UNIVERSITÄT
KLAGENFURT

The
Smart Green House
Project

1 Contents

2 Introduction

This document contains information concerning the Greenhouse (GH) project.

You can find details concerning the available hardware to curry out the project as well as guidelines concerning the first part of the project.

Namely, in section 3 you can find all the hardware that you are going to be given for the project and in the next and last chapter you can find some guiding lines concerning your tasks.

3 Hardware

In this section you can find the exact hardware that you are going to be given to carry out the project. More specifically, you can find information about the microcontroller ESP32, sensors, actuators and more.
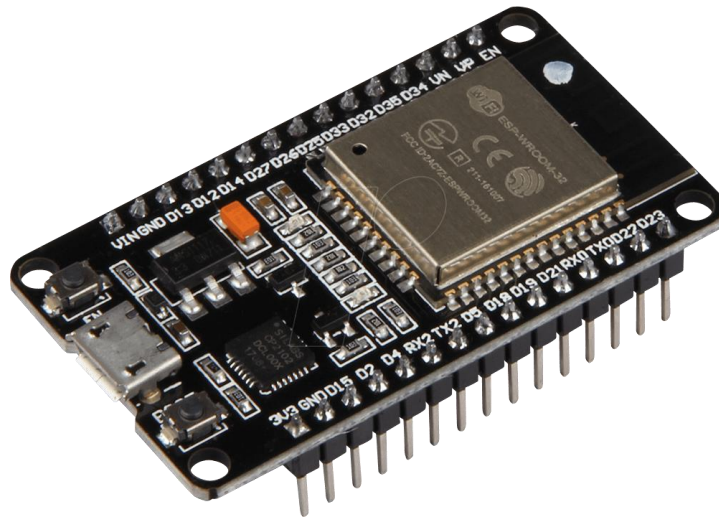
3.1 Microcontroller ESP – WROVER-E

Figure 1 ESP-WROOM-32

Detailed information about the given microcontroller can be found:

- https://docs.espressif.com/projects/esp-idf/en/latest/esp32/hw-reference/esp32/get-started-devkitc.html
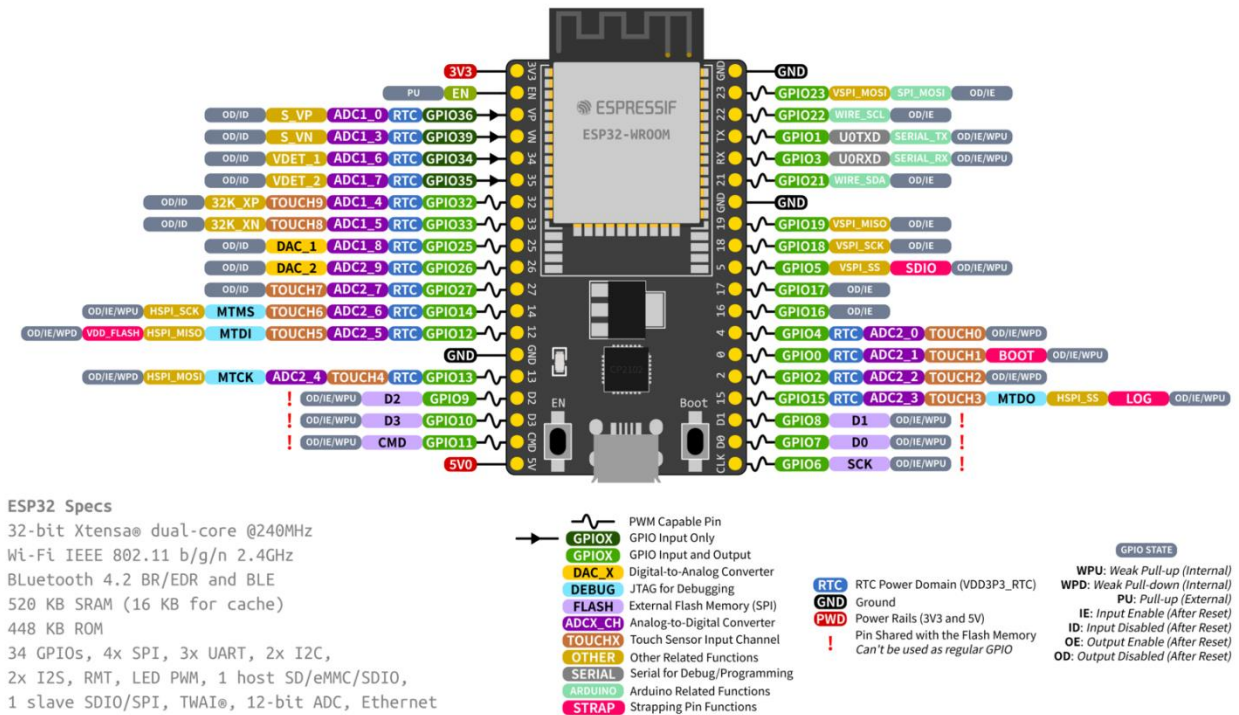
Figure 2 ESP32 DevKitC pin layout.
(source: https://docs.espressif.com/projects/esp-idf/en/latest/esp32/hw-reference/esp32/get-started-devkitc.html)

