SAFECRACKER GAME

USER MANUAL

GAME DESCRIPTION

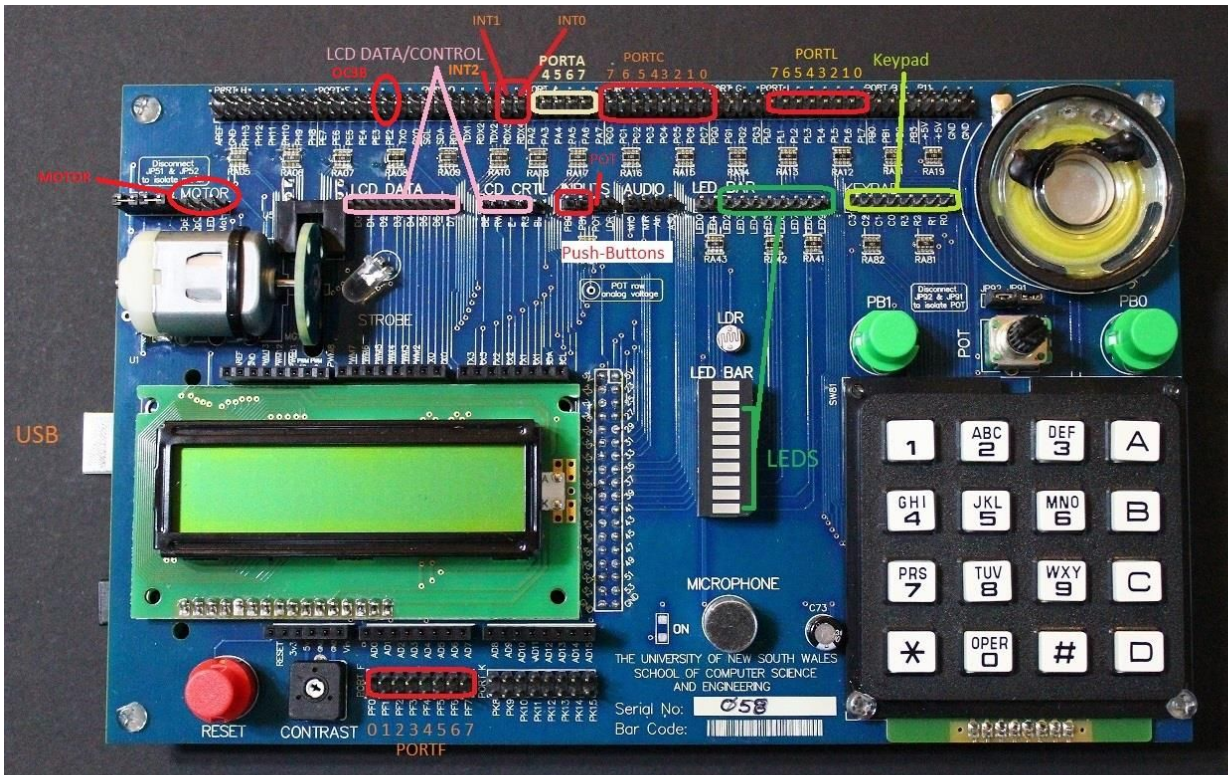
You are an evil mastermind bank robber, and you are able to digitally control all of the locks from all of the safe boxes within banks from around the world. Your Phd thesis in Computer Science at UNSW was developing a microcontroller board which can hack into banks access the funds. Your goal? To use the board to recover enough funds to cover the cost of your student loans! Because degrees aren't cheap!
However you might not get away scot free... if you don't beat the timer before you can crack all three locks then it is game over! If you manage to break all three digital locks and access the funds in the bank, remembering the codes to each of the locks; you win!

