

2320628

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WATER TEMPERATURE MONITORING WITHIN THE HEALTH BOARD



GIG
CYMRU
NHS
WALES

Bwrdd Iechyd Prifysgol
Hywel Dda
University Health Board

AIMS & OBJECTIVES

- Water temperature sensor that can be accessed remotely
- Involves designing and building the system to measure temperature in real-time
- A method for transmitting data to a web interface or mobile application.
- To create an easy format for displaying the temperatures
- The project will also include testing the sensor for accuracy and reliability, and providing thorough documentation of the entire process

Objectives are identified

RELEVANCE TO THE WORKPLACE



HIGHLY RELEVANT,
ADDRESSES THE CRITICAL
NEED OF MONITORING
WATER TEMPERATURE IN
HEALTHCARE SETTING



ACCURATE MEASUREMENT
IS ESSENTIAL FOR
ENSURING SAFE WATER
QUALITY IN ALL
ENVIRONMENTS



REMOTE ACCESS HELPS
ENSURE SAFETY BY
INDICATING TO STAFF SO
THEY CAN PROMPTLY ACT
ON ISSUES



THE EASY TO USE DISPLAY
WILL HELP UNDERSTAND
AND INTERPRET DATA AND
IMPROVE EFFICIENCY

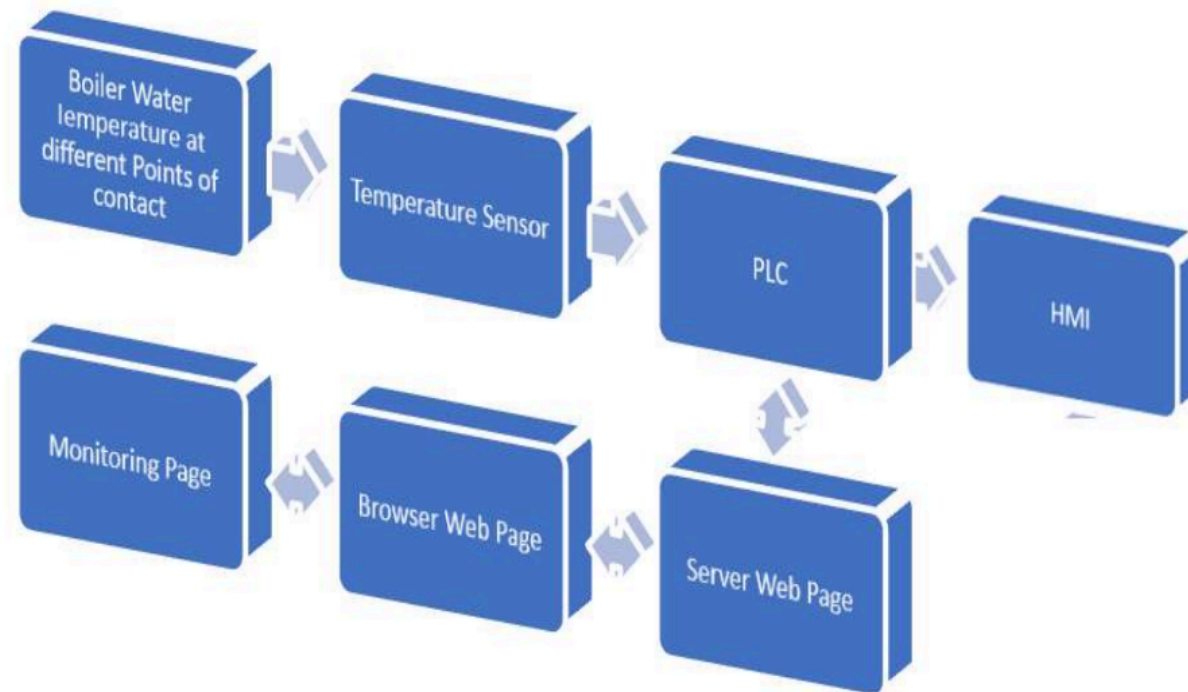


THE PROJECT ALIGNS WITH
WHTM PROVIDING HIGH-
QUALITY CARE FOR
PATIENTS

FUNCTIONAL DESIGN

PLC implemented, number of sensors around the hospital, alarm indication, HMI, wireless access

- Hot water from CHP, pumps around hospital, Sensors showing temperature at each point
- Alarms implemented based on conditions and safety of those using water
- Mobile access possible



DESIGN SAFETY PROTOCOLS



Designing of the program on a PLC will be carried out in a safe environment within the college under college standards



Installation will be done in line with WHTM, British standard and HASAWA



Both a dynamic risk assessment and risk assessment will be carried out before fitting

TESTING THE DESIGN



Initial tests will be implemented with standard procedures and functional tests



Each step of the process will be tested and recorded.



