T Level Technical Qualification in Engineering and Manufacturing – Design and Development

8714-322 Electrical & Electronic

Grade standard exemplification material

Pass - summer 2024

Version 1-0

Version and date	Change detail	Section	Question
v1-0 Oct 2024			

Contents

Introduction

Summer 2024 Results

This document is aimed at providers and learners to help understand the standard that was required in the summer 2024 assessment series to achieve a pass grade for the 8714-322 Electrical & Electronic Occupational Specialism (OS)

The grade standard exemplification evidence (Grade SEM) provided for the pass grade displays the holistic standard required across the tasks to achieve the pass grade boundary in the summer 2024 series.

The aim of these materials is to provide examples of knowledge, skills and understanding that attested to pass standard (threshold competence) in summer 2024. It is important to note that in live assessments a candidate's performance is very likely to exhibit a spikey profile and standard of performance will vary across tasks.

The Occupational Specialism is graded Distinction, Merit, Pass or Unclassified.

The pass grade boundary is based on a synoptic mark across all tasks. The materials in this Grade SEM are separated into two sections as described below. Materials are presented against a number of tasks from the assignment.

Task

This section details the tasks that the candidate has been asked to carry out. What needs to be submitted for marking and any additional evidence required including any photograph/video evidence. Candidate evidence that was or was not included in this Grade SEM has also been identified within this section.

In this Grade SEM there is candidate evidence from:

Task 1 Design
Task 2 Manufacture and Test
Task 3 Peer Review
Task 4 Evaluation and implementation

Candidate evidence

This section includes exemplars of candidate work, photographs of the work in production (or completed) and practical observation records of the assessment completed by provider assessors. This was evidence that was captured as part of the assessment and then internally marked by the provider assessor.

The Occupational Specialism brief and tasks can be downloaded from here .

Important things to note:

- We discussed the approach to standard setting/maintaining with Ofqual and the other awarding organisations before awarding this year. We have agreed to take account of the newness of qualifications in how we award this year to recognise that students and teachers are less familiar with the assessments (grading-arrangements-for-vtqsand-technical-qualifications-within-t-levels-in-the-academic-year-2023-to-2024), whilst also recognising the standards required for these qualifications.

- The evidence presented, as a whole, was sufficient to achieve the pass grade. However, performance across the tasks may vary (i.e. some tasks completed to a higher/lower standard than pass grade).

Grade descriptors

To achieve a pass (threshold competence), a candidate will be able to:

Demonstrate a basic use of software/ technologies to model, evaluate and produce electrical and electronic engineering diagrams and simulations that meets the requirements of the brief.

Demonstrate basic technical skills when developing models and prototypes, resulting in a prototype that may require some modifications.

Apply basic knowledge and understanding of testing processes, resulting in a prototype that has been tested against most of the design criteria.

Interpret information, plan, assess risk and follow safe working methods appropriately when applying practical skills to an acceptable standard in response to the requirements of the brief.

Apply basic knowledge and understanding of the design principles required for electrical and electronic engineering resulting in proposals and solutions that meet the minimum requirements of the brief.

Work safely showing an understanding and suitable level of awareness in the preparation and application of processes, selection and use of tools and manufacturing materials and components, resulting in tasks that are carried out with some minor errors.

Use industry and technical terminology accurately most of the time in both written and verbal contexts.

Task 1 Design

Assessment number (eg 1234-033)	8714-322
Assessment title	Electrical & Electronic Occupational Specialism

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	1
Evidence title / description	• design specification • design calculations, including all workings • selected sensors and electronic locking system with justifications • circuit diagram and wiring diagram • PCB layout • outcomes of the virtual modelling of the proposed circuit design, either as screen captures or printouts • record of outcome of testing the functionality of the physical model of the circuit • bill of materials, with justifications • any notes produced of research undertaken including citation of sources and internet search history.
Date submitted by candidate	DD/MM/24

Task 1

Assessment themes:

- Health and Safety
- Design and Planning
    - Documents
    - Drawings and diagrams
    - Virtual modelling

You must:

- produce a design specification that builds on the design criteria given in the assignment brief, including any references to research used
- generate a suitable design for the circuitry, including:
    - selection of appropriate sensors and electronic locking system with justifications
    - calculations of the values required for successful operation, including the power required by the circuitry, values for at least two different types of components
    - configuration of the circuitry, including a circuit diagram and wiring diagram
    - printed circuitry board (PCB) layout for the circuitry.
- simulate the performance of the proposed design using CAD software
- assemble a physical model of the circuitry and test its functionality
- produce a bill of materials (BoM) listing all of the parts required in the final design proposal, with justifications.

You must complete the design activity prior to carrying out Tasks 2, 3 and 4

If you provide a design plan that is not fit for purpose it is expected that your tutor/assessor will intervene and provide necessary feedback that will be commented on in the marking documentation and reflected in marks awarded.