3.2   Sensors

This section contains the available sensors that can be used to measure various physical state of the interior/exterior of the GH.

Table 1 contains the handed sensors.

Sensor	Picture	Description
FC-37		Rain sensor
Capacitive soil moisture sensor v1.2		Soil moisture sensor

DS1820		**Soil temperature sensor**
BMP280		**Temperature, pressure**
UVM30A **OR** **GUVA-S12SD**		**UV sensor**
GY-30, BH1750 **OR** **TSL2591**		**Light intensity sensor**
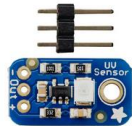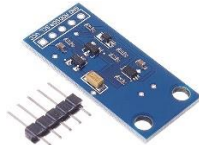
3.3   Actuators
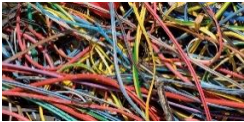
To the change of conditions in the GH

Table 2 Actuators.

Sensor	Picture	Description
FUNGWAN MG 996R		**Servo Motor**
3 – Wire Fan		**Fan**
Amphibious Water Pump		**Water pump**
Light		**Light**

3.4 Misc.

Last but not least you are going to be given the following.

Component	Picture	Description
5v Relay Module		**Relay**
Breadboard		**Breadboard**
Power Supply		**3.3v / 5 v power supply**
Cables		**For the power supply, pin connectors, etc.**

4 Project Description

The ability to interconnect devices of variable sizes and capabilities over the internet is transforming industries! The internet of things (IoT) has found its way in many domains like home automation, industrial applications, military applications and more.

One of the industries that is being transformed and it's of particular interest for your project, is agriculture. Nowadays, farmers are able to monitor their state of their farming areas, monitor and predict the weather, automate processes without the need of their physical presence.