All results will be compiled in a expected vs actual table of results



Simulated fault conditions will be set to test the limits and condition indicators

Test procedure is logical, however a table for actual value comparison would have been mor effective

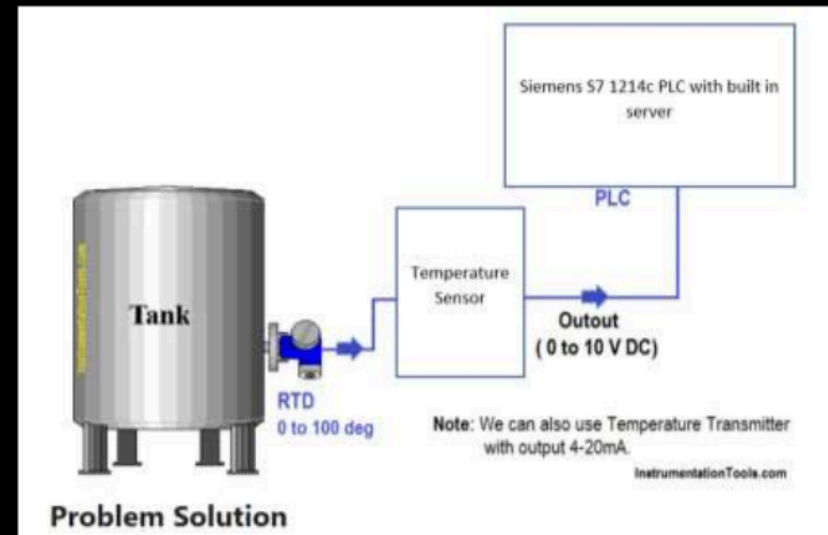


POTENTIAL SOLUTIONS

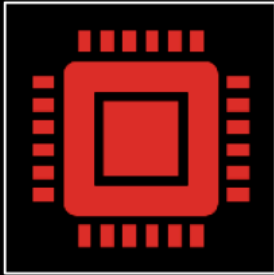


SOLUTION 1- SIEMENS PLC

- The 1214C PLC has a built-in server which includes HTML, Ajax, JSON.
- **Dynamic web server pages functions**
 - HTML – for visual display of content
 - Ajax – for access to a single Tag function and display (JavaScript)
 - JSON – for multiple Tag functions (JavaScript)
- The TIA program will have the bulk of functions and tags, Using above web server we can access the monitoring station



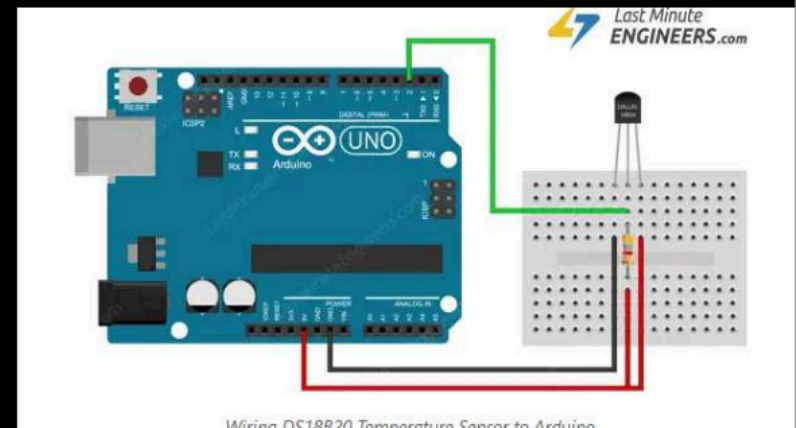
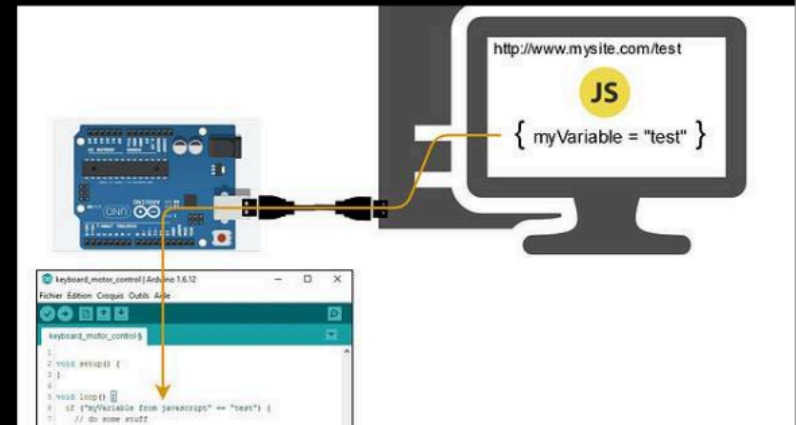
SOLUTION 2 - ARDUINO



