DESN2000 (Computer Engineering) 2026 T2
Project Brief: The door!

Drafted: 05/05/2026

A company has asked your team to develop an early prototype of a smart access security system for a commercial office building. The system should manage who is allowed to enter and exit the building, respond appropriately to unauthorised access attempts, and be customisable so the building management can set specific access rules.

Such a description is open-ended. At this stage, we are trying to simulate a realistic scenario. You will spend the first few weeks (up to the week 5 presentation and design journal submission) drafting and brainstorming your design. If anything is unclear or you have any doubts, please post a question on the forum under the project or ask your lecturer/tutors (this is a simulation of discussing with the company correspondent). If there are reasonable assumptions you can make, feel free to do so.

1. Project Description

Your project is to build an early prototype of the security system on the coaST Development Board (STM32 ARM) provided during the course. The security system firmware is to be written in C and/or assembly language. The guidelines for the prototype are provided below:

- Allow authorised personnel to enter using a smart card (NFC-based), for example, your team's card should work, whilst any other cards should be rejected. Exiting should not require authorisation.

- Support a special administrative key (RFID-based) held by the building management for override or emergency access.
- Use the lights on the board to signal that an authorised person has entered.
- Alert security staff when someone attempts to enter without authorisation – this should be prominent and done both visually (i.e. lights) and audibly (i.e. buzzer).
- Allow management to configure the door to remain unlocked during special events at specific times. This setting should be accessible only to the building management (therefore needs an authorisation) and configured through a keypad interface and display.
- The door mechanism should be direction-aware, i.e. move in different directions depending on entry or exit. This mechanism can be represented using the motor and an attachment (e.g. a 3D printed flap). It should be able to represent both the closed and open state and should not remain open after the person has entered or exited.
- The system should be able to detect whether someone is entering or exiting using sensors. These will be modelled by the two LDRs (located before and after the door) on the board.
- Safety of people is critical. If the door is still open whilst an authorised person is entering or someone is exiting, even if an unauthorised person tries to enter, the door should not suddenly close. In other words, your implementation only needs to alert if someone tries to sneak in while someone else is entering.

2. Teamwork

This is a group project, and you will work in a **group of three**. It is important to work efficiently together as a team to achieve timely deliverables and to complete this project. You are free to collaborate via any means you prefer.

3. Deliverables

The whole course and its assessments revolve around the project. You will be given the assessment tasks in due course.