

Graduation and internship assignments

 LabVIEW™

 python™


VI
TECHNO
LOGIES



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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 specialise 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, semiconductor 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 Why VI Technologies?

Graduating or doing an internship at VI Technologies offers you a bucket load of experience when it comes to LabVIEW development.

We offer you the opportunity to do innovative projects that match your graduation subject. These projects originate from ideas of our employees who do not have enough time to carry them out.

At VI Technologies, you will be a full-fledged colleague and member of a pleasant and informal team of techies for six months. Besides your assignment, you may also go along to expos and other outings.



2 ASSIGNMENTS

2.1 Introduction

At VI Technologies all assignments have to do with LabVIEW because that is our core business. This booklet contains the most recent assignments. If you have a good idea of your own, it is always possible to discuss it with us.

2.2 Interested?

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

2.3 Location

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



3 CREATE YOUR OWN ASSIGNMENT

3.1 Introduction

Have you already played with LabVIEW and do you want to develop yourself further in it? We are always open for projects that can be solved with LabVIEW. Some LabVIEW specialisations you can think of are:

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

3.2 Assignment

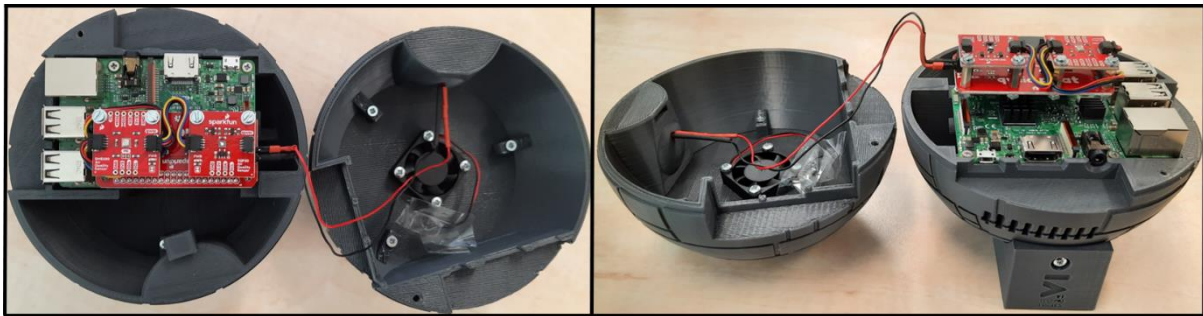
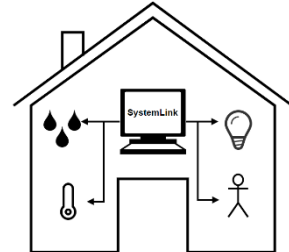
Please send us a detailed assignment description and the experience you expect to gain in our company.



4 ENVIRONMENT MONITORING WITH SYSTEMLINK

4.1 Introduction

In our office building, there are several rooms where the temperature and humidity can fluctuate. These fluctuations are caused by various influences such as the outside temperature, the location of the room, air conditioning, the number of people in the room. We want to store this data in a database and visualise it on a dashboard created in SystemLink. SystemLink.



4.2 Assignment

During a previous internship, a device was made that can measure a number of variables. This device is based on a Raspberry PI programmed with LabVIEW. This device connects to a NI SystemLink server where the data is sent to, an overview dashboard has to be made.

In addition, a number of tests need to be carried out to check whether the current hardware meets all the requirements.

4.3 Technical Aspects

- System Design
- NI SystemLink
- Data Visualisation
- LabVIEW on application level
- LabVIEW NXG WebVI
- Object Oriented Programming
- Internet of Things (IoT)



5 BIOMETRIC SENSOR BODYSUIT

5.1 Introduction

It is becoming increasingly normal to wear a watch that takes measurements on the body. Think of sports watches that measure heart rate, temperature and movement. For these measurements, simple fitness tracking is enough, but for more advanced measurements, such as posture and movement of certain body parts, we need more than a device on your wrist. In order to do these measurements, a bodysuit with two wristbands was developed in a previous stage, which can measure movements in nine axes. In this vest, movement is measured at three points whereby relative movement per sensor is registered. The relative motion of each sensor can be read by external systems through MQTT.



5.2 Assignment

Use the relative motion data measured by the 3 IMU sensors to read out gestures and use them to control an external device e.g. a radio controlled car or a VR application. This can be done with LabVIEW or with another programming language.

