

2024421

by Matthew Perry

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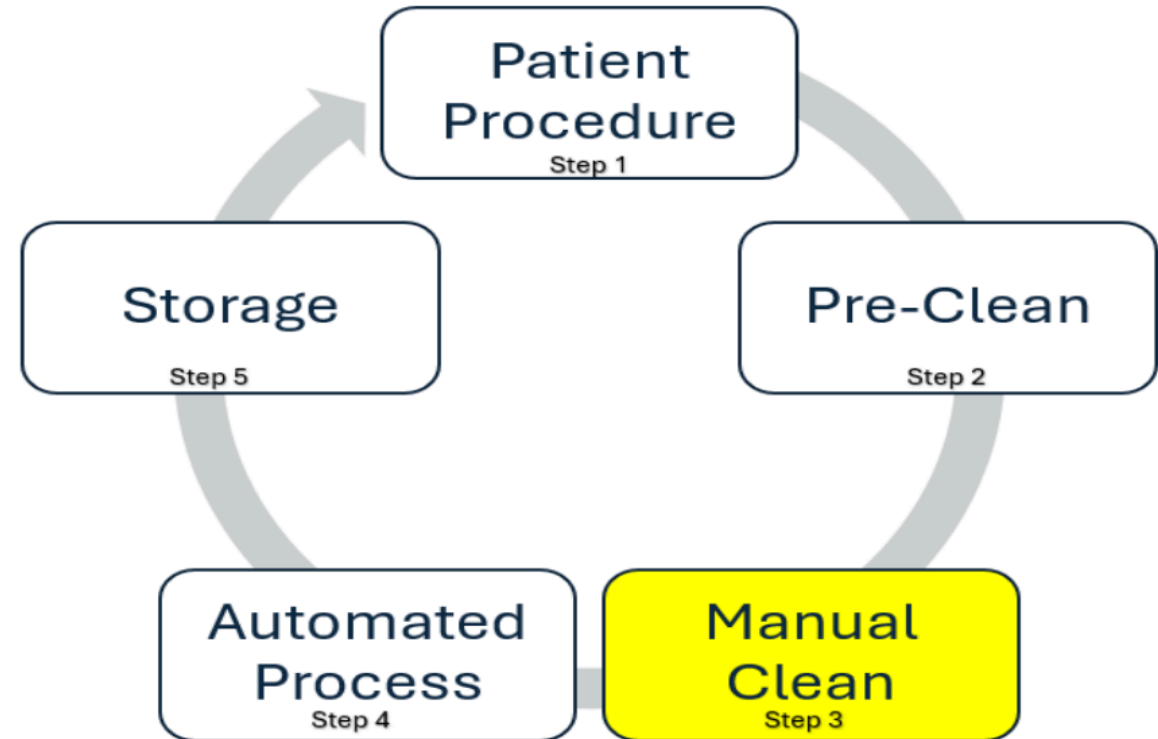
Character count: 1178

