DALHOUSIE UNIVERSITY
Inspiring Minds

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IMPERISYS Quality Assurance Plan

Abstract

IMPERISYS, a heating unit controller, was produced by the Zinck Computer Group company. A quality assurance plan is required to verify that the manufacturing process produced a working copy of the product. The team created physical and functional test cases that are restricted by time and safety.

Overview

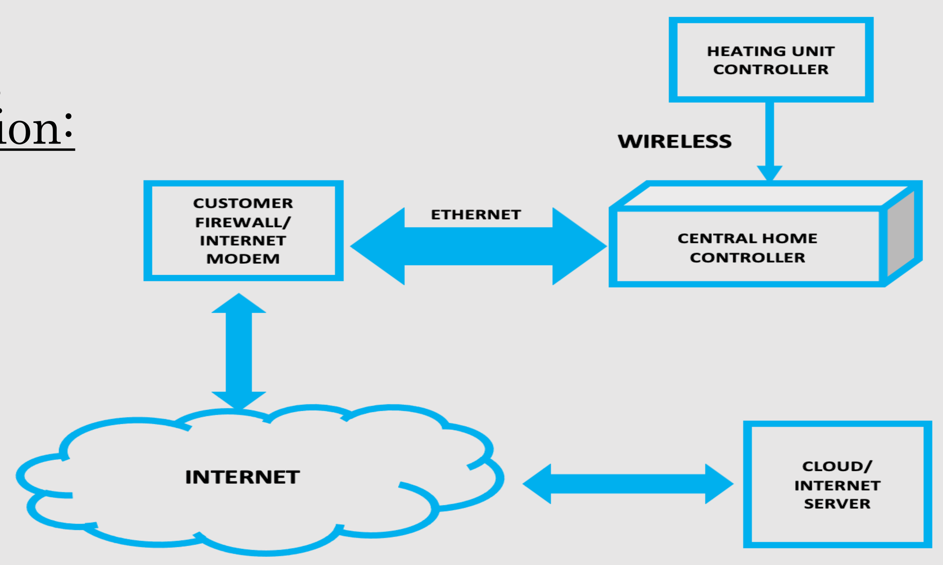
The main objective is to develop a quality assurance plan for the controller board IMPERISYS.

IMPERISYS manages Electric Thermal Storage (ETS) for an El-nur Ecombi storage heater. ETS is a method of storing energy by electrically heating a medium (ceramic bricks). They are wirelessly linked to a Central Home Controller (CHC). The CHC provides the link between the wireless network and the internet.

Figure 1 Elnur Ecombi.

Figure 2 IMPERISYS.

System Operation:

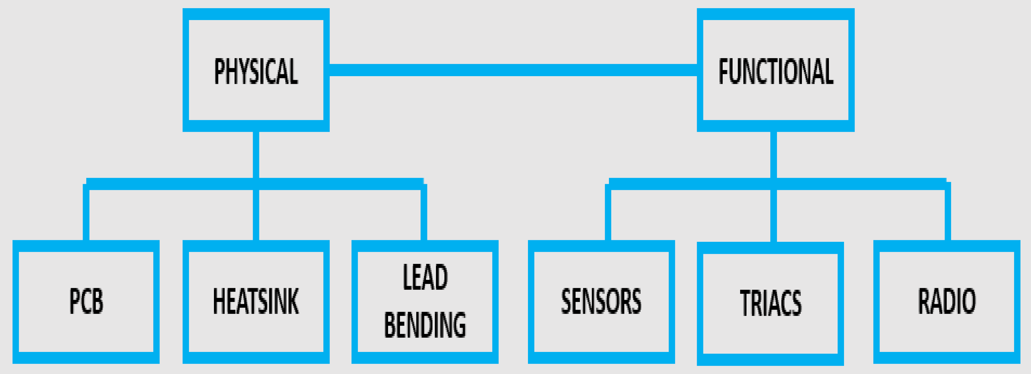


A quality assurance (QA) is a plan that verifies and validates that the product operates as expected. It identifies potential errors prior to selling the product to the customer. Completing a QA ensures that a customer's expectations and demands are met, while the company thrives in a good reputation due a reliable product.

Table 1 *QA checklist sample.*

Physical Testing							
	Pass	WIP	TBD	Fail	Assigned to	Issue type	Comments
Sensors	✓				Mohammad/Sarah	N/A	N/A
Triacs		✓			Nandita/Sarah	N/A	N/A
Radio				✓	Nandita/Sarah	Signal strength	Transmitted signal is unreliable
Functional Testing							
	Pass	WIP	TBD	Fail	Assigned to	Issue type	Comments
PCB	✓				Mohammad/Sarah	N/A	N/A
Heatsink				✓	Mink/Sarah	Height	Height is 5mm
Lead bending	✓				Mohammad/Sarah	N/A	N/A

Test Plans



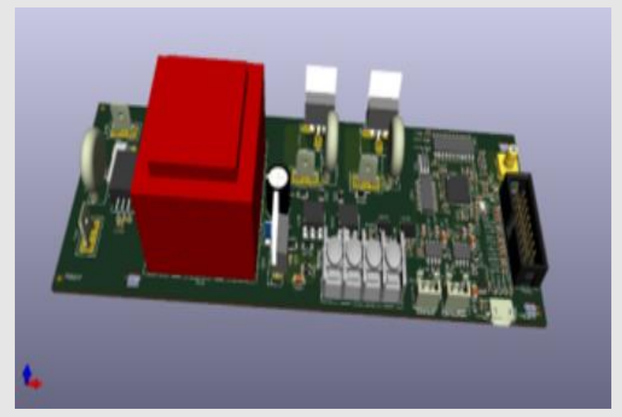


Figure 3 3D IMPERISYS.