Additional evidence of your performance that must be captured for marking:
None

Candidate evidence

Design Specification

Components required:

- Arduino
- Two proximity sensors
- One reed switch sensor. Source (to purchase) https://uk.rs-online.com/web/p/door-sensors-window-sensors/1220719?cm_mmc=UK-PLA-DS3A-_-google-_-CSS_UK_EN_PMAX_RS+PRO-_--_-1220719&matchtype=&&gad_source=1&gclid=EAIaIQobChMI_fjY6O7VhQMVhJJQBh129g6iEAQYASABEgKB3vD_BwE&gclsrc=aw.ds
- 2 LED's (1 green, one red)
- 1 Alarm/buzzer
- 2 Push Button (B3F 4000)
- 1 Servo Motor
- 1 Bolt

Reasons for use:

Arduino:

Arduinos would be good for this project because they are simple and straight-forward to use and program and they are suitable for many components which allows for it to fit the requirements of this project.

Pros:

- Easy to learn and use.
- Versatility
- Widely supported.
- Cost effective.
- Open source

Cons:

- Limited Memory and Processing power
- Limited precision
- Limited security features
- Limited Real time performance

- Limited scalability

Source: https://emeritus.org/blog/coding-arduino-programming-language/

Proximity sensor:

We would use proximity sensor for this project because it will be able to detect when there is a person within the set range of the door which allows for the LED's to be turned on allowing them to know whether the clean room is occupied or vacant. Also, it will allow for the person that enters the rooms to be detected and made sure there is somebody in the room and not just the door being open and closed.

Note:

The proximity on the inside of the room will only activate once the door has shut properly, this is to allow the sensor to detect if there is a person within the clean room once the door has closed. The sensor will not need a constant detection of the person it just needs to be able to identify that somebody is in the room when the door has closed.

Pros:

- It has a low cost and low power consumption.
- It has a good stability.
- High speed and switching rate.
- They are useful to help with security issues that may occur.
- High precision

Cons:

- Temperature and humidity influence them.
- There are possibilities that the range of use could be restricted.
- Capacitive proximity sensors are less precise than inductive (in most cases)

Source: https://www.mathaelectronics.com/what-is-a-proximity-sensor-how-it-works-types-advantagesdisadvantages-applications/

Reed switch sensor:

The reed switch is used to detect whether the door is closed properly or is still slightly open, which will then lead to the buzzer going off if the door stays open for too long.

LED's (light emitting diode):

The reason we would use LED's is because there needs to be some kind of indication of whether the room is occupied or vacant. The red LED will turn on when someone is in the room and the green LED will turn on when the room is vacant.

Pros:

- Long lifespan (longest of all bulbs)
- Energy efficient
- Produce less heat. (Eighty percent light, 20% heat)
- Environmentally friendly

Cons:

- They are directional.
- They can fail under too much heat. (overheat)
- Not great for dimming
- Upfront investment is required.

Source: The Pros and Cons of LED Lights | Brennan Electric (brennan-electric.com)

Push button (B3F 4000):

The use of the push button would be to let the person that is in the clan room get out so that when he presses the button to door automatically opens so that there is no human contact to open the door.

Pros:

- They are durable.
- Versatile in usable situations
- Cost effective (cheap)
- Easy to use.

Cons:

- They have limited functionality.
- They could be accidentally activated.
- Could end up requiring maintenance depending on how much it is used.

Source : https://www.linkedin.com/pulse/what-pros-cons-push-button-switches-yin-fu-wu-zmyje?trk=public_post

Servo Motor:

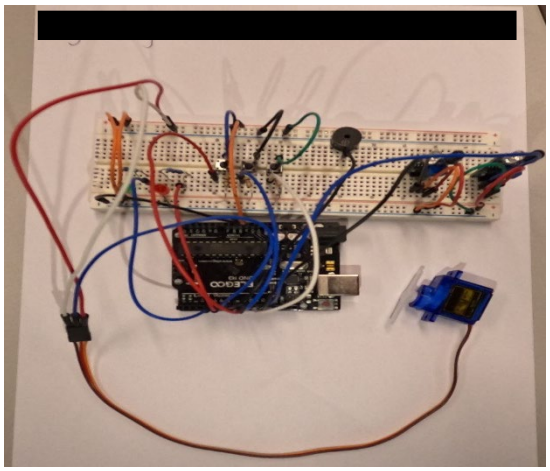
The use of the servo motor will be to allow the door to be locked while somebody is in the room. So that nobody else can get inside because your only allowed one person in the room at a time.

The reason that I would use servo motor over stepper motor is that when you have a servo motor it does the action in one motion whereas stepper does it in steps which means it will take longer to lock the door completely.

Buzzer:

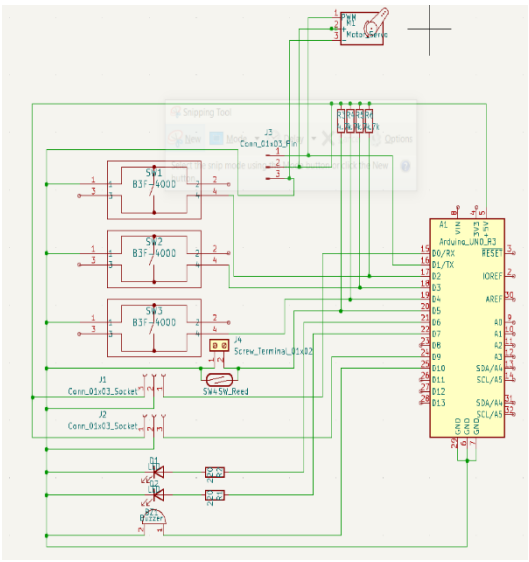
The buzzer will be used to alarm people of when the door is open for too long or has not closed properly which will a set about of seconds. If the door is open for longer than the set time, then the buzzer will activate and stay active until the door is closed.

