Graduation and internship assignments

LabVIEW™ python™

VI TECHNOLOGIES

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1 INTRODUCTION

1.1 Company Profile

VI Technologies is a team of enthusiastic and highly qualified LabVIEW and TestStand specialists.

We specialize in the design and implementation of systems based on National Instruments LabVIEW and TestStand. We help our customers automate their R&D and test and qualify the “things” they develop or produce.

From R&D support to complete releases of professional software products, we serve customers in a wide range of industries, from energy, automotive, semiconductors and civil engineering to educational, military and medical applications.

We also help companies that temporarily need extra LabVIEW engineering capacity or want to involve an experienced architect in setting up the LabVIEW application architecture for a new project. Of course, we can also provide maintenance and modifications or restructuring of existing LabVIEW applications.

1.2 Waarom VI Technologies

Graduating or doing an internship at VI Technologies offers you a wealth of experience in LabVIEW development.

We offer you the opportunity to work on innovative projects that match your field of study. These projects are based on ideas from our employees who do not have enough time to carry them out themselves.

At VI Technologies, you will be a full-fledged colleague and member of a friendly and informal team of techies for six months. In addition to your assignment, you will also be invited to exhibitions and other outings.

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2 ASSIGNMENTS

2.1 Introduction

At VI Technologies, all assignments involve LabVIEW because that is our core business.
This booklet contains the most recent assignments. If you have a good idea yourself, we are always open to discussing it.

2.2 Interested?

If you are interested in a graduation position at VI Technologies, please send your CV, stating the title of your assignment, to: info@vi-tech.nl. If you would like more information, you can of course also send an email to the above email address.

2.3 Location

VI Technologies is located in Weert and is easily accessible by public transport.

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3 CREATE YOUR OWN ASSIGNMENT

3.1 Introduction

Have you already experimented with LabVIEW and would you like to develop your skills further? We are always open to projects that can be solved with LabVIEW. Some LabVIEW specialisations you might consider are:

- LabVIEW Real-time
- LabVIEW FPGA
- LabVIEW NXG
- NI SystemLink
- WebVI's
- NI TestStand

3.2 Assignment

Send us a detailed assignment description and the experience you expect to gain within our company.

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4 CORDOVA NXG API FOR WEBVI'S

4.1 Introduction

Apache Cordova is an open-source mobile development framework. It allows you to use standard web technologies such as HTML, CSS, and JavaScript to develop cross-platform applications. The applications run within a wrapper that gives you access to device hardware such as sensors, data, network status, and much more via a standardized API.

4.2 Assignment

Cordova makes it possible to run a LabVIEW web application natively on an Android or iOS device. In order to access Cordova's API in LabVIEW, various JavaScripts need to be created, and security is also an important consideration.

The assignment is to create a LabVIEW WebVI API so that the end user does not need to know anything about JavaScript or security. This API will be created with LabVIEW NXG.

4.3 Technical Aspects

- LabVIEW op applicatie niveau
- LabVIEW NXG
- LabVIEW Webvi
- JavaScript
- Internet security

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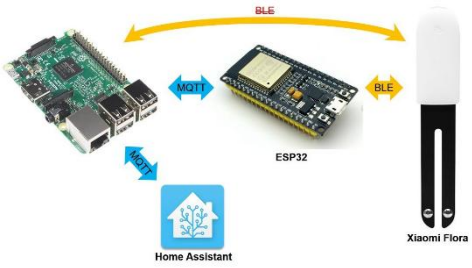
5 INDOOR PLANTS MONITOR

5.1 Introduction



We have many plants in our building. Unfortunately, these plants do not all have the same care requirements.

A plant sensor could be used to monitor the soil of each plant, allowing them to be fed and watered at the right time. M5Stack is an ESP32-based IoT system with modules that are easy to connect to each other. This allows you to quickly implement an IoT solution without needing extensive knowledge of hardware and electronics. The M5Stack can be programmed with Micropython.

5.2 Assignment

Use M5Stack to create a hub that can read the plant sensors, allowing us to monitor which plants in our building need feeding and watering. In addition, a dashboard must be developed where we can see which plants need to be cared for and where they are located in the building.

5.3 Technical Aspects

- Python/micropython
- Raspberry Pi
- ESP32
- ESPHome
- IOT
- Bluetooth/BLE

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6 LICENSEPLATE RECOGNITION

6.1 Introduction

In the morning, when the first person arrives at the office, the gate is closed. Sometimes that person's transmitter may not be working properly, forcing them to wait until another colleague opens the gate. To automate this process, a **vision** system would be created. The camera scans number plates, and if you are the first person to arrive, the gate opens for you. When you are the last to leave, the gate closes.

