DEVELOPMENT OF A DISTRIBUTED TEMPERATURE MEASUREMENT SYSTEM FOR THE MODELLING OF THE INTERNAL HEAT DISTRIBUTIONS OF A HOT WATER CYLINDER

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OBJECTIVES

- Design and develop a temperature measurement system
- Design and prepare experimental setup
- Design a graphical user interface (GUI)
- Perform experimental tests on the system
- Analyse experimental results

Development of a distributed temperature measurement system for the modelling of the internal heat distributions of a hot water cylinder

Reference	: CVS1
Supervisor	: Mrs Chantelle van Staden
Can be completed in first semester	: No
Student already assigned	: None
Direction	: Mechatronic
Required elective	: None

Description:
The internal temperature distribution of a hot water storage system is an important consideration in designing such a system to minimise heat losses. This temperature distribution is also highly dynamic during the heating and draw-off phases. This project involves the development and testing of a cost-effective temperature monitoring system with distributed sensors to map the dynamic temperature distribution inside a domestic hot water storage system. The system must be designed to withstand water and a high-pressure environment. The system will be installed into a hot water cylinder and tested under laboratory conditions with the view to obtain research results on the behaviour of the heat distribution inside the cylinder under various operating conditions. The project will also include the internal modelling of the water flow and stratification using thermodynamic modelling software.

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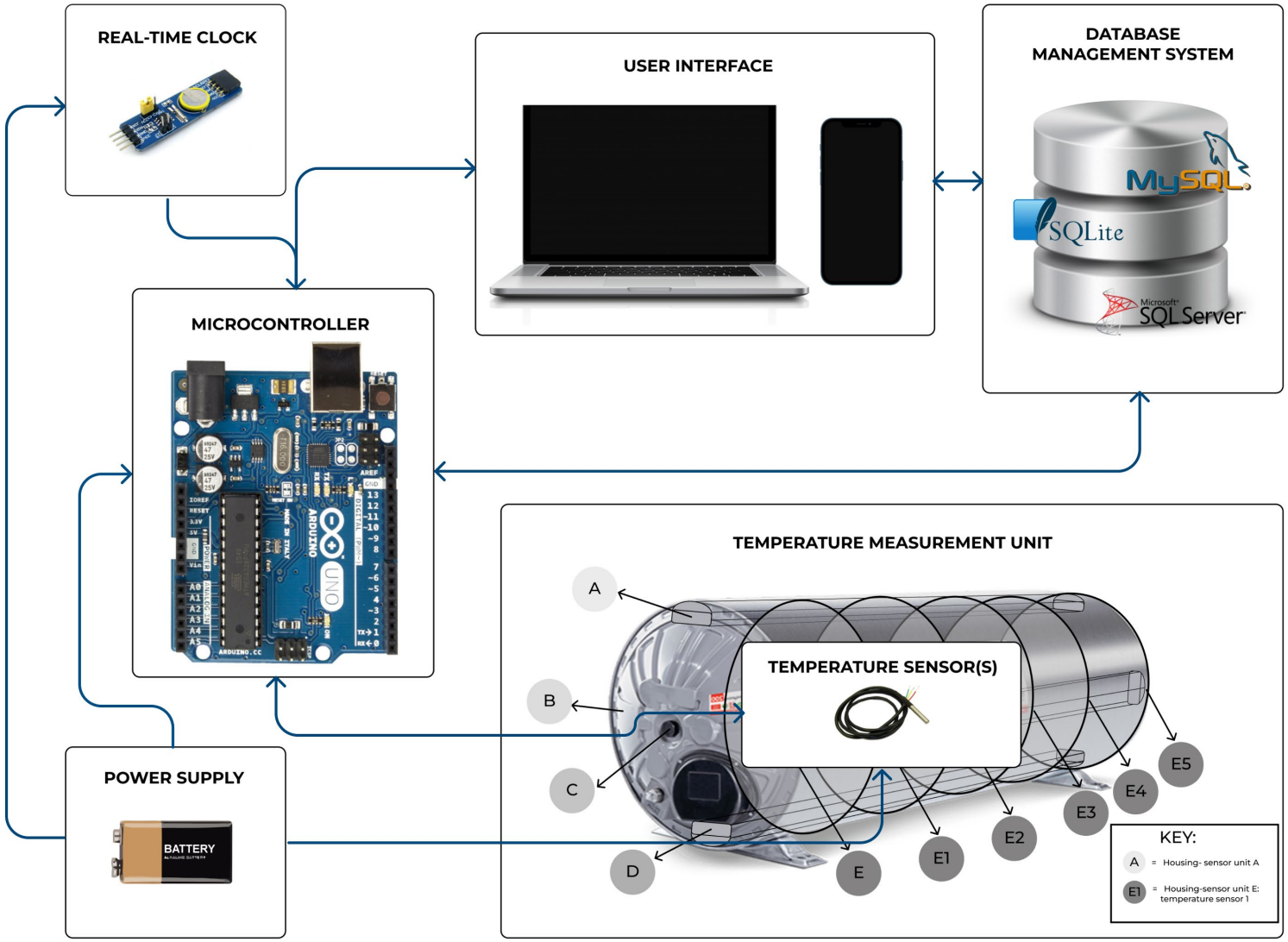
SYSTEM OVERVIEW