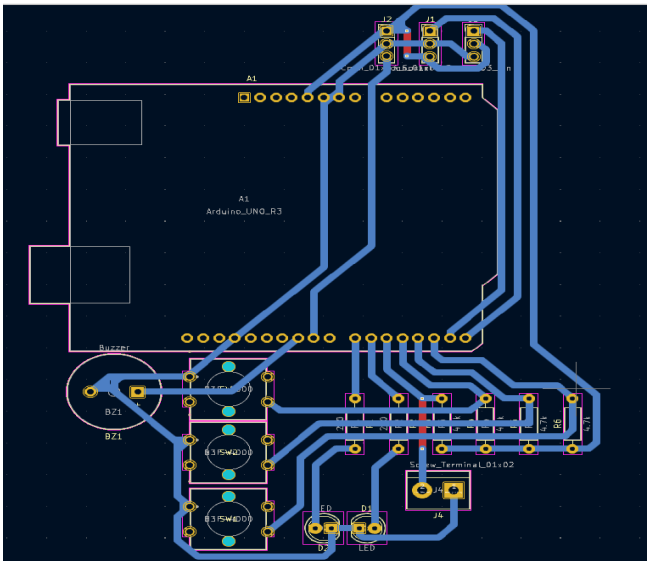
Record of outcome of testing the functionality of the physical mode of the circuit



This is the physical test circuit for the whole project to prove that the circuit that has been created works for the function required.

Schematic and PCB design for the circuit





The photo on the right side of the screen is the schematic layout and this is where you set the footprints and decide which components you need and the footprints you need to have for the PCB layout.

The photo on the left is the PCB layout which has all the components footprints on so that you can wire them together and be able to put them into the PCB engraver so that you can have a circuit board that you can put the components.

For the calculations i used R = V/I this helps me to find out the resistor value that is required for each component.

3 / 0.015 = 200 which i then bumped up to 220 resistors for the LEDs.

Task 2 Manufacture and Test

Assessment number (eg 1234-033)	8714-322
Assessment title	Electrical & Electronic Occupational Specialism

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	2
Evidence title / description	• completed risk assessments • test records for the results of testing the circuitry • PCB • prototype.
Date submitted by candidate	DD/MM/YY

Task 2

Assessment themes:

- Health and Safety
- Manufacturing
    - Prototype/model
    - Developing
    - Testing
- Reports
    - Implementation
    - Record/reports

You must:

- produce and complete risk assessments for the production of the PCB and the construction of the soldered prototype
- produce the PCB for the design
- build a soldered prototype working circuitry from their design
- test the operation of the circuitry.

Additional evidence of your performance that must be captured for marking:

- assessor observation of:
    - the production of the PCB
    - building of the soldered prototype
    - testing of the circuitry.

To support the comments made within the Practical Observation the assessor must capture the following photographs and videos that must be submitted as supporting evidence for each candidate:

Photographic evidence which shows:

- unassembled PCB clearly showing the track layout
- back of the assembled PCB showing all soldered joints
- front of the assembled PCB showing positioning and fitting of components.

Video evidence which shows:

- functionality of the prototype.