Sink Accessory Prototype

Matthew Perry

Introduction

Endoscope



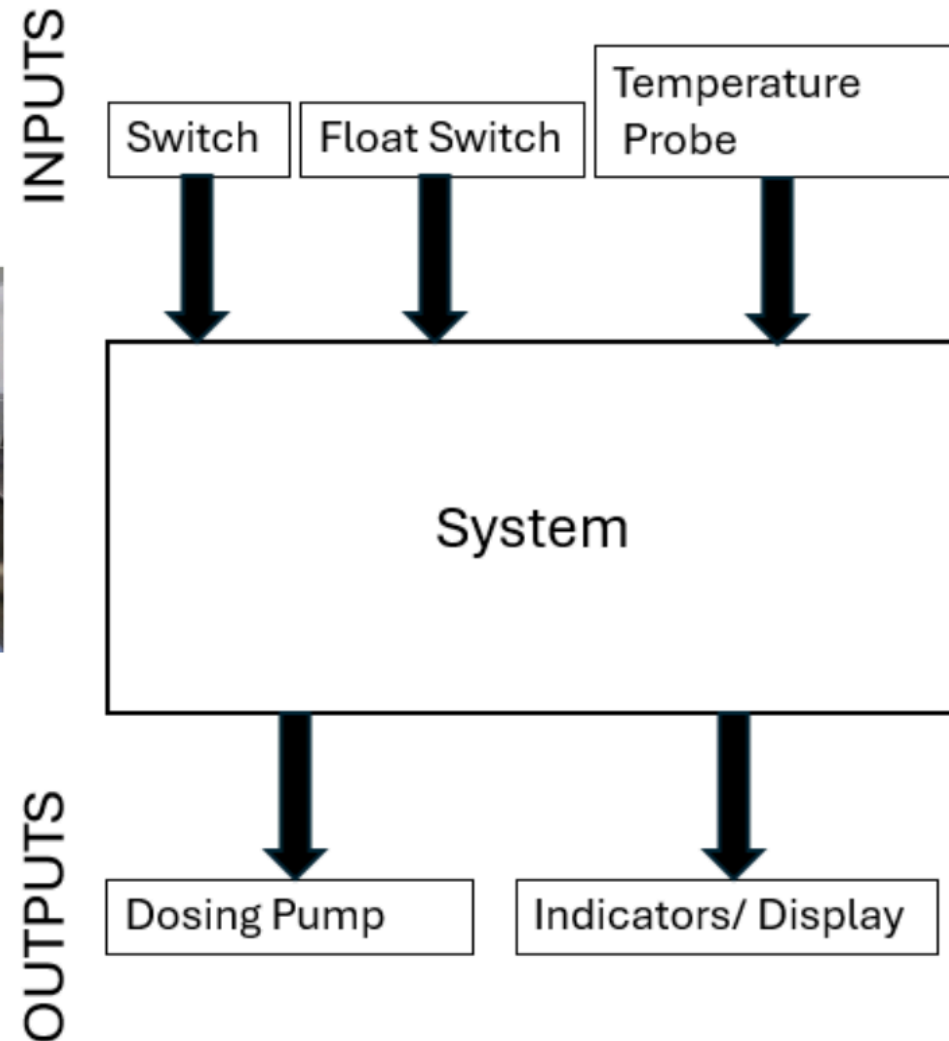
Aims and Objectives

- Develop a prototype to assist medical professionals by monitoring the following key parameters:

- Cleaning time
- Dosing
- Temperature
- Visual Indicators



- Integration of systems into one calibrated solution will enhance compliance with BS EN ISO 13485.