SETTING UP THE SAFECRACKER GAME

COMPONENT	USAGE	PORT CONNECTION	PORT
LCD	Displays the status of the game	D<0–7> → PF<0–7> RS → PA7 E → PA6 RW → PA5 BE → PA4	F
LED	Feedback for the potentiometre when cracking the safe in-game.	LED<2–9> → PC<0–7> LED<0–1> → PG<2–3>	C G
Motor	Spins when the correct keypad button is being held in the 'Find Code' screen.	Mot → PE5 OP0 → TDX2 OPE → +5V	E
Strobe Light	For flashing when the game is won	LED → PA3	A
Buttons	Used to Start/Reset the game	PB0 → RDX4 PB1 → RDX3	D
Keypad	Used to input information and adjust difficulty	C<0–3> → PL<7–4> R<0–3> → PL<3–0>	L

Speaker	Beeps when the counter decrements, the game is won or lost, and every time a new round starts.	Speaker +5V → PB3 Speaker GND → GND	B
Backlight	Indicates when the game is active for the user	BL → PE2 (0CR3B)	E
Potentiometer	To receive analog input from the user to assist in cracking the safe	POT → PK8	K

An image of the board with most of the ports outlined can be seen below, this may help in assembling and making the connections required for the game to function. This image was provided by CSE, UNSW.



BUTTON ACTIONS

A description of what each button does at each stage, and the function they provide.

Button	Stage	Function
Keypad '*'	Start Screen	Displays in the top right of the screen, the current high score for the currently selected difficulty setting
Keypad '#'	Start Screen	Blanks ALL high scores
Keypad 'A..D'	Start Screen	Sets the difficulty and displays it on the screen in the top right. (A=20s, B=15s, C=10s, D=6s)
ALL Keypad Buttons	Find Code Screen	At this screen, the user is able to tap each of the keypad buttons to 'find' the right one. When the right one is found, it will spin the motor while presses, up to a duration of one second
	Enter Code Screen	At this screen, the user may use the keypad to enter in the 3 components of the code they got correctly in each find code stage
Left Push Button	Start Screen	Starts the game, by going first to the Countdown timer screen. If the backlight is off, it will fade in
Right Push Button	All Screens	Will reset the game back to the start screen
ALL Keypad & Push Buttons	Win Screen	If the screen has been dimmed, then the screen will fade it. Regardless of this, pushing any button at these screens will return the user back to the start screen
	Lose Screen	

OPERATION INSTRUCTIONS

1. Initial Information Overview (Home)

When the game is turned on, the home screen will be shown with the title of the game. From this screen, the user has the option to start the game by pressing PB1 (the left push button), set the difficulty, or to check highscores. If this is the very first time that game has been run on the board, then the memory will be empty and thus the highscores will be 0, and default difficulty will be 20 seconds.

To change difficulty, the user may click the buttons A through D, where A sets the difficulty to 20 seconds, B to 15, C to 10, and D to six seconds. At all times, the current difficulty will be shown on the top right of the LCD screen. To view the high score of the current difficulty, the user may press the * key, which will replace the text in the top right of the LCD with the score for that difficulty.
These highscores persist through power loss due to storage in the EEPROM (as does the most recently played difficulty). The user may press the # key to clear ALL highscores. During gameplay, to exit anytime, simply press the right green push button (PB0).

2. To start the game (Countdown)

To start the game, press the left green push button (PB1). This will take the user to the next screen where a three second countdown will begin on the bottom right corner of the LCD.

3. To reset the potentiometer (Reset Pot)

After the 3 second countdown ends, the user will be directed to the RESET POT Screen. Turn the potentiometer dial as far as it will go anti-clockwise to reset the potentiometer and begin the safe cracking process of the game. The countdown timer is based on the difficulty setting, and is decrementing on the screen once a second. Once the countdown ends, the game will timeout and it will be game over. As the timer is counting down, there will be a short beep for every second that counts down.