PCB:

There must not be any solder bridging, missing or overlapping components, and scratches or pin holes on traces.

Heatsink:

The recommended spacing between the heatsink and board is 12.4 mm.

Lead bending:

The minimum distance between package body and bending should be 2.5 mm, while avoiding bending at the edge of the package.

Sensors:

The output voltage is measured by a voltmeter. For the voltage sensor, the measurement is across resistor 108. For the current sensor, the sensitivity factor is used to convert the measured value to a current reading.

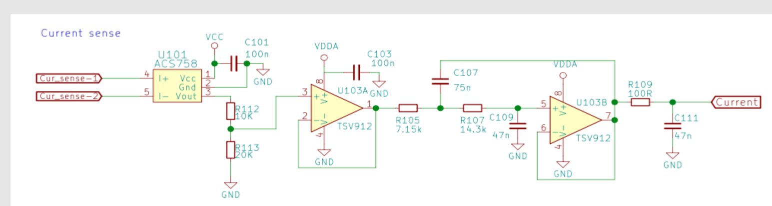


Figure 4 Current sensor schematic.

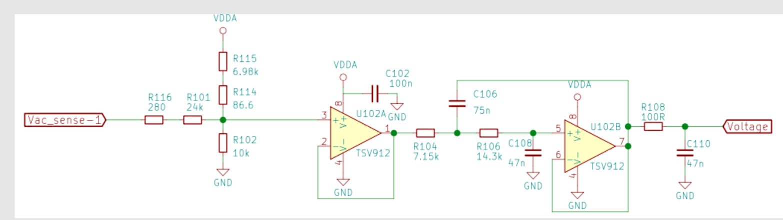


Figure 5 Voltage sensor schematic.

Triacs:

An ohmmeter and a jumper lead is used to measure the continuity and direction of current.

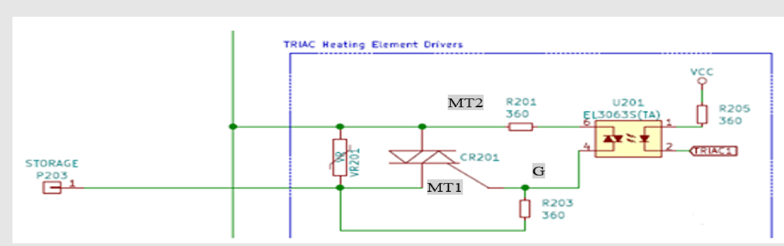


Figure 6 Triacs sensor schematic.

Radio:

SmartRF software is used to send commands through the control panel to measure signal's strength and the output power.

User Interface Software

IMPERISYS' dashboard provides central control and reporting. It configures the devices, presents the total power usage, as well as logs temperature and system status information.

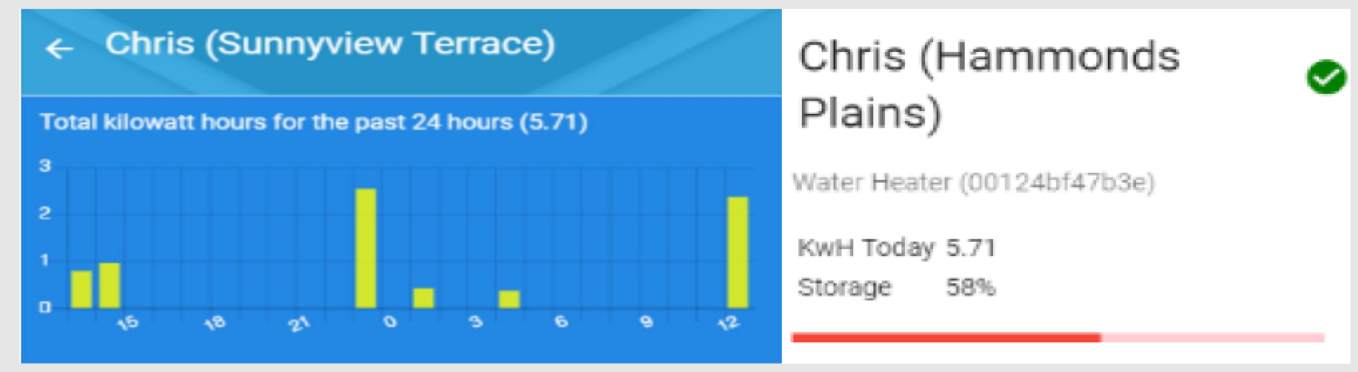


Figure 7 Collected data on dashboard.

Challenges

- Board testing time is 15 minutes and must be reduced to five minutes.
- A sampling method to represent the entire batch of boards is to be determined.
- A qualified electrician must be aware of the grounded components due to working with a 230V source.

Recommendations

- A resistor will replace the RTD and thermistor sensors since our goal is to test the board rather than the components.
- The board is to be modified to include test points to ease the testing phase.

Conclusion

The team created the initial test cases to verify IMPERISYS' physical and functional operations. The plans will be implemented and altered to meet the targeted time. Upon finalizing the QA plan, automating the test plans will be the next phase of this project.

References

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