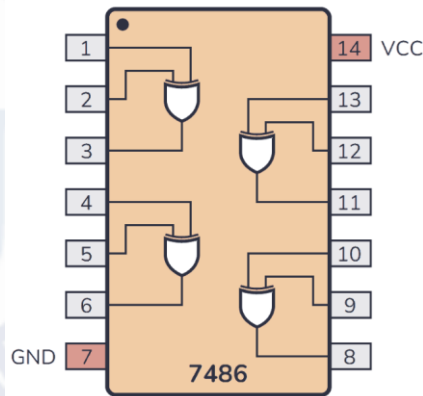
Various forms of integrated circuit (IC) chips are essential components and commonly used at school experiment and an industrial site.

Problem Description

- Hard to identify a IC chip
- Not convenient to look for datasheet

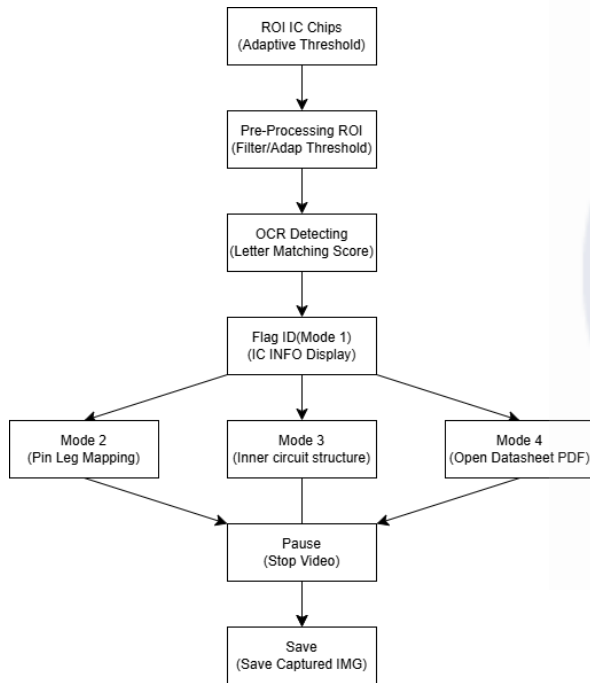
Project Objective

- IC chips and its node are identified by corresponding mode.
User may pause or resume the program and save the image.



Introduction

Flow Chart



Key Advantages

- **No webcam required**
Runs with your phone camera — no extra hardware required.
- **Easily Customizable**
Add new chips by updating an 'IC_INFO' dictionary.
- **Multi-Function Support**
Includes various modes to cover all user needs.



```
IC_INFO = {  
    "IC1": {  
        "name": "IC1",  
        "pin": [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 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Mode Description

Mode 1



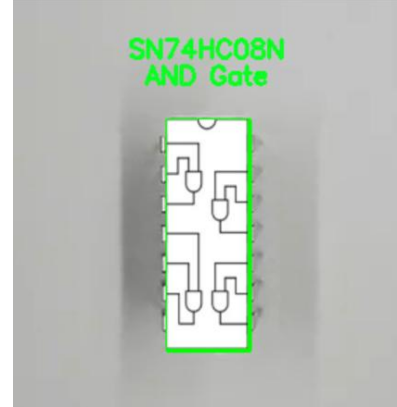
- Default Mode
- Detect IC Name
- Match to Function Type

Mode 2



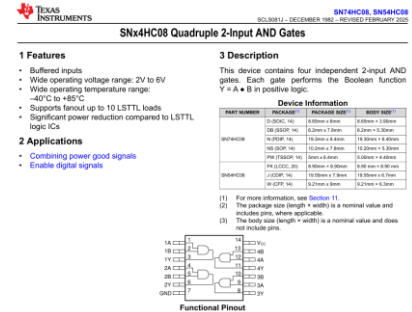
- Toggle Display Mode
- Pin Identification
- Oriented Text Rendering on IC

Mode 3



- Toggle Display Mode
- Overlay Internal Circuit Diagram

Mode 4



- Retrieve Matching Datasheet
- Open PDF for Detailed Specifications

Function Description

Pause / Resume

- Toggle behavior: pressing 'p' pauses the program, and pressing 'r' resumes it.
- Only one is active at a time.
- Used to freeze processing for inspection or saving.

Save

- Triggered by pressing 's' while paused.
- Prompts user to enter a filename.
- Saves the current frame as a .png image.

Exit

- Press 'ESC' (Escape key).
- Immediately terminates the program, regardless of current mode or state.

Demo Video

<https://youtu.be/vTJCyv63dBk?feature=shared>



Conclusion

Objectives Summary

- Successfully developed a machine-vision system which detects IC chips
- Provides multiple mode and functions to increase user's convenience

Challenges

- Heavy pre-processing before Tesseract OCR
- Multiple filtered images used to ensure OCR accuracy
- Difficulty in rotated text placement (coordinate transform, DCM)

Improvement

- Need to improve operation speed
- Need to improve exact node position
- Need to improve IC indicating accuracy

The background of the slide features a large, light blue watermark of the Handong Global University logo. The logo is circular, with the Korean text '한동대' (Handong University) at the top and 'HANDONG GLOBAL UNIVERSITY' at the bottom. In the center of the logo is a stylized 'HGU' monogram.

Thank You!!