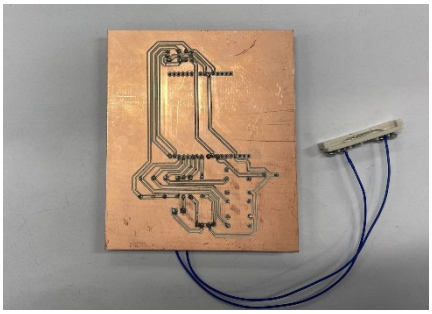
Candidate evidence

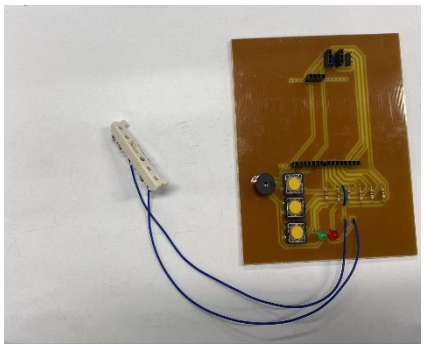
Task 2 – Risk Assessment

Description of hazard and what harm it could cause	**Probability (1-10)**	**Seriousness (1-10)**	**Initial Risk (Probability x Seriousness)**	**Methods used to evade the risk**
Cutter blade catching your finger. Could cut and scar you.	2	3	(2 x 3 = 6)	Dont put your fingers near the cutter while it is spinning.
Milling dust going in your eye, could make your eyes red and sore.	2	2	(2 x 2 = 4)	Make sure the cover is still on when it is cutting, also make sure the extractor is always on.
Burn your finnger when you are trying to solder the components into the Circuit Board. Could scar you from the burn.	3	4	(3 x 4 = 12)	Keep fingers away from the heated part and teh just soldered components
Taking in the fumes from the soldering. Could lead to helath problems cause they are toxic.	4	3	(4 x 3 = 12)	Wear a mask when you are doing the soldering so you dont have to breath in the fumes.
Triiping over the objects near the machines, This could lead to a concussion and other body injuries because of falling over.	2	2	(2 x 2 = 12)	Look where you are going and make sure you leave the objects out of the way so they dont become a hazard for other people.

Task 2 - Test records for the results of testing circuitry.

This is the back of the circuit board which is where it was engraved and i did all of the soldering.





This is the front side of the board. Where all the components are connected and allows for me to do the testing.

The testing showed all the components what they needed to do.

The sensors had to show that the room is occupied or vacant.

The reed switch shows that the door is open or closed for too longn and if it is open for more than 20 then the buzzer will activate until the switch is connected again.

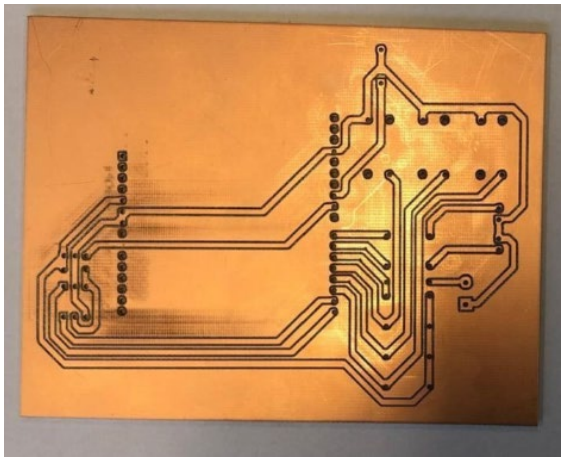
The buttons are used for the lock on the door, so when you press the top button the servo motor acts as if the door lock is opening and when you press the second button the servo motor acts as if the door is locking.

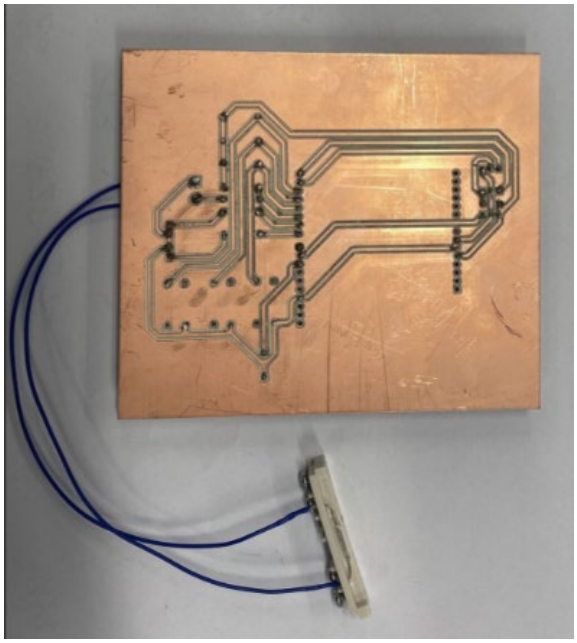
All the testing went well and it all worked too.

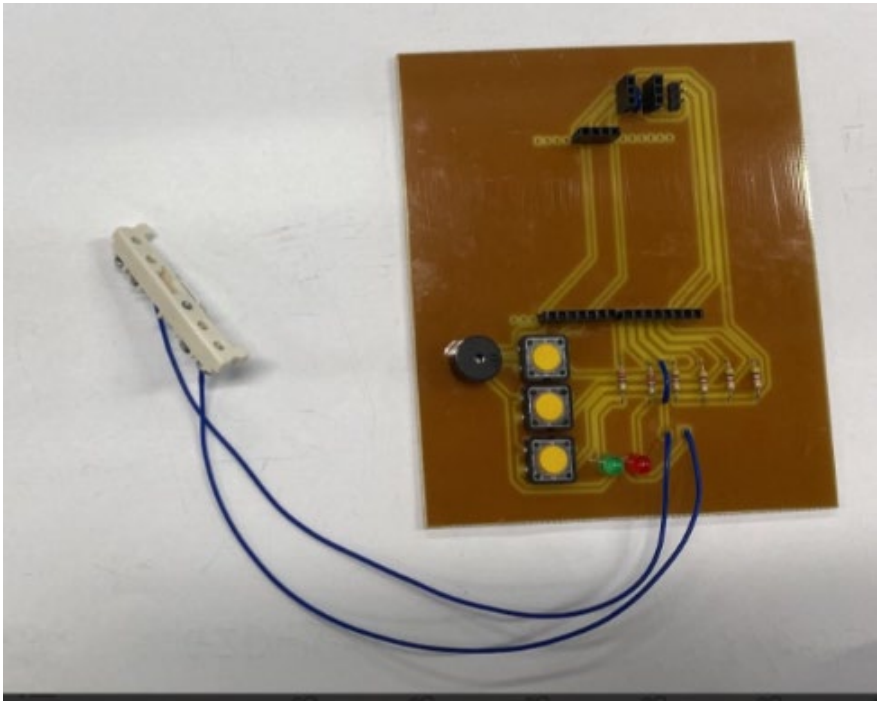
<u>What went wrong:</u>

I did not make it so that the locking system stays lcoked form the outside.

