COMP2121 Lift Emulator User Manual

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How to use the lift emulator:

The lift emulator is designed to be almost identical to a real lift system. On the board the keypad represents the levelled floors and an emergency button, the two push buttons represent the open and close buttons of inside a lift, the LEDs represent the door state of the lift and finally the motor emulates the doors opening and closing.

Reading information on the lift emulator:

LCD Display

The LCD has two roles in the operations of this emulator. The LCD displays the current floor on which the lift is located.

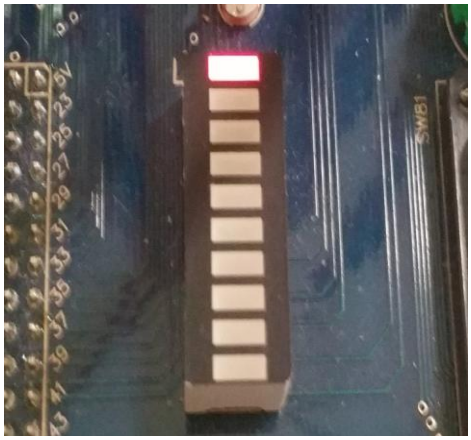
Figure 1: LCD displaying the current floor 0 of the lift emulator.

It also displays the emergency message in emergency mode.

Figure 2: LCD displaying the emergency alarm message

LEDs

The two highest LEDs are utilised to display the door state of the lift (closed, opening, opened, or closing). If the top most LED red light is on this signals that the door is currently closed. If this LED is flashing by itself then it represents the door currently closing its doors. Figure 3 (left) displays how this LED is pictured on the board.



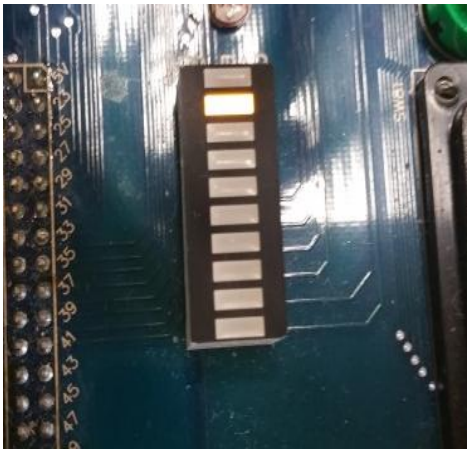


Figure 3: (left) LED displaying the top most red LED. (right) LED displaying the second top most yellow LED.

If the second top most LED yellow light is on, this signals that the door is currently opened. If this LED is flashing by itself then it represents that the doors are currently opening. Figure 3 (right) displays how this LED is pictured on the board.

There is a special case where both strobe LED's are flashing, the emergency alarm is turned on.

Figure 5: LED displaying that the emergency alarm is on.

The bottom 8 LEDs are utilised to denote the direction that the lift is travelling or if it's stationary. If the LED lights is travelling upwards it denotes that the lift is moving upwards, if the LED lights is travelling downwards it denotes that the lift is travelling downwards. Nothing is lit if the lift is stationary. Figure 6 shows how the bottom 8 LEDs are displayed.