- Measure temperature distribution
- Accurate recording of data - RTC
- Acquire and manipulate sensor data
- Store sensor data
- Manage system through GUI



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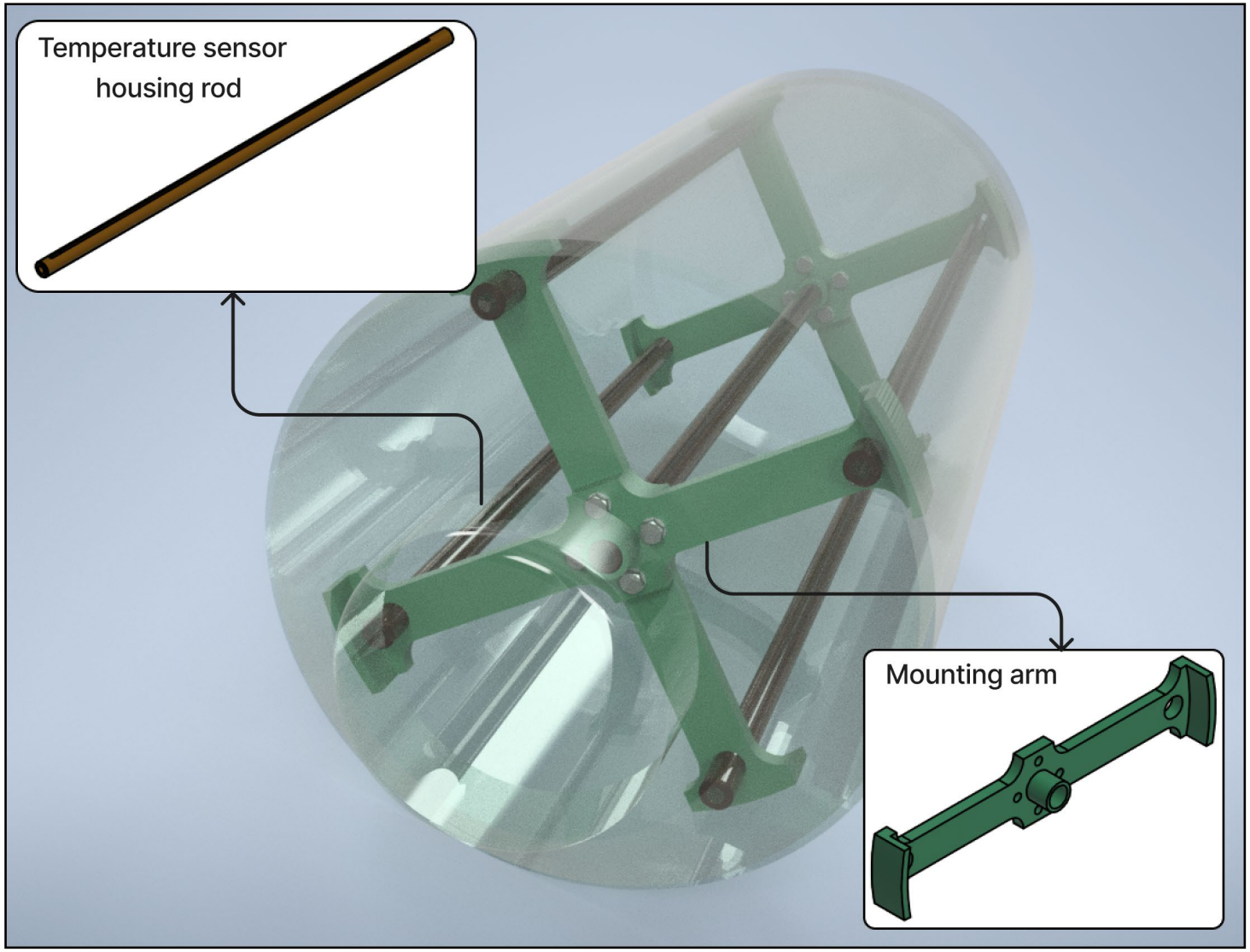
TEMPERATURE MEASUREMENT UNIT