Task 2 – Photographic evidence







Task 2 Practical observation form

8714-322 Design and Development: Electrical & Electronic - Summer 2024

Candidate name	Candidate number
<first name> <surname>	ABC1234
Provider name	**Date**
<provider name>	1st May 2024

Complete the table below referring to the relevant marking grid, found in the assessment pack.

Do not allocate marks at this stage.

This observation must cover	Assessor observation should include:	Assessment Themes
Production of the PCB	• The production of the PCB.	• Health and Safety • Manufacturing
Building of the soldered prototype	• The building of the soldered prototype.	• Health and Safety • Manufacturing
Testing of the circuitry	• The testing of the circuitry.	• Health and Safety • Manufacturing

Notes – *detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.*
Production of the PCB: Risk assessment is mostly complete and covers some of the major risk factors. Risk mitigation methods are limited. Likelihood against probability has been attempted but not for all hazards. Health and safety is followed during preparation and throughout the tasks so that all work is completed safely. Some risks and hazards that occur during the tasks are mitigated against as they arise. Minimal health and safety considerations have been included as part of the design and evaluation/ implementation. **Building of the soldered prototype:** The prototype/ model is mainly appropriate but may require significant modifications. The prototype/ model meets some of the requirements of the design criteria. The soldering is adequate for functionality. Selection of tools, equipment and processes is not always appropriate to the task. Use of tools, equipment and processes is basic, resulting in a finish that is of poor quality. **Testing of the circuitry:** Some understanding shown through selection of tests, some appropriate tests carried out in order to check the prototype/ model meets the design criteria. The model has been tested against some of the design criteria and meets some of the requirements. Selection and use of testing and measurement equipment is mostly appropriate and carried out with some errors in accuracy.

Internal assessor signature	**Date**
X	1/5/24

If completing electronically, double-click next to the 'X' to add an electronic signature once the record is **finalise**

Task 3 Peer review

Assessment number (eg 1234-033)	8714-322
Assessment title	Electrical & Electronic Occupational Specialism

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	3
Evidence title / description	Peer review feedback form Feedback record form
Date submitted by candidate	DD/MM/YY

Task 3

Assessment themes:

- Reports – for consideration only

As part of the development and design process it is critical that engineers can work constructively with others and consider feedback to inform designs to ensure they meet their purpose and requirements.
The assessor will set up the groups and make sure that candidates have access to copies of their design.

You are required to present your design;

a. Prepare to present your design verbally using annotated sketches and diagrams.
b. Present and explain your design.
c. Peer reviewers will now have time to reflect on your design.
d. Discuss feedback from the group on your design presented in part b.
e. Peer reviewers will now complete the peer review feedback form.

For parts a), b) and d) **you** must:

- proactively participate in the discussion
- manage your time
- seek any clarity in the feedback given and be prepared to ask questions
- record any feedback notes on the feedback record form provided.

For parts c), d) and e) **peer reviewers** must:

- proactively engage in the discussion
- respond constructively and fairly
- ensure the peer review feedback form is completed fully and handed to the assessor.

Additional evidence of your performance that must be captured for marking:
None

Candidate evidence

Peer Review Form

Assessment ID	Qualification number
8714-322	8714-32
Candidate name	**Candidate number**
<first name> <surname>	ABC1234
Provider name	**Provider number**
<provider name>	999999a
Date	**Series**
01/05/2024	Summer 2024

Question	Feedback
Explain how well the diagrams/drawings meet the design criteria.	Fits the criteria well a passive buzzer was used as alarm, Three buttons (entry, exit, emergency) 2 (LEDs red and green) Six resistors (4 -4.7K,2-220 ohms) Two pir sensors (for detection in and out the room) they all connect to Arduino
Explain how well the diagrams/drawings meet the specification criteria.	the button is for entry exit (button one entry and two exit they turn at 90 degrees the LEDs are for display (the green led shows that the room is vacant and red shows that it is occupied which is showed by being connected to proximity in the room

	the passive buzzer is activated when reed switch is disconnected from magnet a twenty second timer is activated.
Explain how well the diagrams/drawings conform to the relevant conventions.	Ninety angles BSI 7671 Proper separation between lines on PCB
Explain how the system could be optimised/improved.	Could have used an actual locking system so that the room is denied entry when occupied. More technology could have been used.