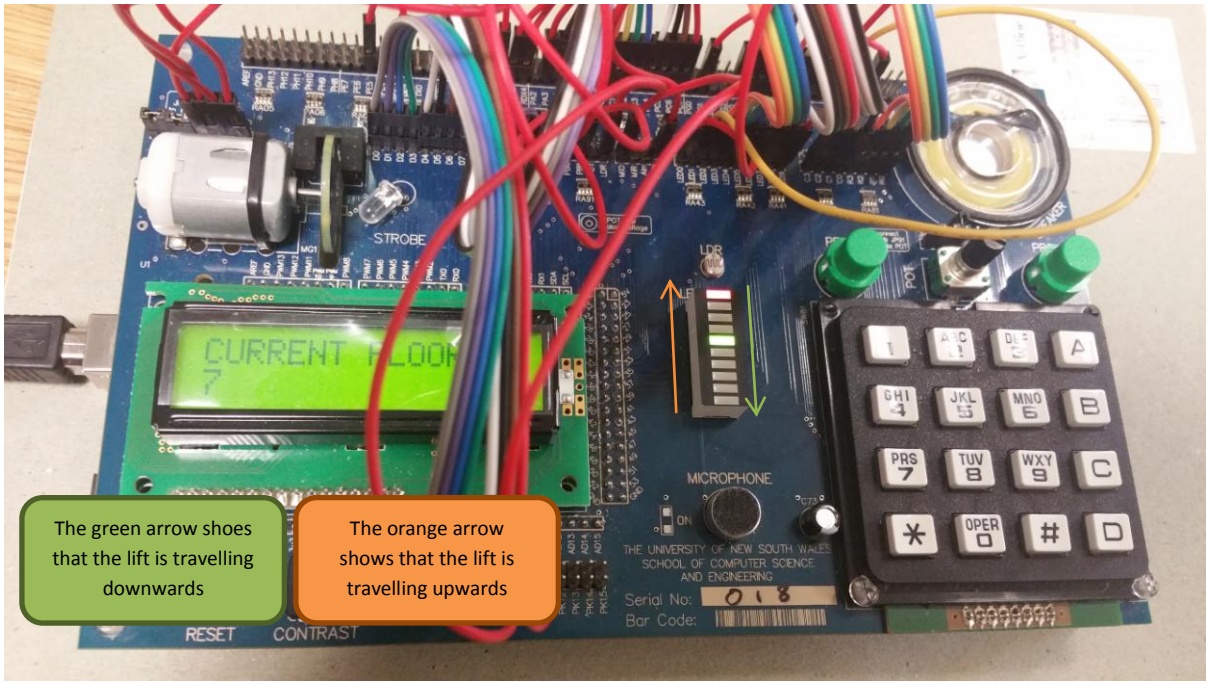


Figure 6: LED displaying the direction that the lift is travelling from the current floor.

Keypad

Figure 7: The keypad

The numbers on the keypad allows users to request a stop at that corresponding floor level. So if the button '8' is pushed, a request is made to visit floor 8. Multiple floors can be requested at the same time.

The star key on the keypad is the emergency button which triggers the lifts emergency mode. The button can be pushed once again to allow the lift to resume its normal operations as before. Pushing the emergency button should stop the servicing of the lift, close the lift and then go all the way down to the bottom floor (i.e. level 0). At the bottom floor the lift will open its doors to allow the people back out and then close its doors displaying on the LCD an error message which can be seen from Figure 2. The strobe LED will blink continuously to signal the alarm for emergency until the star button is pushed again to resume its normal operation.

Push buttons

The green push buttons which are located above the keypad, PB0 and PB1, represent the open and close buttons respectively. When the close button (right button) is pushed when the doors are currently open, it signals the lift to close the doors immediately without waiting. If the door is currently opening the button is also functional but instead of closing immediately it closes right after the door has been opened. These are the only two times when the button should be functional.

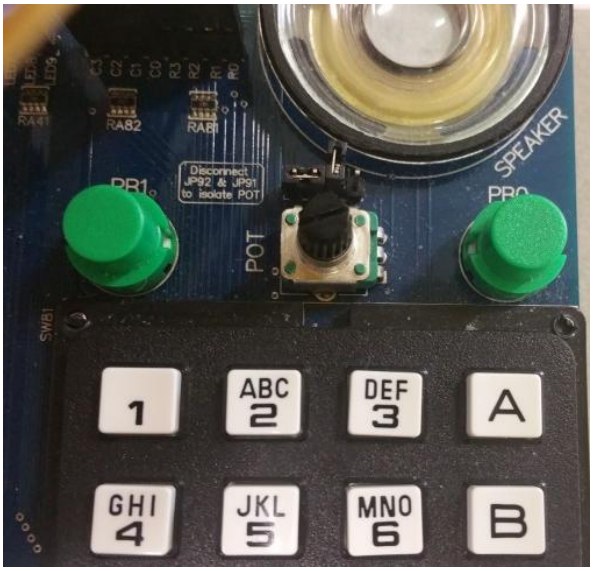


Figure 8: The push buttons

The open button (left button) requests to open the door, but it can also be held (rather than just pressing once). The doors should only open (invoked by this button) when the lift has stopped at a floor, or when doors are closing. The doors remain opened if the button is held.

Wiring

The following table shows the connections necessary for the lift emulator to work.

Port Group	Pin	Port Group	Pin
PORT F	PF0	LCD DATA	D0
PORT F	PF1	LCD DATA	D1
PORT F	PF2	LCD DATA	D2
PORT F	PF3	LCD DATA	D3
PORT F	PF4	LCD DATA	D4
PORT F	PF5	LCD DATA	D5
PORT F	PF6	LCD DATA	D6
PORT F	PF7	LCD DATA	D7
PORT K	PK9	INPUTS	LDR
PORT K	PK10	AUDIO	MiO
PORT E	PE5	LCD CTRL	BL
PORT E	PE2	MOTOR	Mot
PORT D	RDX3	INPUTS	PB1
PORT D	RDX4	INPUTS	PB0
PORT A	PA3	MOTOR	LED
PORT A	PA4	LCD CTRL	BE
PORT A	PA5	LCD CTRL	RW
PORT A	PA6	LCD CTRL	E
PORT A	PA7	LCD CTRL	RS
PORT C	PC0	LED BAR	LED2
PORT C	PC1	LED BAR	LED3
PORT C	PC2	LED BAR	LED4
PORT C	PC3	LED BAR	LED5
PORT C	PC4	LED BAR	LED6
PORT C	PC5	LED BAR	LED7
PORT C	PC6	LED BAR	LED8
PORT C	PC7	LED BAR	LED9
PORT L	PL0	KEYPAD	C3
PORT L	PL1	KEYPAD	C2
PORT L	PL2	KEYPAD	C1
PORT L	PL3	KEYPAD	C0
PORT L	PL4	KEYPAD	R3
PORT L	PL5	KEYPAD	R2
PORT L	PL6	KEYPAD	R1
PORT L	PL7	KEYPAD	R0
PORT B	PB0	LED BAR	LED0
PORT B	PB1	LED BAR	LED1
P11	+5V(any)	MOTOR	OpE