- Design layout
- Suitable temperature sensor
- High temperature and pressure resistant material
- Design for assembly



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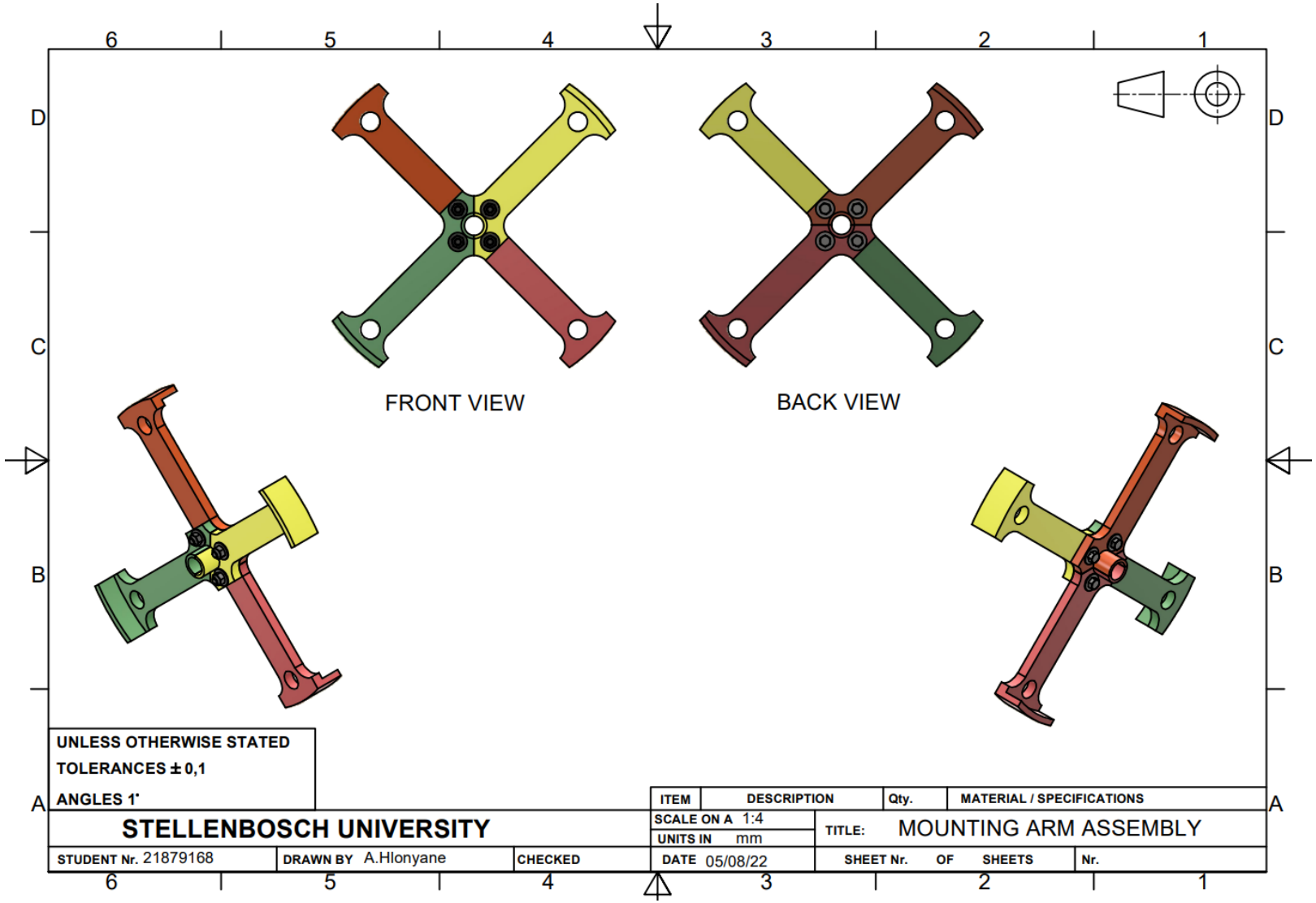
IMPROVED MOUNTING ARMS

