

1 Architecture phase

In this chapter the structure of the system will be described. When describing the architecture, subsystems and the connections between them will be defined.

1.1 Context diagram

The context diagram in Figure 1 shows how the external sources interact with the system.

1.add text to describe the figure

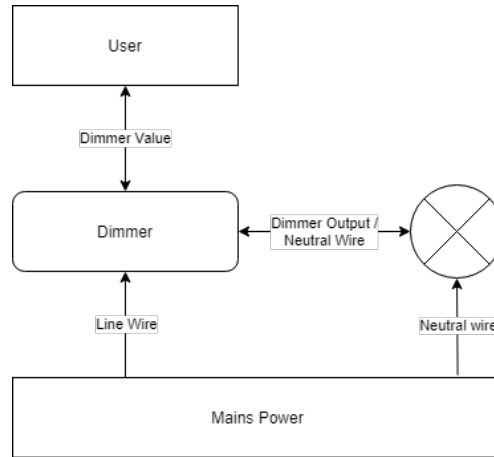


Figure 1: Context diagram

1.2 Architecture Interconnect Diagram

The architecture interconnect diagram (Figure 2) gives a more detailed overview of the system. This diagram shows the connections between the three subsystems (Power supply, Microcontroller and Dimmer) and their external connections as shown in Figure 1.

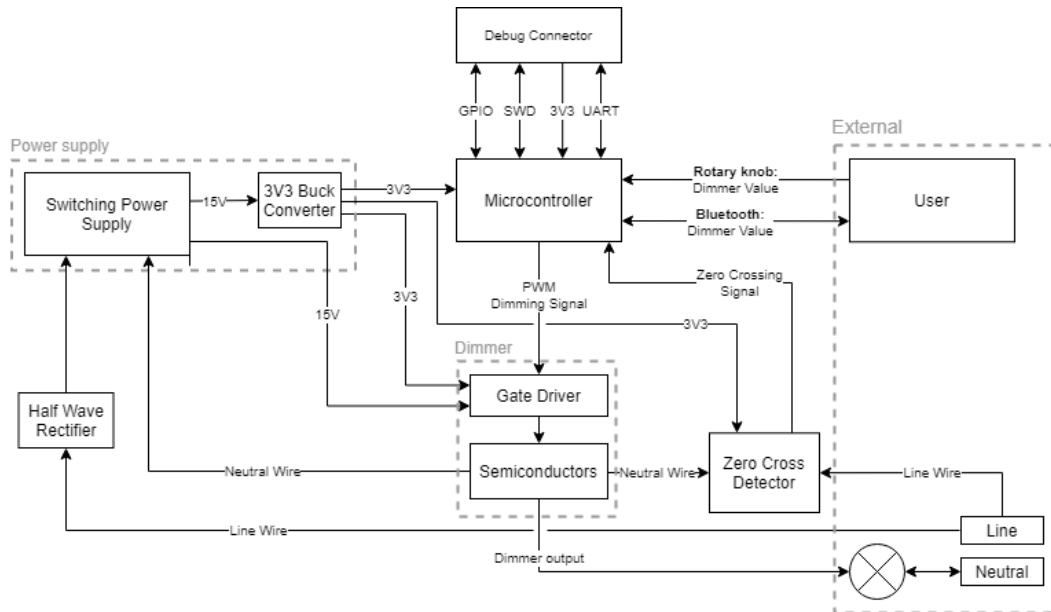


Figure 2: Architecture interconnect diagram

1.3 Subsystems

The system consists of three subsystems, the following sections will briefly describe these three subsystems and the data flows between them.

1.3.1 Power supply

The power supply contains four parts: a half wave rectifier, DC to DC power converters and zero-crossing detection.

This subsystem provides power at the right voltage for the gate driver and microcontroller. The zero-crossing system will supply a square wave signal to the microcontroller.

1.3.2 Microcontroller

The microcontroller is part of the SoC which handles the Bluetooth communication and ensures that all subsystems are connected. It receives the zero crossing detection signal from the power supply, detects use of the rotary knob and sends a PWM signal to the dimmer system.

External connections to the microcontroller for debug purposes are: UART, Serial Wire Debug, four GPIO pins and the ability to power the microcontroller from an external power source.

1.3.3 Dimmer

The dimmer is responsible for generating the phase cut output signal from a PWM signal derived from the microcontroller.

This subsystem consists of two semiconductors for phase cutting the output signal and a gate driver to drive the semiconductors.

1.4 Traceability of requirements

The Requirements traceability matrix shows which subsystem is responsible for a requirement.

	Power supply	Microcontroller	Dimmer
REQ-1.1	✓		✓
REQ-1.2	✓		✓
REQ-1.3	✓		
REQ-1.4	✓	✓	
REQ-2.1		✓	✓
REQ-2.2		✓	✓
REQ-2.3	✓		✓
REQ-2.4			✓
REQ-2.5		✓	
REQ-2.6		✓	
REQ-3.1	2.todo		
REQ-3.2		✓	
REQ-4.1		✓	
REQ-4.2		✓	
REQ-4.3		✓	
REQ-5.1	✓		✓
REQ-5.2	✓		
NFREQ-1	✓		
NFREQ-2	✓		
NFREQ-3	✓	✓	✓

Table 1: Requirements traceability matrix

1.5 Data dictionary

The data dictionary shows the connections as displayed in the architecture interconnect diagram (Figure 2), Table 2 shows a description of the flow, the unit and range.

Data flow	Description	Unit	Range
<i>Power supply:</i>			
Zero crossing signal	High-low transitioning signal	Volts	0 - 3.3
Power input	Mains AC power input	Volts (RMS)	207 - 253
<i>Microcontroller:</i>			
Dimmer value: knob			0 - 100%
Dimmer value: Bluetooth			0 - 100%
<i>Dimmer:</i>			
PWM dimming signal	Signal from the microcontroller to the dimmer	Duty cycle	0 - 100%
Dimmer output	Phase cut AC power from the dimmer to the light	Duty cycle	0 - 100%
<i>Debug connector:</i>			
UART	Receive, Transmit	Baud	3.rate
SWD	Clock, I/O	-	-
GPIO	General purpose IO for debugging	-	-
3V3, GND	External MCU 3V3 power input	Volts	3.0 - 3.6

Table 2: Data dictionary