

2221114

by Kai White

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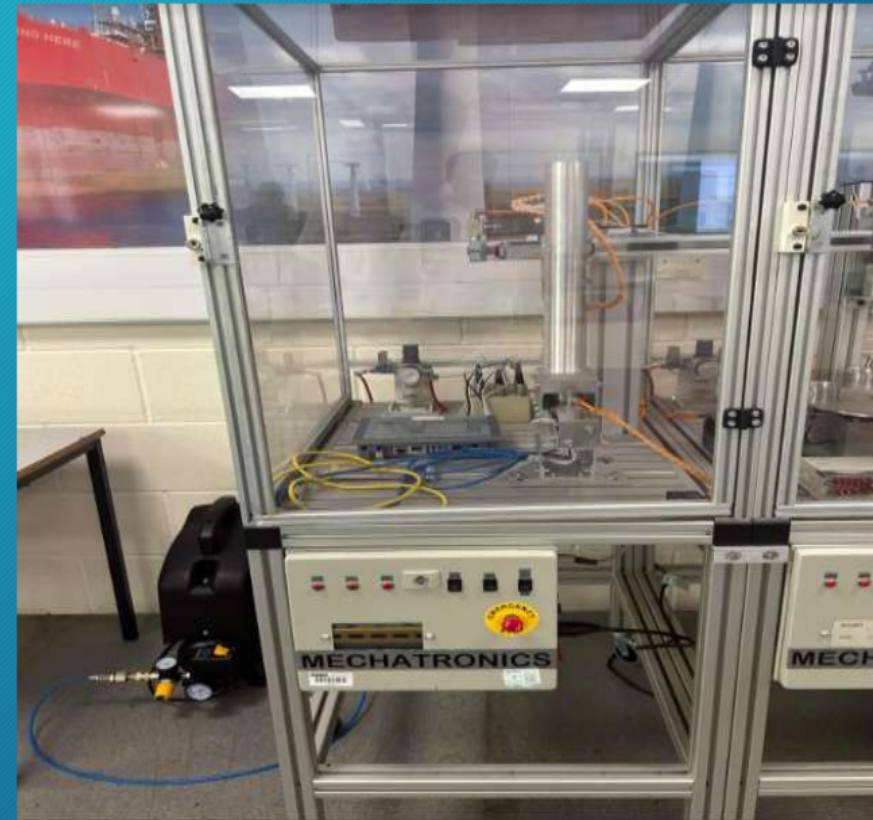
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Loading Station

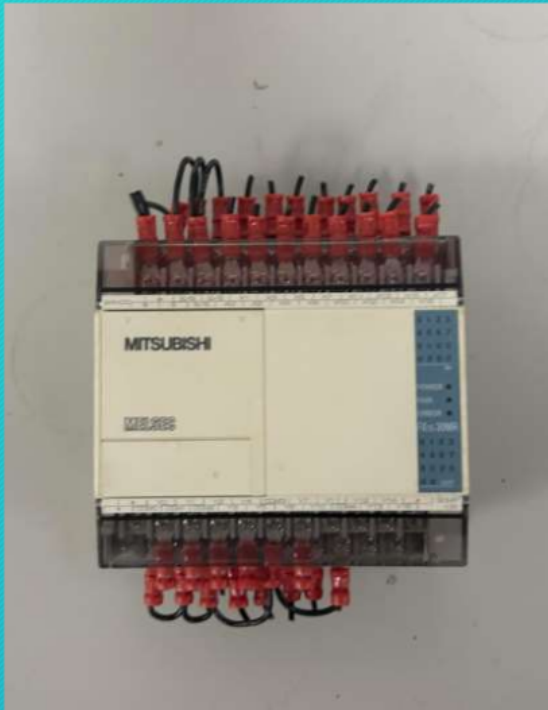
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PROJECT BACKGROUND

- A new PLC needs to be installed
- To sequence the loading station by controlling the pneumatic arms and sensors.
- Should correctly path a component through the station.



SOLUTION 1 - Mitsubishi FX PLC



- Can be programmed using GX developer
- Safety interlocks
- Older technology
- No screen interface
- Outdated
- Components are hard to acquire.

