

# Drone User Manual

Shao Hui z5155945

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## 0.1 Introduction

This project simulates a drone searching a certain mountain for accident scene.

Drone can search a mountain of  $64\text{m} \times 64\text{m}$  with max height of 127m and minimal height of 0m. This mountain is represented by a  $64 \times 64$  matrix. This project provide some tools to randomly generate such mountain which will be discussed in section 3.

This project uses two press key, and a  $4 \times 4$  keypad to control simulation. The simulate process will be discussed in section 4.

## 0.2 Board Connection

AVR Pins (top and bottom row)		Input/Output Device Pins (middle row)	
Port Group	Pin	Port Group	Pin
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 D	RDX4	INPUTS	PB0
PORT D	RDX3	INPUTS	PB1
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 F	PF8	LCD DATA	D8
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 E	PE3	JP92	RIGHT
MOTOR	Mot	JP91	RIGHT

JP92 and JP91 isolate POT and let it be connected between pwm generator and motor to make sure the motor wont crash the board.

## 0.3 Mountain Generator

This project provided a random mountain generator written in python called generator.py that will generate a 64×64 matrix and write it to the "mountain.asm" file which will be included into the source code.

This generator uses such technique,

1. Randomly generate a peak in position x, y with height h.
2. Generate down from the peak to its neighbour grid until height became less then 10.
3. Combine this graph with the former mountain map and cut out the positions that are lower than the former map.
4. Repeat this procedure for several times.

This technique always generate a mountain that make sense. You can also use your own generator or simply type in a mountain that suits your need. But make sure when you assemble the project, label your mountain with a label "mountain".

## 0.4 Control Procedure

Every time when the board is reset. The LCD will display a string "Input X:".

You should always follow such emulate procedure.

1. Input some number within 64 using keypad end with "#", which is the row number of the accident scene. If your input is invalid, led will flash three times and board will be reset.
2. After LCD showed "Input Y:", input some number within 64 using keypad end with "#", which is the column number of the accident scene. If your input is invalid, led will flash three times and board will be reset.
3. After LCD showed "READY", press PB0 to start search. LED will flash 3 times to indicate the start of search. LCD will show drone's current position and flying direction. Motor will be spinning, fast means flying high, low speed means suspending.
4. During search, you can always press PB1 to abort the search. LCD will show "ABORT".
5. After finding the accident scene. LCD will show "FOUND" and the position of the accident scene. Motor will stop. If a accident scene not fount(which actually never happen during a simulation), LCD will show "NOT FOUND", and motor also stop.