Peer Review Form

Assessment ID	Qualification number
8714-322	8714-32
Candidate name	**Candidate number**
<first name> <surname>	ABC1234
Provider name	**Provider number**
<provider name>	999999a
Date	**Series**
01/05/2024	Summer 2024

Question	Feedback
Explain how well the diagrams/drawings meet the design criteria.	The design was met, the components that were used for his design seemed to be well thought out he met the design criteria specification. two card readers were used as the automatic door, one for entry and exit, an active buzzer was used as an alarm system. For the sensors, two motion sensors were used, as locking system a servo motor was used at a 180 degrees angle and two LEDs for display, and they were all connected to an Arduino system.had an emergency button.
Explain how well the diagrams/drawings meet the specification criteria.	The motion sensors were used to detect a person within 2 m and one inside of the room to detect if the room were occupied so that no one would be allowed entry. Is encoded to so that if someone tries to swipe the card reader it would not allow entry and would display. And if the room is empty the green led would display and allow Entry If the door was left open for more than 20 seconds, the active buzzer would alert causing the person in the room to close it.

Explain how well the diagrams/drawings conform to the relevant conventions.	No 90 angles BSI 7671
Explain how the system could be optimised/improved.	The candidate stated that he would use a reed switch as the sensor to detect whether the door is shut or closed. The motion sensors would be switched for proximity sensors because when someone is within 2m all that would be needed is for the sensor to detect and show the display on led.

Feedback Record Form

Assessment ID	Qualification number
8714-322	8714-32
Candidate name	**Candidate number**
<first name> <surname>	ABC1234
Provider name	**Provider number**
<provider name>	999999a
Date	**Series**
01/05/2024	Summer 2024

Candidate's notes
• Met the criteria well with the choice of components. • Couldve been clearer explaining how the components. • Shoulve added a locking system, so access is denied form the outside. • Use a more advanced entry access system e.g. RFID, keypad, fingerprint. • Made sure all the resistors are correlated corrected. <u>Strength:</u> Coding the arduino Good Planning and organisation Soldering the components into the PCB <u>Weakness:</u> Research throught first task.

Task 4 Evaluation and Implementation

Assessment number (eg 1234-033)	8714-322
Assessment title	Electrical & Electronic Occupational specialism

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	4
Evidence title / description	Outcomes of virtual modelling Revision control document Evaluation and implementation report
Date submitted by candidate	DD/MM/YY

Task 4

Assessment themes:

- Health and Safety
- Design and Planning

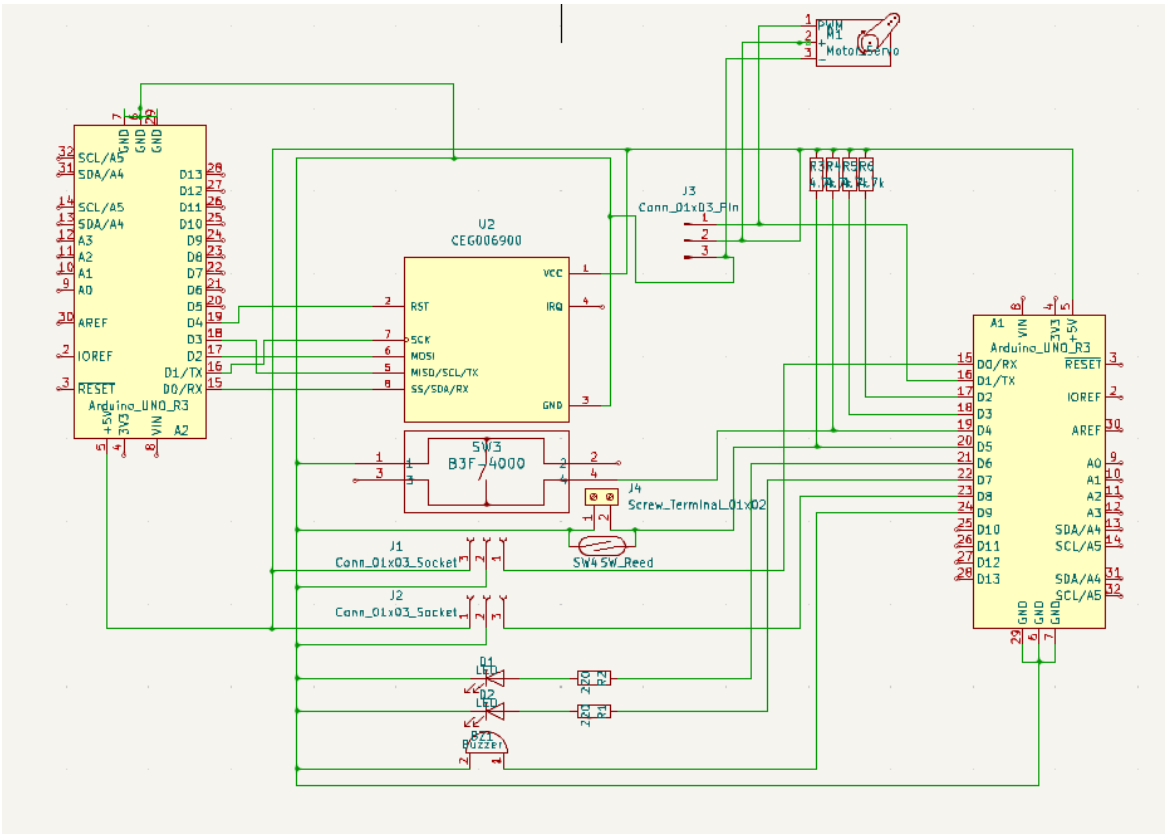
You must:

- update the virtual model of their final design using appropriate software to incorporate any changes made and research completed in response to feedback or as a result of manufacturing and testing
- produce a revision control document/report that is typically 500 words justifying why changes were made or not made as a result of the peer review feedback
- produce a report evaluating the design and development work completed. The report should typically be 800 words. This must include:
    - an explanation of the test methods used, reasons for their use and their limitations
    - a summary of the capabilities of the circuitry
    - an evaluation of the fitness for purpose of the design proposal and its conformance to the design criteria and specification
    - the information necessary for a third party to implement the prototype
- an outline of any additional factors that may need to be considered during the implementation, including:
    - cable types to be used to connect the sensors to the circuitry, if appropriate
    - health and safety considerations
    - applicable requirements from wiring regulations
- any further improvements or adaptions required to the prototype, including any reasoning and justifications if adaptions or improvements are not required.

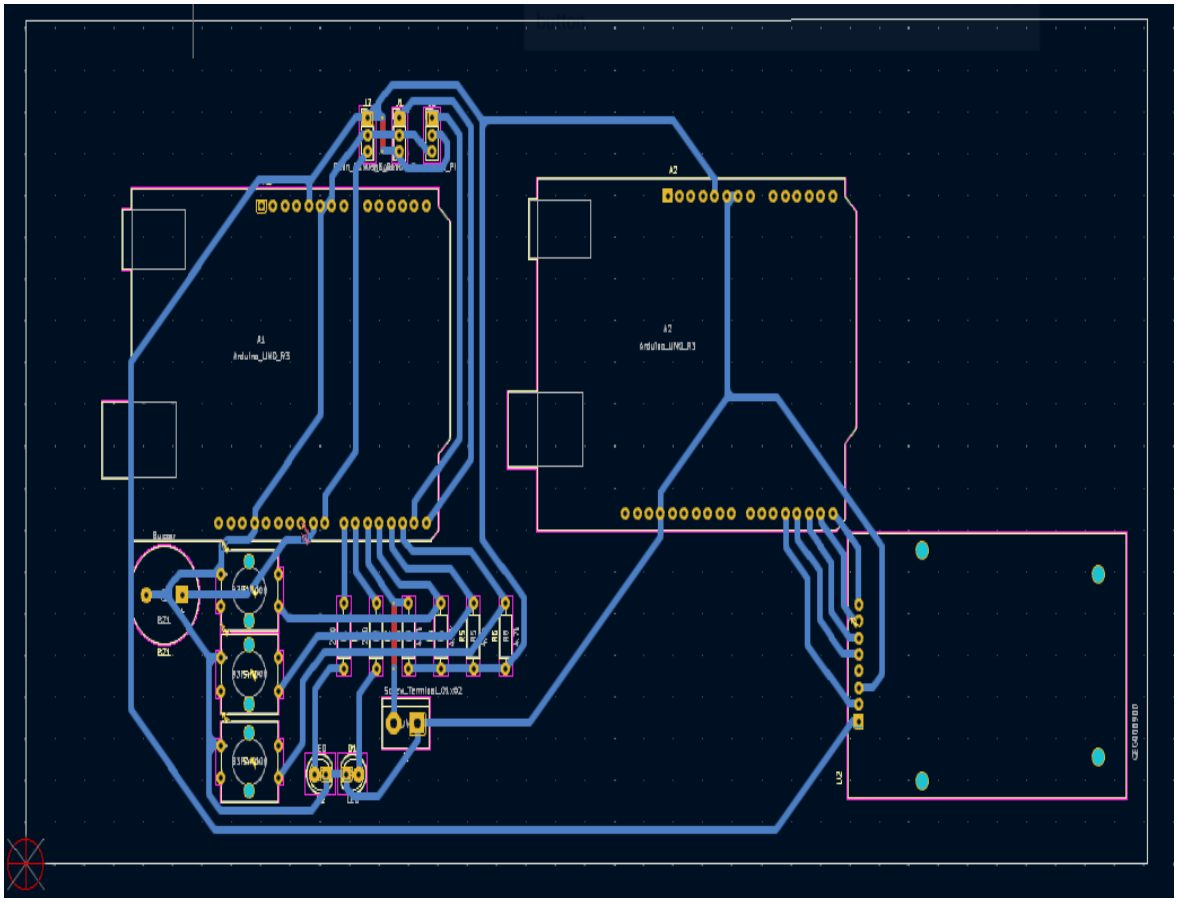
Additional evidence of your performance that must be captured for marking:
None

Candidate evidence

Revision control report:



This is the changed schematic after I have taken the feedback into consideration from the peer review. The changes that I have made to this schematic is that I have removed the entry and exit button from the whole circuit and added an RFID (card reader) for the exit. This would develop my circuit and project because it would allow for less hand on during the process because they will not need to press a button to get inside of the clean room which is the aim of the project from the start. The disadvantages to adding the RFID is that there was not enough pins on the Arduino left which made it so I had to add another Arduino so that I could fit it into the whole process, this is a disadvantage because it would be a lot more difficult to code because it would have to program two Arduinos to work one circuit which would be very difficult for someone which little experience coding Arduinos for more complex circuit that require more precise coding and instructions. Also, it is a lot harder to code the RFID to make it so the door lock when it has been activated because it requires and more in-depth code to make it do multiple things.