SOLUTION 2 - Siemens 1214C DC/DC/DC



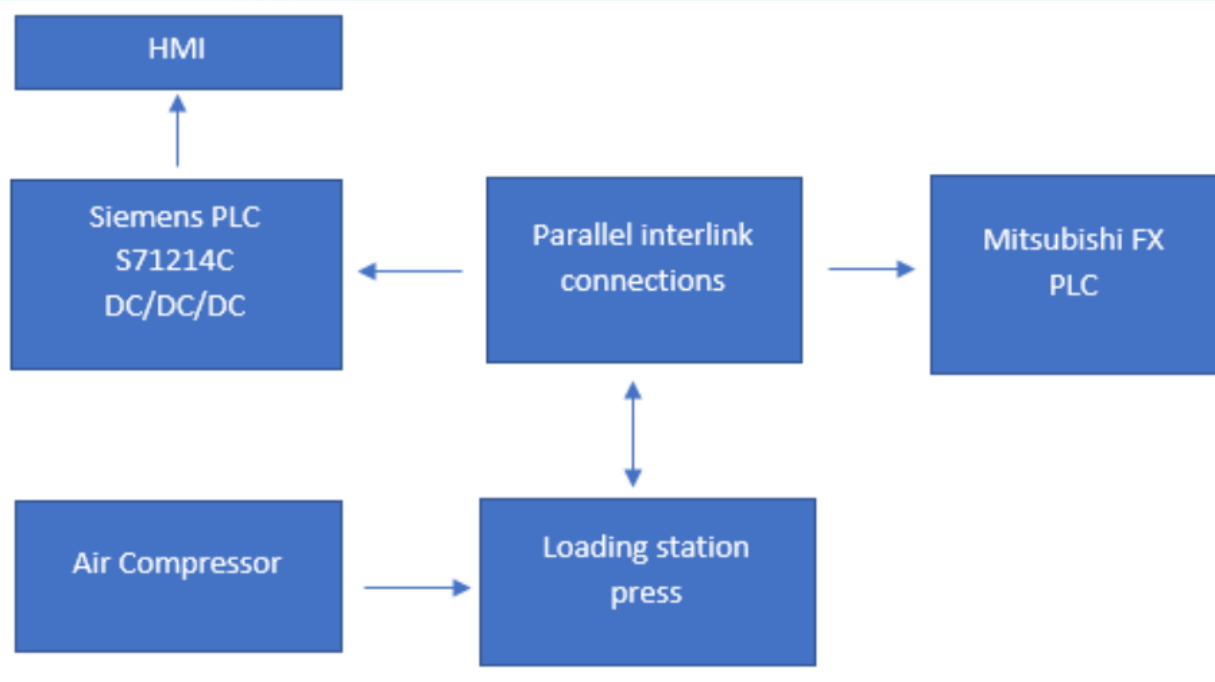
- Can be programmed with TIA portal
- Well supported throughout the college
- Tia portal is a lot more future proof than GX developer
- Ethernet connection
- Cost is lot more expensive for the PLC and HMI
- Software needs training to use.

Comparison

	Siemens	Mitsubishi
Software	More advanced	Outdated
Inputs / outputs	14 / 10	24 / 24
PSU	24V DC (safety)	85 - 264V AC
CPU processing time	0.08 μ s	0.48 μ s
Key features	Ethernet , HMI	Cost