Arduino with web server dynamics will do the same tasks as the PLC version including real time response to values.



The main drawback of this method is the display because there is no easy HMI option.



SOLUTION 3 – SIEMENS PLC 1212

This PLC (S7 1212C) has less memory and cannot accept the dynamic functions like the 1214c module in solution 1

This Module without JavaScript will result in a page flicker on refresh, the refresh time is 0.2s which is noticeable

The switches and LED's conditions are monitored using page refreshes inside the HTML program (this method without JavaScript functions is not very reliable)



Input: 10011011 Output: 10100000



SOLUTION COMPARISONS

Solution No	Cost	Reliability	Complexity
Siemens 1214c PLC with JavaScript	HMI - £800 PLC - £350 PLC software – £1000 Web server software – open source	Very reliable with dynamic web pages	Complex due to embedded programming TIA not complex
Arduino MCU with JavaScript	Arduino - £20 Extension board for web server - £20	Not as reliable as PLC with JavaScript	C++ program language is complex Same JavaScript as PLC
Siemens 1212 without JavaScript	HMI - £800 PLC - £250 PLC software - £1000	Not reliable for real time monitoring	Less complex due to no JavaScript

EXPENSES

ITEMS Required	COSTS
Seimens PLC	£300
HMI	£800
Temperature Sensor	£250
WiFi Router	£50
Computer Monitor + PC	£350

- Estimated costs for the project based on equipment needed
- Prices not applicable, all supplied by the college

Good budget

S ACTUAL ME SCALE

ANY
QUESTIONS?



FINAL GRADE

GENERAL COMMENTS

71 /100

PAGE 1

PAGE 2

Text Comment. Objetcives are identified

PAGE 3

Text Comment. Good argument presented

PAGE 4

Text Comment. Good FD with block diagram

PAGE 5

Text Comment. Good codes of practice

Text Comment. Test procedure is logical, however a table for actual value comparison would have been mor effective

Text Comment. Very good solution

Text Comment. Good possible solution

Text Comment. This indicates a good knowledge of the PLC architectures

Text Comment. Good use of table for comparison

Text Comment. Good budget

Text Comment. This need a comparison timeline

SION PHILLIPS

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RESEARCH-INFORMED LITERATURE

 Good project background and explained the theme very well. 7/10
Good evidence of research including the components critical to the project. 8/10

15/20

KNOWLEDGE AND UNDERSTANDING

 Clear explanation of project task and purpose with relevant arguments for project. 3.5/5
Project constraints were discussed with an action plan. Codes of practice and standards were industry policy and explained for the project including intellectual property. 3.5/5
Environmental and sustainability were explained as part of the project purpose in the question section. 3.5/5
The functional design was explained clearly with a good understanding of the proposed system components. 3.5/5
Response to questioning was very good. 7/10

21/30

ANALYSIS

-
- ✎ The problem was clearly defined and linked with good examples from industry to support argument for the project. 3.5/5
 - Functional design was clear and critical points identified. This was aided with a good block diagram.7/10
 - Good argument for the choice of final solution with the aid of comparison table. 3.5/5

14/20

PRACTICAL APPLICATION AND DEP.

- ✎ Design specification included good relevant detail and a good block diagram. The explanation was clear and relevant to the research. 3.5/5
- Argument for critical choice of final solution application was clear and critical points in the application process were identified and compared. 7.5/10
- Project plan is clear with a good work breakdown structure. No test plan included. 3/5

14/20

SKILLS FOR PROFESSIONAL PRAC.

- ✎ Slides were very informative and and contained relevant detail from research. 3.5/5
- Overall delivery was very good and demonstrated a good understanding of the task. 3.5/5

7/10