4.Crack the safe (Find Pot)

Once the Pot is reset, the user will be sent to the Find Pot screen. On the Find Pot Screen, the user must find the sweet spot of the lock using the potentiometer by tweaking it in order to crack the safe. As turning the potentiometer clockwise increases the voltage, you must find the correct position of the potentiometer without exceeding the voltage but within the time limit. If you have found the position, hold it for one second and you will proceed to the next stage of the game.

The LEDs will indicate whether or not the potentiometer is in the correct position or not. If all the LED bars are lit, the potentiometer is very close to the target position (within 16 values). If the potentiometer is relatively close to the target position (within 32 values); all except the top LED bar will be lit. All except the top 2 LED lights will be on if the potentiometer is within range (48 values) of the target position. Slowly adjust the potentiometer so that all LEDs are lit then hold it there for one second to progress to the next stage of the game.

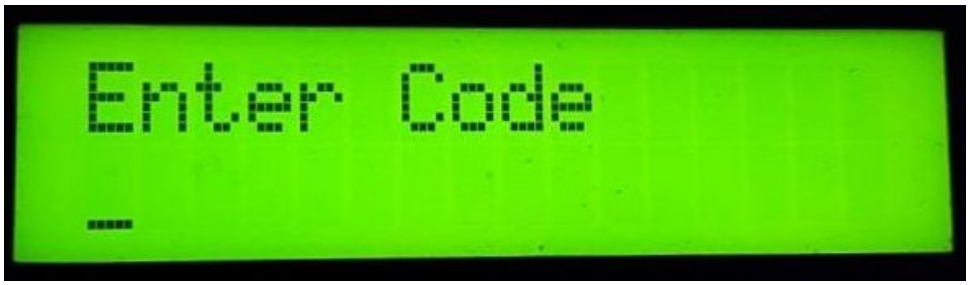
Be careful to not overshoot, because otherwise the user will be sent back to the previous screen, without resetting the clock.

5. Enter the code.

If the user is able to crack the lock in time, they are directed to the Enter Code screen. At this screen the user is able to press each key on the keypad until they have found the first element of the final code. The user will know if they have found the correct key button, because when pressed the motor will spin. If the user holds the key for one second, the next round will start; sending the user to the Reset Pot screen.
If the user can crack three different codes, they are sent to the Enter Code screen.

6. Enter the code.

When the three different keys have been cracked, the user will be directed to enter the code in the same order as it was originally cracked. When the user presses a key which has the current part of the code (in order it were cracked), an asterisks is displayed on the screen. Entering the wrong code will clear all asterisks on the screen, prompting the user to re-enter the code. There is no time limit for the user to enter the code.



7. Completion of the game.

When the user has successfully completed the game, they will be taken to the Game Complete Screen. To replay the game, they may press any key. On this screen the strobe light will be flash (at 2Hz) in celebration!