This is the PCB design for the circuit with the recent changes which includes the new RFID and the second Arduino. As you can see on the photo the design looks more complex because there is another Arduino and the RFID wiring which could also mean that it makes longer to make and solder and would also make it a little more expensive because it would require more copper because the circuit itself is bigger.

With this feedback that I got from the peer review it allowed me to see what I could've don differently to make my project go better and work more efficiently and the requirements of what it would need to do, as in my circuit it didn't allow for a locking system that denies entry from the outside when the clean room is occupied.

A way that I could improved from the start of the project is do more thorough research because then I would have realised that I could've used different components that would of made the whole project run a lot smoother and it think it would of allowed for me to have less problems, but it also could have led to more problems with the coding because it would've been my first time coding which means that I might not of been able to finish the testing process which means I wouldn't of been able to do the manufacturing and it would've ruined the whole project, so I think that the feedback I got was really effective and helpful for me to

look and project I will do in the future and allow for me to make better decision running up to the manufacturing and testing processes.

Evaluation

The project went well because my circuit works and meet most the requirements of the client, The testing process showed me that my choice of components was the correct set of components and that I did not need to change them to make the circuit work.

An explanation of the test methods used reasons for their use and their limitations:

I used breadboards to test my circuit and at first it wasn't going so well because of little physical errors and coding was a big part, but once the circuit was built correctly on the breadboard the coding seemed to be a lot more simple, it allowed for me to see if I needed to change any parts of the circuit to allow for others things to work but all the components that I used work and once the code was written it allowed for me to see how the circuit works and it did eventually after some minor changes in the code like the variables being the wrong way around e.g. the PIR making the lights come off instead of on.

A summary of the capabilities of the circuitry:

The whole board and circuitry worked, and all the components work to their designated function. It took some time to get the whole circuit working because some of the soldering the first-time round didn't go as well as I would have hoped for, so I remade a new PCB for me to do the soldering again which was helpful because the second time round the whole board worked.

- Both PIR sensors linked to the correct LEDs so that the people can know if the room is occupied or vacant.
- The buttons worked to the function of making the servo motor turn to rein act the lock on the door so that when I pressed the first button the door unlocked, and the second button make the door lock when it was closed.
- The reed switch and the passive buzzer linked well so that when the reed switches magnet was disconnected after 20 seconds the buzzer will make noise until the magnet reconnects, but there was one issue which was that when the magnet reconnected the circuit didn't work for 10 seconds after, I couldn't find why that was in the time that was given but I'm sure would have been able to figure it out with more time.

An evaluation of the fitness for purpose of the design proposal and its conformance to the design criteria and spec:

The whole design mostly fits the design criteria and ticks most the points that the client requirements. There were some points that it did not meet like the door locking and preventing people coming inside when the room is occupied. Other than that, most of the point was met which was a considerable success and I am happy with how it turned out.

The information necessary for a third party to implement the prototype:

The things that you would need to know if you were a third party is that you would need to make sure that when you are testing that the wires and in the correct areas, things like 5V wires are in 5V and that the ground wires are in ground which will prevent the circuit from blowing and malfunctioning.

An outline of any additional factors that may need to be considered during the implementation:

I had to use two front copper cables because of the way it was wired it didn't allow for me to use the normal wiring method throughout, I had to use 9 male – female wires because both the PIR sensors required it to be able to fit into the pin socket and I had to use them on the servo motor to fit it on the pin heads, I also had to strip two pieces of stranded cable to connect the reed switch into the circuit because it didn't have pin sockets/heads for a wire to fit into the switch. The wires needed to be stripped and soldered because it wouldn't be able to fit into the copper board because of the strands that wouldn't go through the whole that had been drilled, this part could have been averted if I had used the screw terminal because it would of made connecting the reed switch in.

The first H&S thing to consider would be the fact that you need an extractor fan when doing soldering so that you do not inhale all the fumes from the solder melting, also make sure to wear goggles in case any of the solder splashing into your direction.

Any further improvements or adaptions required to the prototype, including any reasoning and justifications if adaptions or improvements are not required:

The first improvement to prototype would to add the card readers so that getting into the room uses less hands on ways and the second adjustment I would add to the circuit is that I would want to add the locking system that denies entry form the outside when the room is occupied so that the room is more secure and safe when it is in use.

Get in touch

The City & Guilds Quality team are here to answer any queries you may have regarding your T Level Technical Qualification delivery.

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