- Modular design
- Easier assembly
- PLA has low heat distortion temperature



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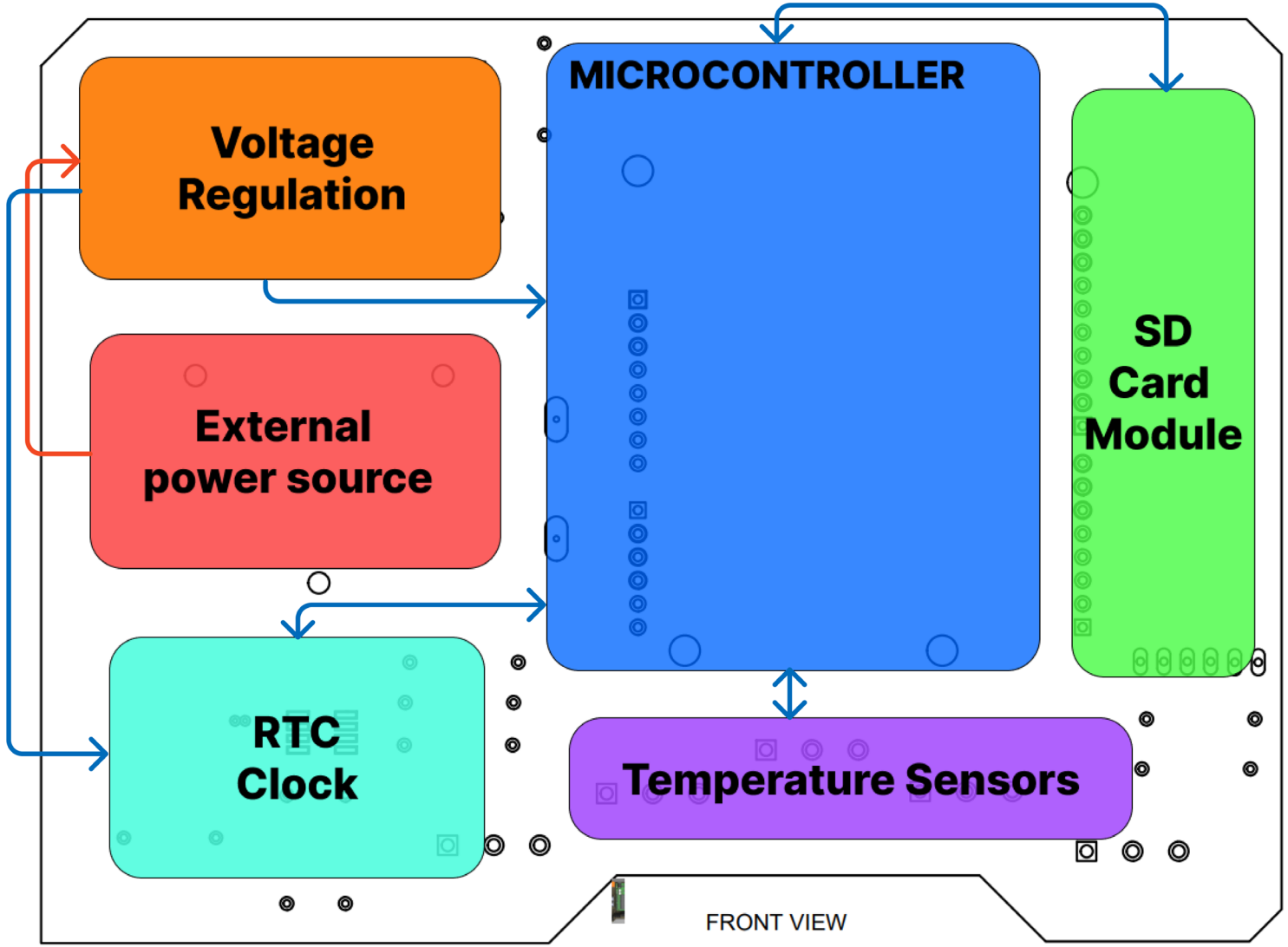
DATA ACQUISITION SYSTEM