Note - All the equipment for siemens is provided so cost wont be an issue

FUNCTIONAL DESIGN SPECIFICATION

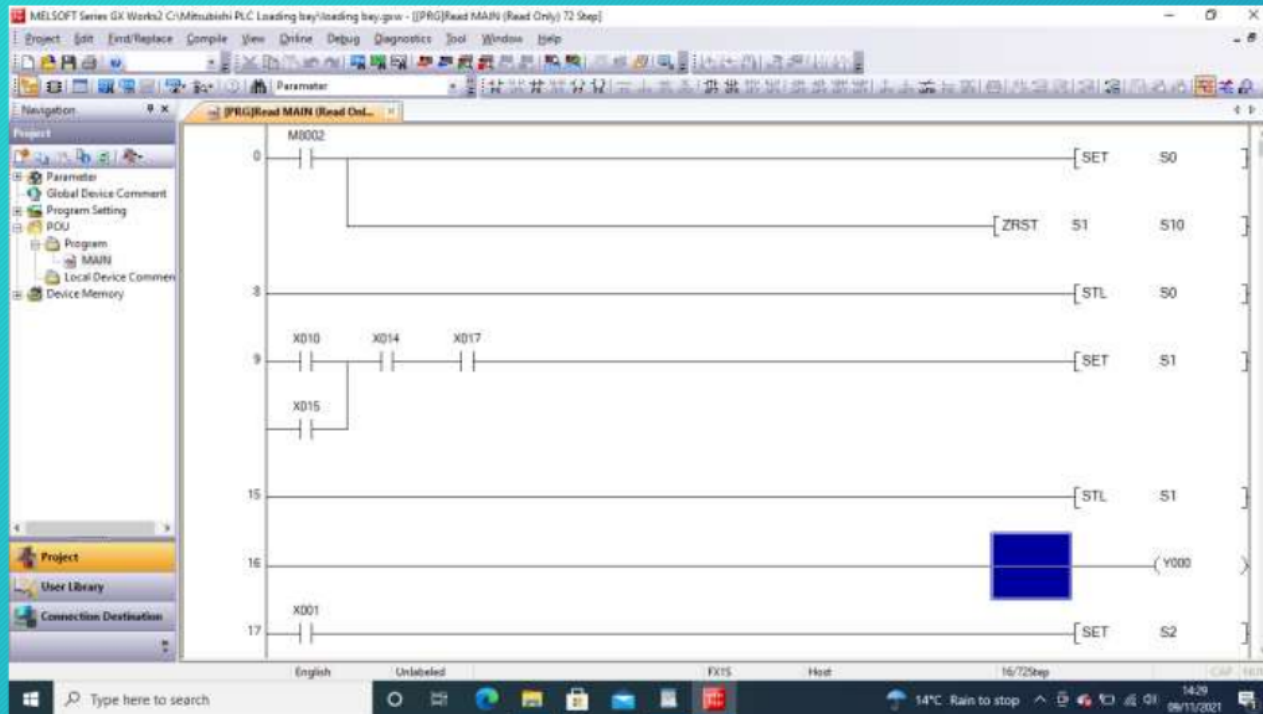


- PLC upgrade
- Parallel interlink between the current Mitsubishi and siemens
- HMI for a display of the sequence and to gain easy control
- Improvement - now an Ethernet instead of rs432

ADDITIONAL DESIGN SPECIFICATION

- Tia portal will now be used instead of GX developer
- Safety locks will be added on the door and air compressor with programming
- The extruder cylinder and the gripper will be controlled by program