In this project you are called to create a solution to monitor and control the climate of a Green-house. The project is divided into 2 main building blocks. The first one is the hardware part in terms of monitoring the physical state of the Green House with sensors and changing that physical state with actuators. The second part is about being able to monitor and change the conditions in your Green-house remotely.
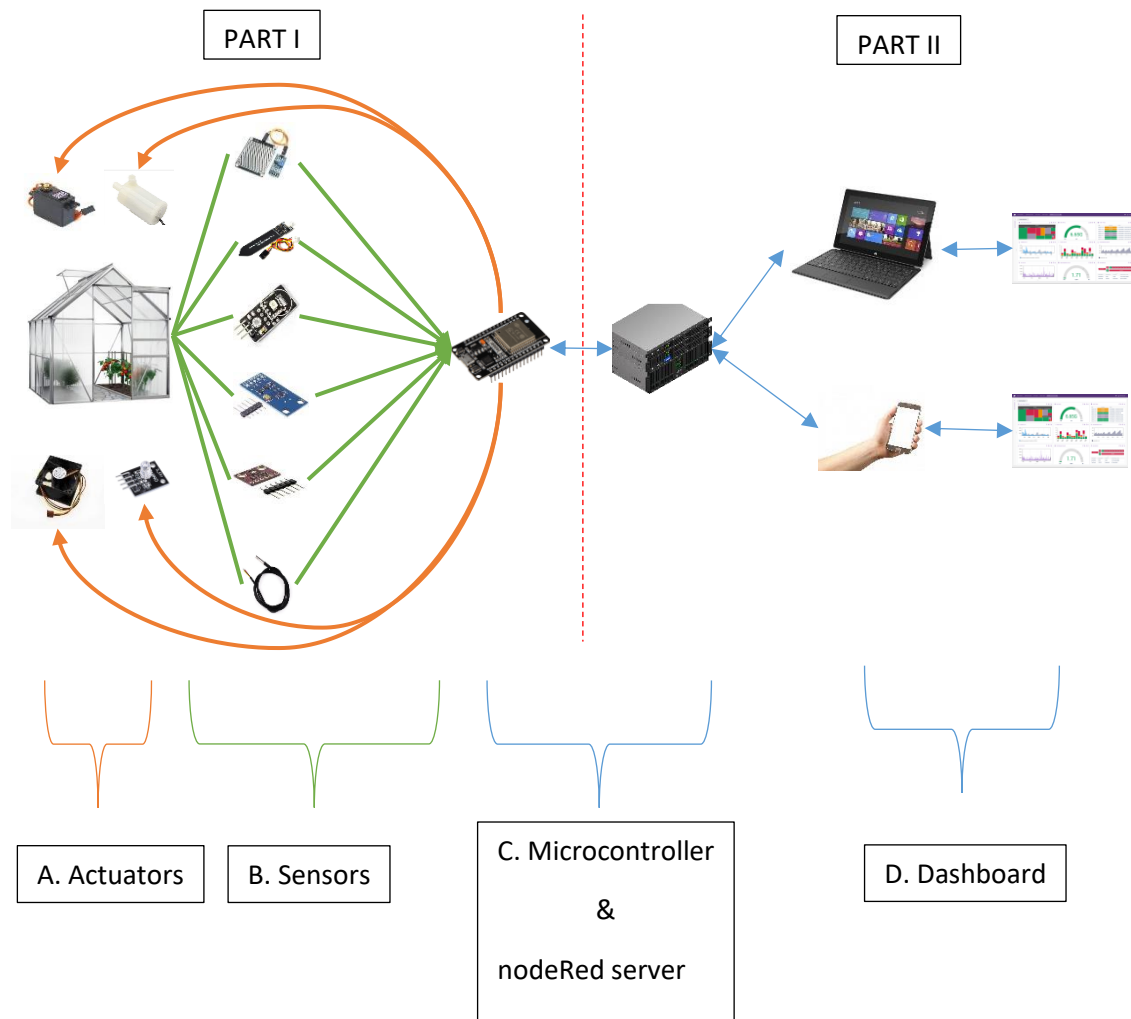

Figure 3 Project overview. The project is split in part I and II. The first part contains the Actuators and Sensors that are being connected to the microcontroller, whereas the second part contains the connectivity of the microcontroller via WI-FI to the nodeRed server which is going to be used to create and host your dashboard.

4.1   Tasks Part I

Your tasks for the first part of the project are:

1) Familiarize yourself with the available hardware. Find out about the given:
   a. Microcontroller
   b. Sensors
   c. Actuators
   d. Misc.

2) Find out how to install the necessary libraries in order to program your given microcontroller.

   Note: that can be done in your own preferable way but one of the most user friendly ways is to do so though the Arduino IDE.

3) Once the installation is complete verify its success by creating the famous "Hello world!" program.

   Note: when you are trying to upload code to your microcontroller you have to keep the boot button pressed until you see the connecting message in your debugging prompt.

4) Proceed with the actual implementation of the project. Namely:
   a. Harvest data from the sensors
   b. Control the actuators

   Note: the ESP is in line with the Arduino in terms of programming therefore in case you cannot find enough material online for the given ESP you can always try to search how the sensors and actuators are integrated with the Arduino and tune the codes accordingly.

5) Let's proceed with the PART II. Of the project.