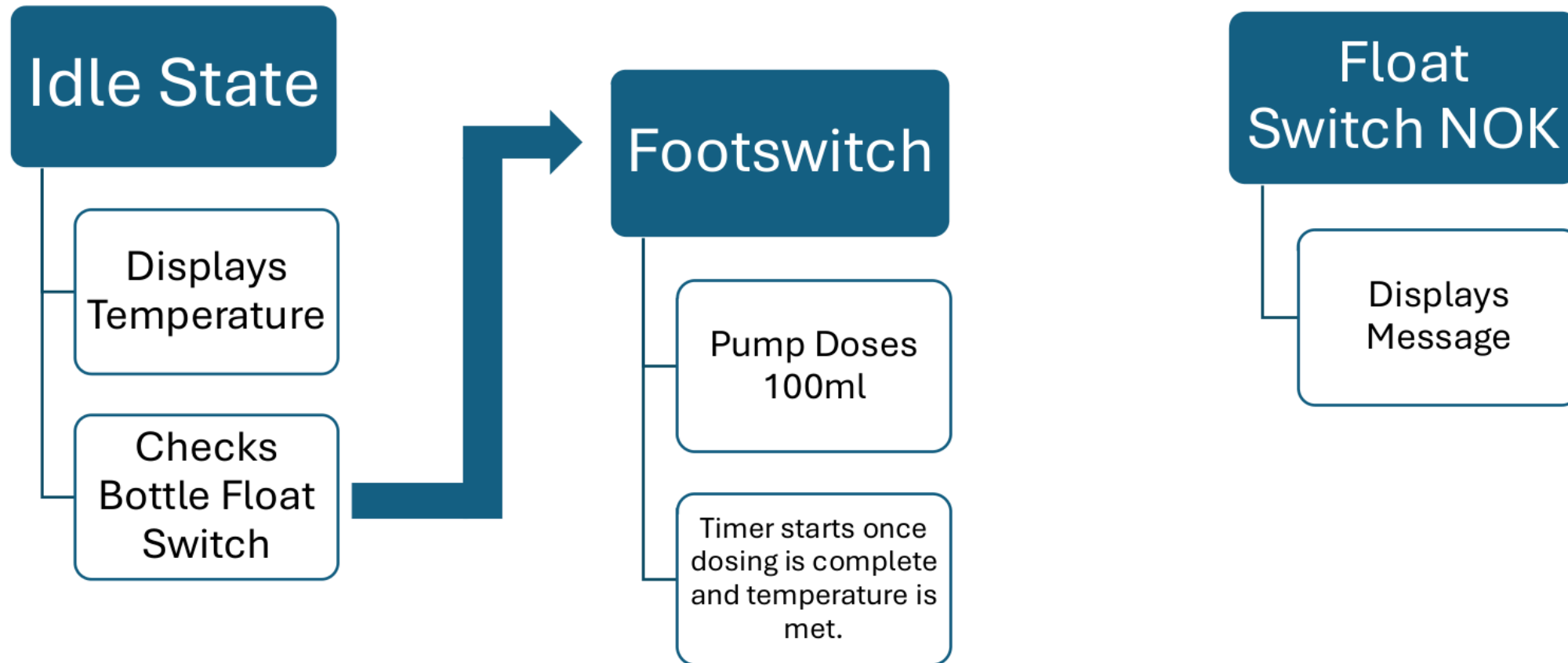


Functional Design Specification

Functional Design Specification	
Key	
Reference	Characteristics
A	Physical
B	Software
C	Safety
D	Alarms
E	Performance

Functional Design Specification	
Reference	Specification
A1	The system should consist of 3 main components: footswitch, pump and control box.
B1.4	The dosing pump timer must be reconfigurable, with a range of up to 2 minutes.
B1.6	The wash timer should be optionally removable from the user interface page.
C1.1	Power must be automatically disconnected when the front panel is removed.
D1.1	A low-level alarm must be indicated when the dosing supply bottle is low.
E1	Temperature accuracy must be within +/- 1 degree of calibrated probe.
E1.1	Timer accuracy must be within +/- 5% of recorded time.
E1.2	Dosing 100ml x3 with +/- 5% tolerance.