It is also possible to expand the bodysuit with other sensors to gather additional biomedical data from the wearer.

5.3 Technical Aspects

- Mathematical models
- MQTT
- LabVIEW
- Hardware Design
- Sensors for the human body



6 LIE DETECTOR

6.1 Introduction

Have you always wanted to know if the person sitting across from you is lying? When someone lies, certain physiological activities occur. This can be recognised by measuring physiological responses such as heart rate, blood pressure, muscle tone and respiratory rate.



6.2 Assignment

The assignment is to develop a digital polygraph using the NI MyRIO and a number of sensors.

Find out which sensors are most suitable to measure the reactions to detect lies.

Develop a LabVIEW Real Time application for the MyRIO that reads the sensors.

Develop a LabVIEW desktop application that serves as a front-end to the data that the MyRIO measures.

6.3 Technical Aspects

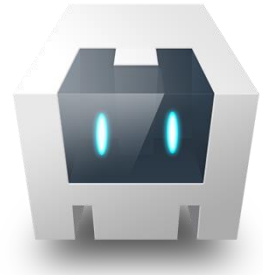
- LabVIEW on application level
- LabVIEW Real Time
- LabVIEW FPGA
- Hardware design
- Sensors for the human



7 CORDOVA NXG API FOR WEBVI'S

7.1 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 inside a wrapper that provides access to device hardware such as sensors, data, network status, and much more via a standardised API.



7.2 Assignment

With Cordova it is possible to run a LabVIEW web application native on an Android or IOS device. To be able to use the API of Cordova in LabVIEW you have to make several JavaScripts and also pay attention to security.

The assignment is to make a LabVIEW WebVI API so the end-user doesn't have to know anything about javascript and security. This API will be made with LabVIEW NXG.

7.3 Technical Aspects

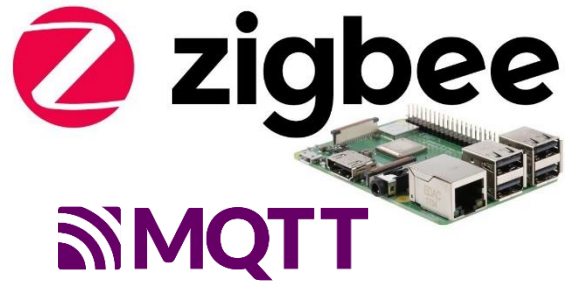
- LabVIEW on application level
- LabVIEW NXG
- LabVIEW Webvi
- JavaScript
- Internet security



8 ZIGBEE AND MQTT WITH LABVIEW

8.1 Introduction

Zigbee is a complete IOT solution that allows smart objects to communicate. Zigbee is a Full-stack solution for many smart home devices, because zigbee is such a solid solution for The Internet of Things (IOT) there are many products on the market that use zigbee. Like sensors for windows and doors and actuators like relays and lights.



MQTT is a machine-to-machine (M2M) data transfer protocol and the leading messaging protocol for the Industrial Internet of Things (IIoT). MQTT is a publish/subscribe protocol that allows edge-of-network devices to publish to a broker. Clients connect to this broker, which then mediates between the communication of the two devices. Each device can subscribe or register to certain topics. TT is een machine-to-machine (M2M) data transfer protocol en het leidende messaging-protocol voor het Industrial Internet of Things (IIoT).

8.2 Assignment

In our office building, there are several rooms where windows can be opened. These windows must be closed in the evening before the alarm is activated. We would like to have a screen at the main entrance that shows whether a window is still open, and if so which one it is.

A Raspberry Pi will read the sensors via Zigbee and publish this data via MQTT to a broker. The screen where the information is displayed will subscribe to these messages and then display the data on a screen.

8.3 Technical Aspects

- LabVIEW op application level
- LabVIEW NXG WebVI
- Object Oriented programming and design
- MQTT
- ZigBee
- Internet of Things (IoT)

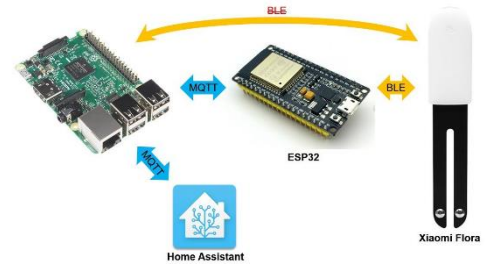


9 INDOOR PLANTS MONITOR

9.1 Introduction

In ons pand hebben we een groot aantal planten. Helaas hebben deze planten niet allemaal dezelfde behoeften

Met de Xiaomi Mi plant sensor zou de grond van iedere plant gemonitord kunnen worden waardoor er tijdig voeding en water aan deze planten gegeven kan worden. M5Stack is een op ESP32 gebaseerd IOT systeem met modules die gemakkelijk aan elkaar te koppelen zijn. Hierdoor kan je snel een IOT oplossing realiseren zonder veel te kennis te hoeven hebben van hardware en elektronica. De M5Stack is te programmeren met Micropython.