- Arduino UNO R3
- Regulate voltage to 5V
- Battery pack – uninterrupted measuring
- SD Card for back up storage



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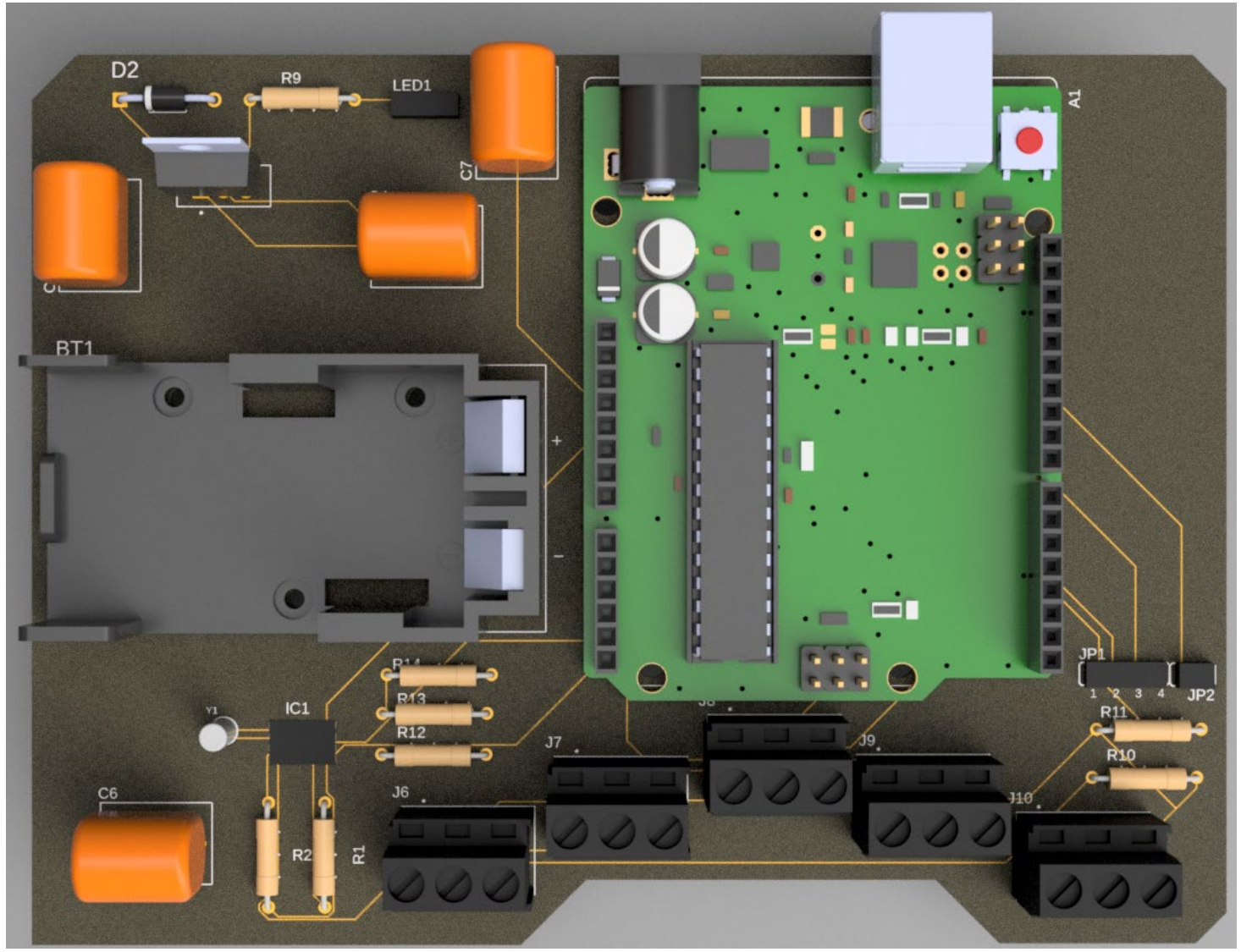
PCB DESIGN

- Component placement
- Adhere to Stellenbosch standards



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Thank you
Enkosi
Dankie

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