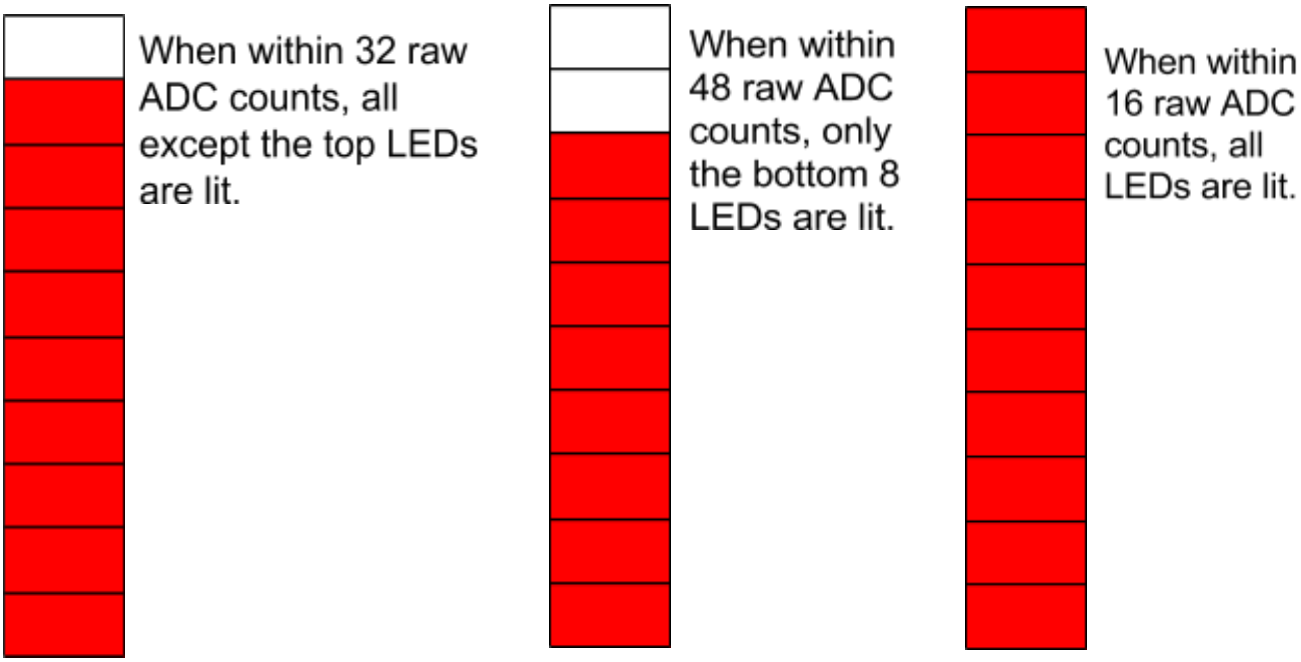
8. Timeout

a. If the user fails to find the position of the potentiometer within the allocated time (not within the countdown) then the timeout screen will display, indicating game over. To replay the game, press any key.

INTERPRETING THE DISPLAYS

LED

The LED indicates the proximity of the potentiometer from the assigned voltage, during the *Find Pot* screen. Initially the user will have turned the pot as far as it will go left, and the stage will transition from the *Reset Pot* stage. From here, turning the pot to the right slowly will give the user feedback on the LED bar display in regards to how close they are to the actual value. When the pot is held for one second when all lights are illuminated on the LED bar, the user has successfully passed that stage.



LCD

The LCD indicates the stage of the game the user is in.

RESET POT SCREEN

R	e	s	e	t		P	O	T		t	o		0		
R	e	m	a	i	n	i	n	g	:		?				

Depending on the difficulty selected by the user, the remaining time will be displayed in the area of the question mark.

FIND POT POSITION SCREEN

F	i	n	d		P	O	T		P	O	S				
R	e	m	a	i	n	i	n	g	:		?				

The remaining time is a continuation of the time remaining from the previous screen which was to reset the potentiometer.

SCAN NUMBER SCREEN

P	o	s	i	t	i	o	n		f	o	u	n	d	!	
S	c	a	n		f	o	r		n	u	m	b	e	r	

On this screen, the user will traverse the keypad pressing on the keys until the motor spins at full speed indicating the right letter has been pressed moving to the next screen, “Enter Code” which will indicate for the user to enter the code that was pressed in the order of the press

ENTER CODE SCREEN

E	n	t	e	r		C	o	d	e						
*	*	_													

The user enters the code found from the previous screen. If the code entered is incorrect, the user the bottom half of the LCD will clear and the user is allowed to enter the code again. This process can continue on.

GAME WIN SCREEN

G	a	m	e		C	o	m	p	l	e	t	e			
Y	o	u		W	i	n	!								

This screen is shown, when the user enters the correct code in after cracking all the locks.

GAME LOSE SCREEN

G	a	m	e		o	v	e	r							
Y	o	u		L	o	s	e	!							

This screen is shown, if the user isn’t quick enough on any of the stages, and the timer counts down to 0.