6.2 Assignment

In previous projects, an intermediate **C++ wrapper** was developed that acts as a bridge between the **OpenCV Library** and **LabVIEW**. This wrapper enables users to call powerful OpenCV functions within the familiar LabVIEW environment, similar to the native IMAQ functionality. However, the current version only supports basic operations (such as threshold values and contours), which is insufficient for complex tasks such as number plate recognition in visually “busy” environments.

The core of this assignment is to transform the static vision library into a dynamic **AI-driven ecosystem**. You will expand the existing wrapper so that it not only executes standard algorithms, but can also load and control modern **Deep Learning models**.

6.3 Technical Aspects

- NI CompactRIO
- LabVIEW
- Vision
- OpenCV
- OpenCV DNN
- C++

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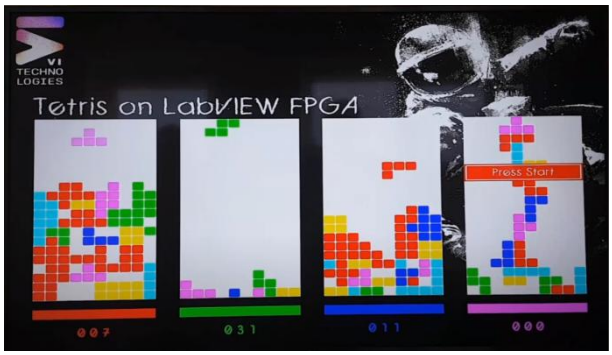
7 TETRIS SOLVER WITH VISION AND AI

7.1 Introduction

A colleague previously programmed 4-player Tetris on an FPGA. Now we want to use vision to create an AI player. This player must recognize the 'Tetris blocks' in these images and determine their location, using this data as input for an algorithm that ultimately determines where the Tetris block should fall.



7.2 Assignment

Create a vision system that can recognize Tetris blocks and operate the controller to play one of the players in 4-player Tetris. The type of camera to be used for this still needs to be determined.

7.3 Technical Aspects

- Vision
- Artificial Intelligence
- Python
- OpenCV

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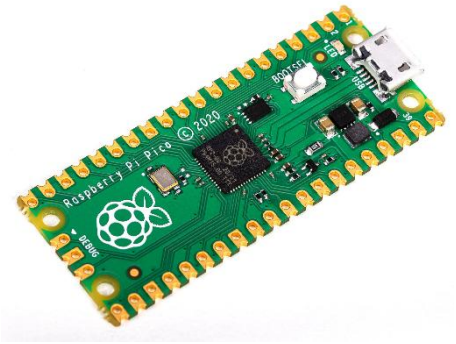
8 CUSTOM VISA DEVICE

8.1 Introduction



Beautiful things are being created in the world of Open Source. The team behind GCentral has released firmware for the Raspberry Pi Pico that allows every Pico to be used as an NI-VISA device in LabVIEW. NI-VISA is an API for controlling Ethernet, GPIB, Serial, USB, PXI, and VXI instruments.

8.2 Assignment

Create a LabVIEW dashboard that collects data from Raspberry Pi Pico.

8.3 Technical Aspects

- Raspberry Pi Pico
- Python
- LabVIEW
- LabVIEW RT
- NI CompactRIO

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9 VISION CONTROLLED FOOTBALL TABLE

9.1 Introducton

We have a table football table in our building. It's fun to play with two or four people, but it's not much fun on your own.

9.2 Assignment

Using LabVIEW, vision and actuators, prepare the table football table to play against one or two other players and win.

9.3 Technical Aspects

- Raspberry Pi Pico
- Python
- LabVIEW
- LabVIEW RT
- NI CompactRIO

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10 DISTRIBUTED MONITORING SYSTEM

Introduction

More and more companies want to collect data from their industrial equipment for real-time monitoring. National Instruments' CompactRIO is an industrial controller that can be programmed with LabVIEW. At VI Technologies, CompactRIOs are often used for customer solutions. National Instruments recently developed a gRPC plugin for LabVIEW, which we would like to put to the test.

gRPC (gRPC Remote Procedure Call) is an open-source framework designed for efficient communication between services in distributed systems.

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Assignment

Create a LabVIEW dashboard that collects data from industrial equipment based on the CompactRIO and makes this data available to users at different locations via gRPC. The setup will consist of a central host system and a network of CompactRIOs.

Technical Aspects

- gRPC
- LabVIEW
- LabVIEW RT
- NI CompactRIO

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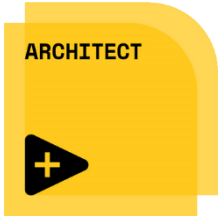
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