Program Structure

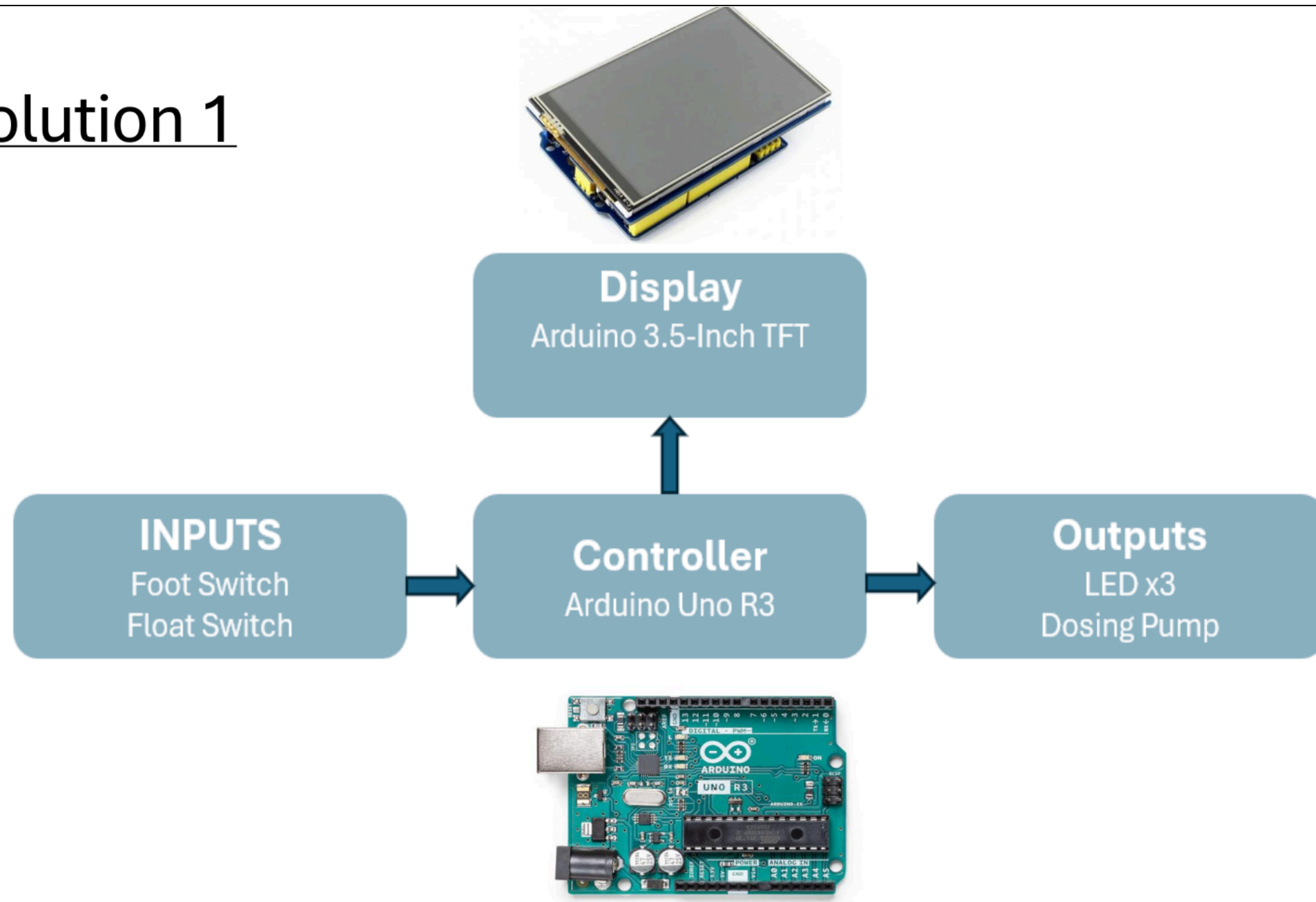


Testing Phase

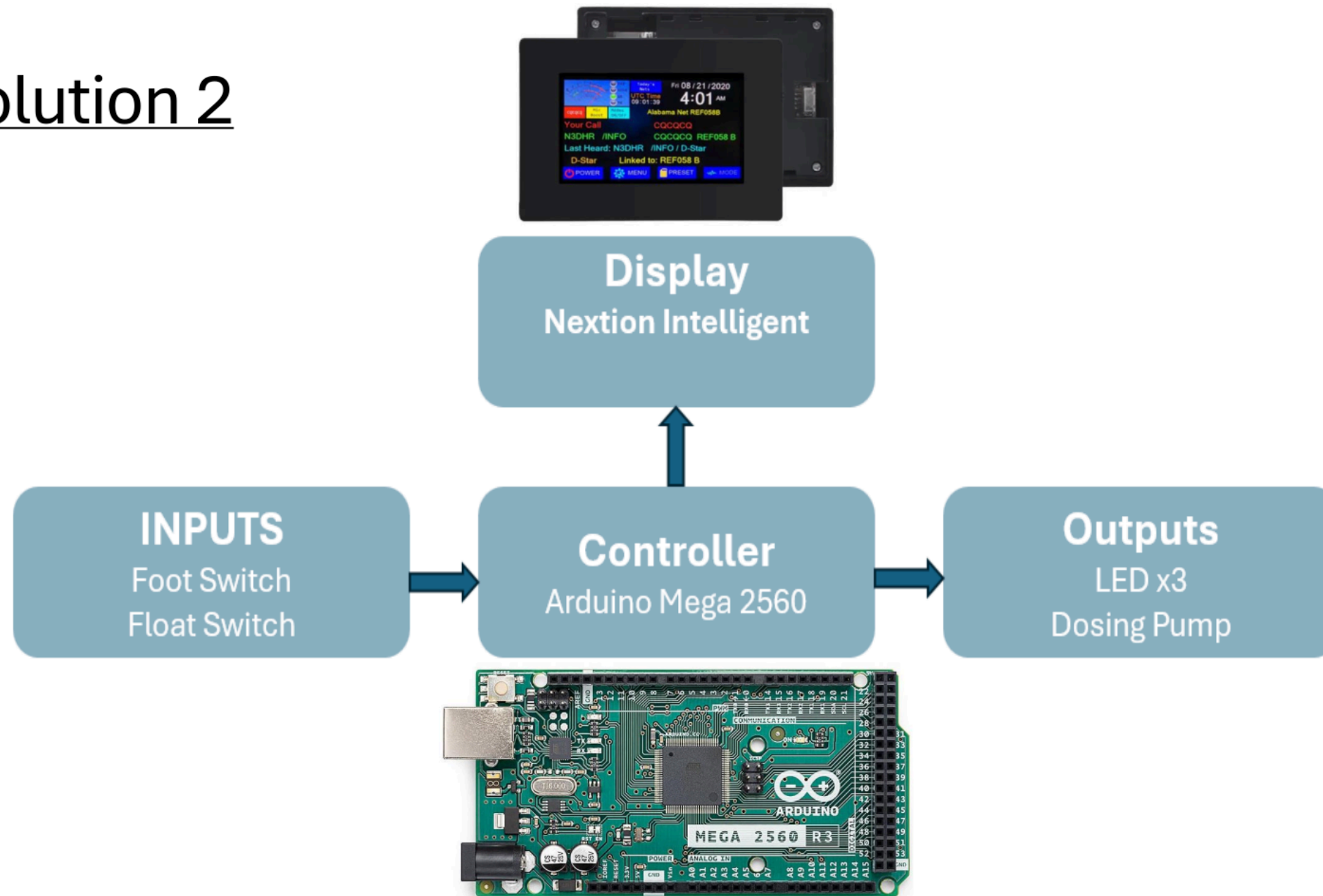
- 18 tests covering 5 key characteristics referenced to the FDS

Test Plan						
Test Number	FDS Reference	Description	Expected Result	Actual Result	Pass/Fail	Evidence
1	A1	Press the footswitch.	Dosing sequence starts immediately after pressing the footswitch.			
2	B1	Place calibrated probe next to systems temperature probe in a container filled with water at 27 degrees by using a calibrated probe.	The systems temperature reading is within 1 +/- degree of the calibrated probe reading between 26 and 28 degrees.			
3	B1.1	Fill container with water at 23 degrees referencing a calibrated probe for accuracy. Using the systems digital display alter offsets/potentiometers to match. Check display to ensure system is reading 23 degrees.	The systems temperature probe is calibrated accurately, matching the reading of the calibrated reference probe and on the system displays within +/- 1 degree (Between 22 and 24 degrees).			
10	C1	Select settings page, password should be requested and enter wrong password.	Entry is denied and a message states that the password is incorrect.			
13	D1.1	Fill a container and insert the dosing lance. Remove the lance and then check the display.	An alarm indicates that the bottle is empty on the digital display.			
17	E1.2	Set dosing time to achieve 100ml, insert lance into a 500ml cylinder and press footswitch to commence dosing. Record result and repeat the action 3 times.	Recorded results are within +/- 5% of each other. Results read between 95ml to 105ml.			
18	E1.3	Check the repeatability of the float switch by removing and inserting the lance from a container filled with water, while checking the display. Repeat the action 3 times.	A low-level alarm indicator is shown each time after removal and then cleared after re-inserted.			