CURRENT SEQUENCE



- Mitsubishi ladder logic
- Converted to Siemens - auto and manual modes

BUDGET

- Siemens s7 1214C PLC - £420
- HMI - £250
- Tia portal (single use) - £300



TEST PLANNING

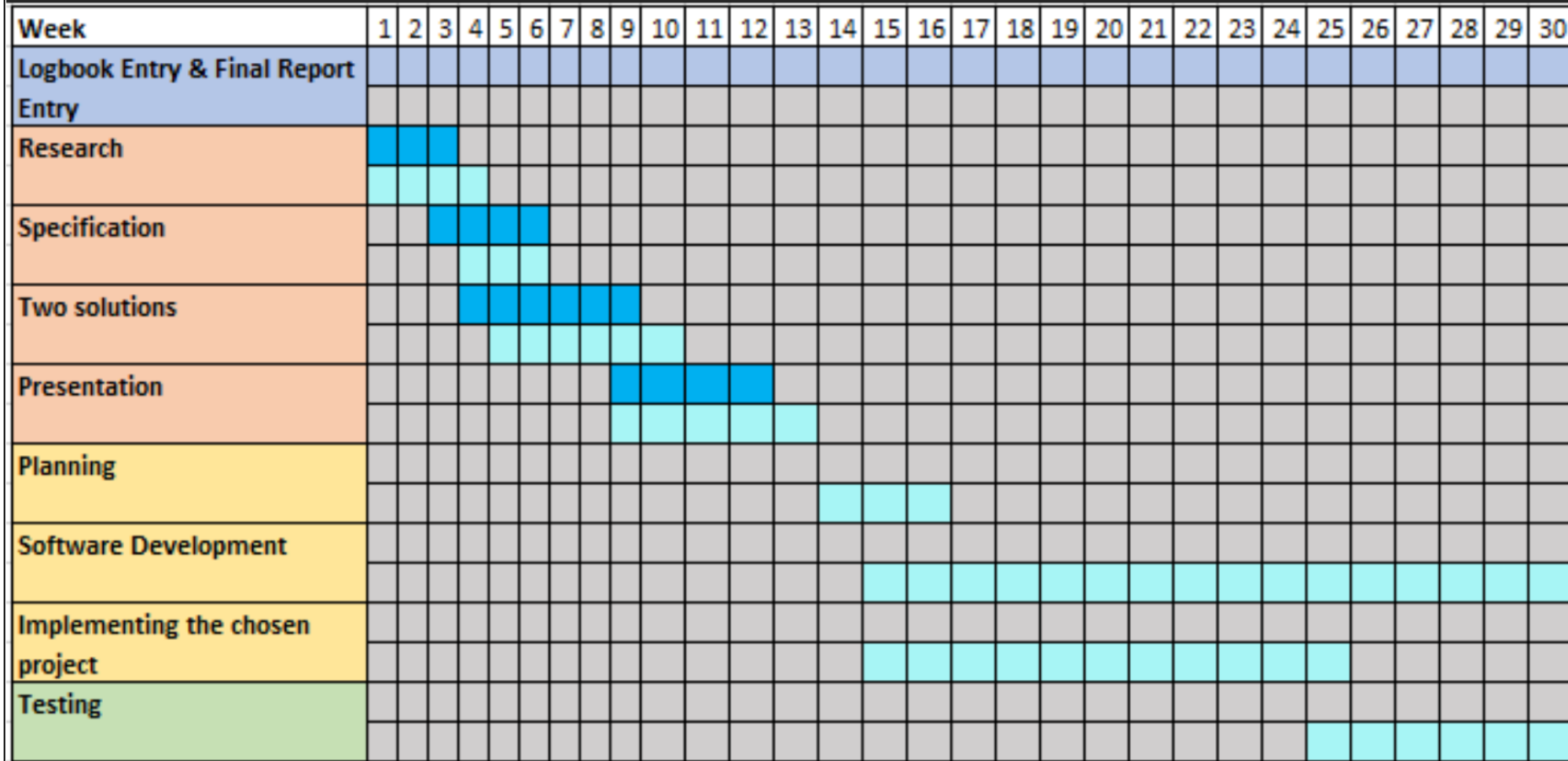
Existing test table - manual

Cylinder Action	Cylinder Position	Switch Operated	Input Address	Output Address
A-	Loader RETRACTED	S1	X0	Y0
A+	Loader EXTENDED	S2	X1	Y1
B-	Gripper RAISED	S3	X2	Y2
B+	Gripper Lowered	S4	X3	Y3
C-	Gripper OPEN	S5	X4	Y4
C+	Gripper CLOSED	S6	X5	Y5
D-	Travel LEFT	S7	X6	Y6
D+	TRAVEL RIGHT	S8	X7	Y7

Proposed test table – automatic sequence

Cylinder Action	Cylinder Position	Switch Operated	Input Address	Output Address
A-	Loader RETRACTED	STEP1	X0	Y0
A+	Loader EXTENDED	STEP2	X1	Y1
B-	Gripper RAISED	STEP3	X2	Y2
B+	Gripper Lowered	STEP4	X3	Y3
C-	Gripper OPEN	STEP5	X4	Y4
C+	Gripper CLOSED	STEP6	X5	Y5
D-	Travel LEFT	STEP7	X6	Y6
D+	TRAVEL RIGHT	STEP8	X7	Y7

Gantt Chart



Expected

Actual

FINAL GRADE

GENERAL COMMENTS

68/100

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GRADING FORM: CSG-RUBIC

KAI WHITE

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RESEARCH-INFORMED LITERATURE



Project background was explained clearly and included good relevant detail. 7/10
Evidence of background reading for the system included significant details. 7/10

14/20

KNOWLEDGE AND UNDERSTANDING



Project purpose was identified and explained in good detail. 3.5/5
Project constraints and risks were explained. 3/5
Environmental and sustainability were covered in the question section. 3.5/5
Functional design was explained clearly and demonstrated a good understanding of the requirements. 3.5/5
Response to questioning was good and included relevant detail. 6.5/10

20/30

ANALYSIS

 Project was defined clearly and a good explanation was given. 3.5/5
Functional design specification has good relevant details and supported with a block diagram. 7.5/10
A good argument given for the choice of final solution. 3/5

14/20

PRACTICAL APPLICATION AND DEP.

 Design specification included relevant details and was explained clearly. This was aided with a block diagram. 3/5
Argument for critical choice of final solution was explained well and key points were identified. 7/10
Project plan identified the key tasks in the work breakdown. 3/5

13/20

SKILLS FOR PROFESSIONAL PRAC.

 Slides contained good relevant information resulting from research. 3.5/5
Overall delivery was good with key points highlighted. 3.5/5

7/10