9.2 Assignment

Using M5Stack, create a hub that can read the plant sensors, enabling us to monitor which plants in our building require feeding and watering. We also need to develop a dashboard that allows us to see where in the building which plants need to be looked after.

9.3 Technical Aspects

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



10 LICENSEPLATE RECOGNITION

10.1 Introduction

In the morning when the first person comes into the office, the gate is closed, sometimes that person's transmitter does not work properly, so the person has to wait for another co-worker to open the gate. To automate this, a vision system would be made for this. The camera looks for number plates, and if you are the first person, the gate opens for you. If you are the last to leave, the gate closes.



10.2 Assignment

A vision system has to be created, based on a Raspberry Pi and a camera, yet to be chosen, that can open and close the gate. It should also be possible to add and remove new license plates via a webinterface, which is secured with credentials. Besides the vision system, it should still be possible to open the gate with a hand controller.

10.3 Technical Aspects

- Raspberry Pi
- Vision
- OpenCV
- Python



11 INFORMATION DASHBOARD

11.1 Introduction

Have a trainee take stock of which VI-tech information we want to display on a dashboard in order to share more information internally with the employees (e.g. new prospects, projects that are currently running, news items (VI tech post on twitter for example) Open Reuse items etc.).



What information is general enough to show in the canteen. An example of a dashboard in our style is shown below.

11.2 Assignment

- Overview of current projects based on info from Planio
 - Open issues
 - Closed issues
 - Status
 - Number of commits per week
- Upcoming birthdays and a page when someone has a birthday. Using outlook calendar
- GBs downloaded/uploaded per week
- News from Tweakers
- The weather
- Our website blogs
- Twitter feed #labview
- Releases + changelog Re-use projects (Jenkins)
- LinkedIn posts
- Solar panel yield

11.3 Technical Aspects

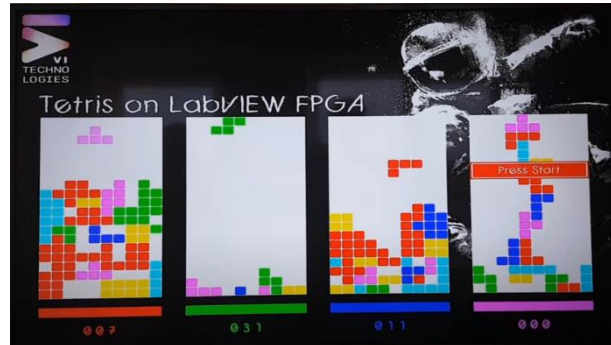
- Raspberry PI
- UI
- Rest API
- RSS
- Python



12 TETRIS SOLVER WITH VISION AND AI

12.1 Introduction

A colleague has programmed 4-player Tetris on an FPGA in the past. Now we want to make an AI player with vision. This player has to recognise the "Tetris blocks" on these images and determine their position, use this data as input for an algorithm that eventually determines where the Tetris block should fall.



12.2 Assignment

Create a vision system that can recognise Tetris blocks and control the controller to play one of the players in 4-player Tetris. We still have to decide what kind of camera to use for this.

12.3 Technical Aspects

- Vision technology
- Artificial Intelligence
- Python
- OpenCV



13 AUTO AIMING NERF GUN

13.1 Introduction

Sometimes you see a project that you would like to rebuild, and this is one of them. An automatically aiming Nerf gun. Fun to tease your colleagues with, but also just fun because of the technique it contains.



13.2 Assignment

Make a vision system based on a Raspberry Pi, which can recognise people, aim and shoot Nerf darts. The system must have a universal camera tripod connection so you can mount it in different places.

13.3 Technical Aspects

- Vision
- Artificial Intelligence
- Python
- OpenCV
- 3D printing/design





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