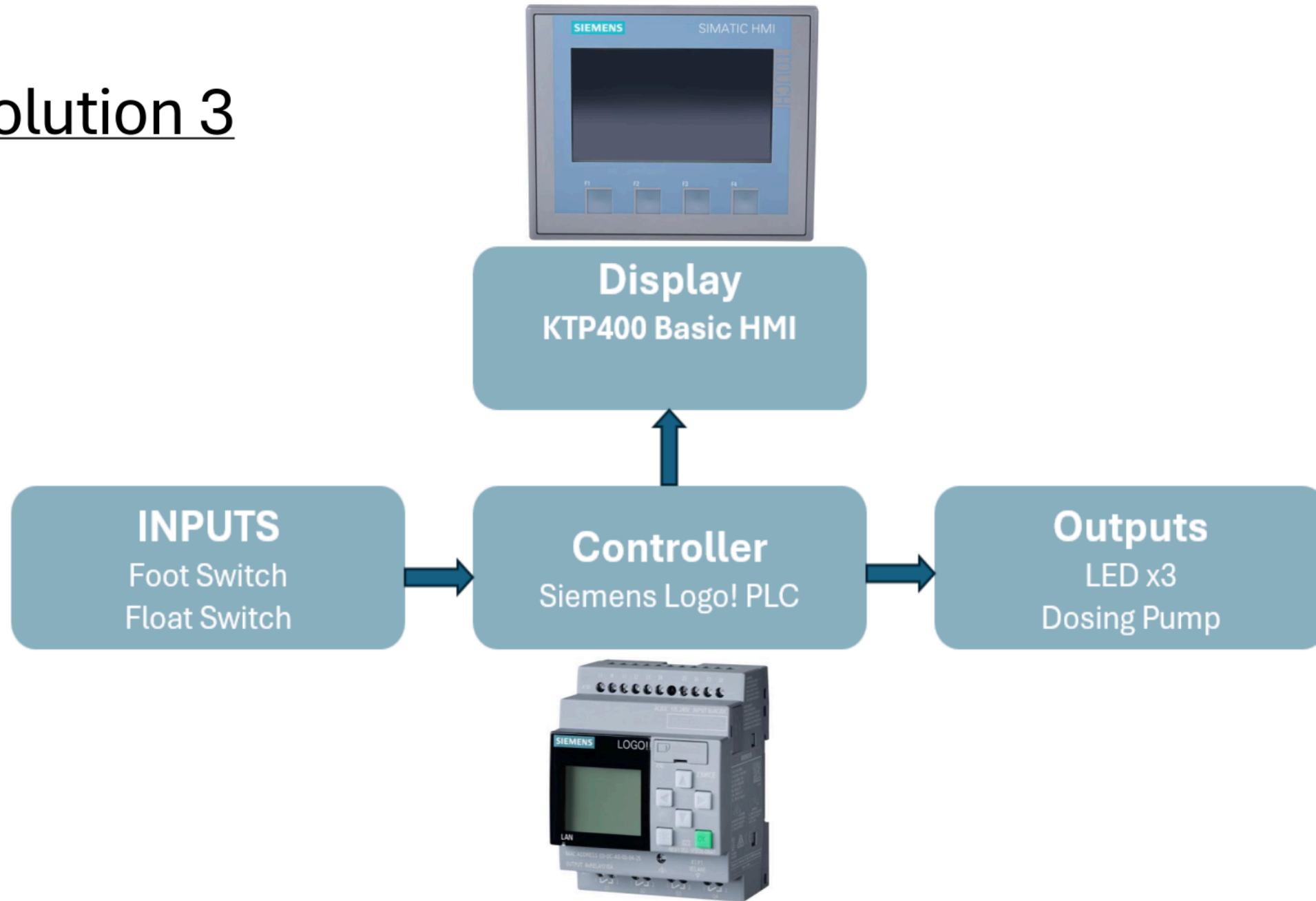
Solution 1



Solution 2

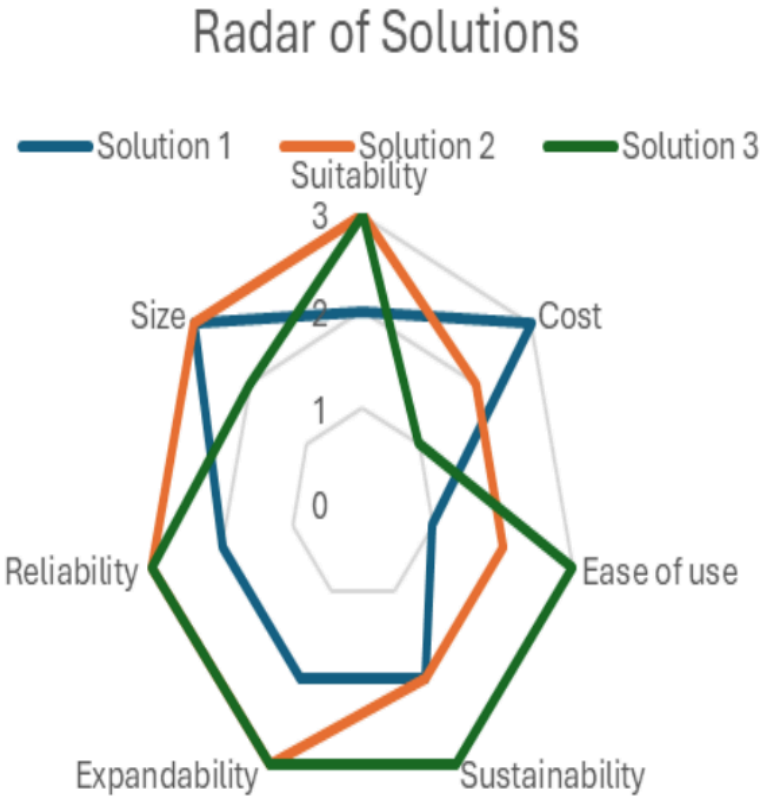


Solution 3



Chosen Solution

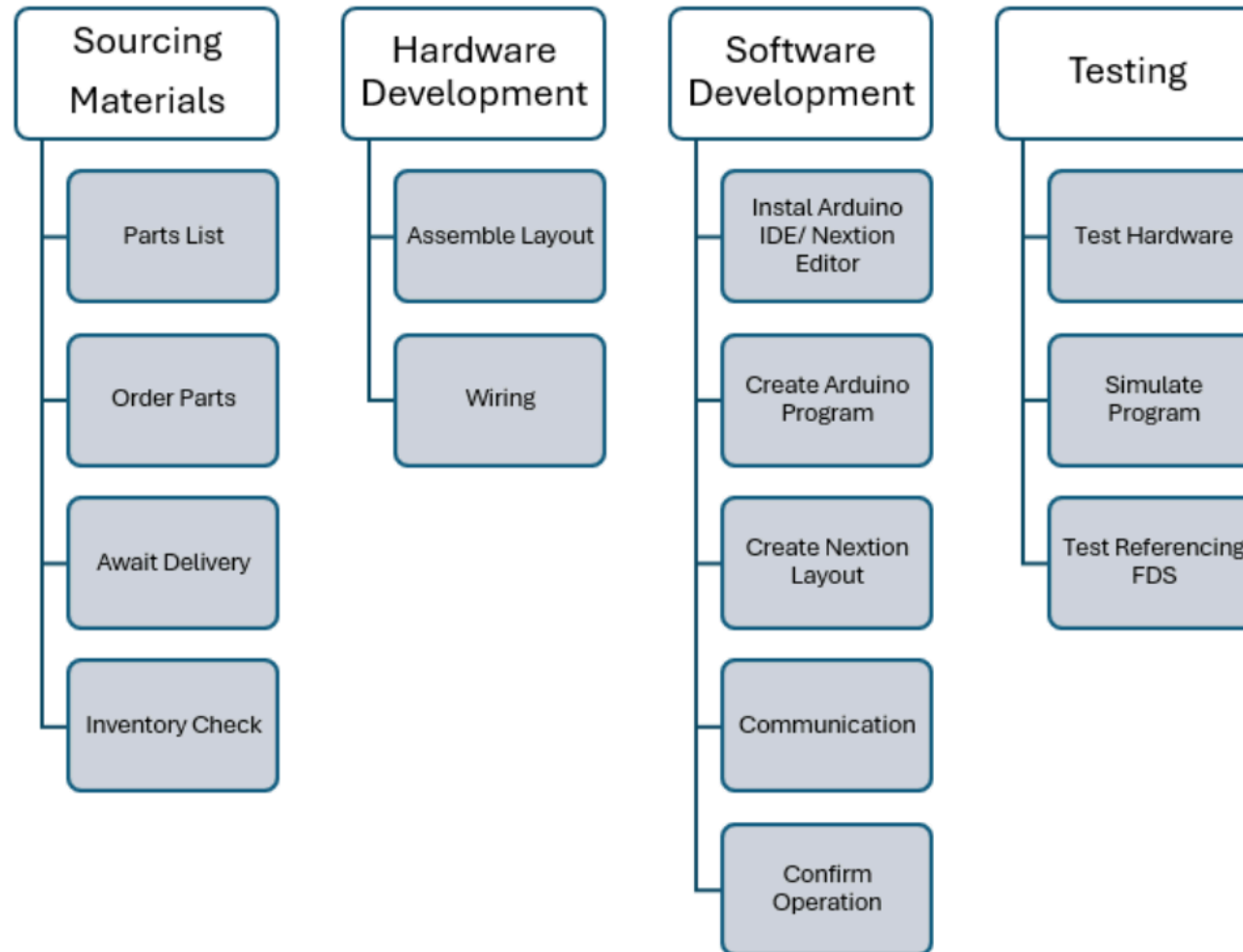
Solution 2 – Arduino Mega 2560 & Nextion Intelligent



Comparison of Controllers			
Characteristic	Solution 1	Solution 2	Solution 3
Cost	2	3	2
Delivery Time	3	3	3
Ease of use	2	2	3
Suitability	2	3	3
Expandability	2	3	3
Weight	3	3	3
Size	3	3	2
Digital I/O	2	3	2
Analog I/O	2	3	1
Flash Memory	1	3	2
Communication Protocol	3	3	3
Total Score	25	32	27

Comparison of Displays			
Characteristic	Solution 1	Solution 2	Solution 3
Cost	3	3	1
Delivery Time	2	2	2
Ease of use	1	3	3
Suitability	2	3	3
Resolution	2	3	3
Weight	3	3	3
Size	2	3	3
Graphical Design Capabilities	1	3	3
Total Score	16	23	21

Work Breakdown Structure



Gantt Chart

[illegible]

FINAL GRADE

GENERAL COMMENTS

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GRADING FORM: NEW CSG-RUBRIC

MATTHEW PERRY

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1. ENGAGEMENT WITH LITERATURE



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2. KNOWLEDGE AND UNDERSTANDING



Project background and problem definition (7/10)
Project constraints, risks, health and safety (7/10)
Response to questions (7/10)

21

3. COGNITIVE AND INTELLECTUAL

 Functional Design Specification (7/10)
Test planning (7/10)
Project Planning and management methods (6/10)

20

20/30

4. PRACTICAL APPLICATION

 Review of Solutions (7/10)
Justification of final solution (7/10)

14

14/20

5. TRANSFERABLE SKILLS

 Quality of the presentation slides (7/10)
Quality of the delivery style
Good (6/10)

13

13/20