

Defuse the Bomb

A CSC 102 Project

Team: Tim Knapp, Andres Ponce, Rodrigo Asturias

# BOMB DEFUSAL MANUAL

Version 1

Verification Code: 0zDBAAXBKCEA

# The Game

This project is based on the game **Keep Talking and Nobody Explodes**<sup>1</sup>, a cooperative bomb defusing party game. As the game designers put it, “You’re alone in a room with a bomb. Your friends, the 'Experts', have the manual needed to defuse it. But there’s a catch: the Experts can’t see the bomb, so everyone will need to talk it out – fast! Put your puzzle-solving and communication skills to the test as you and your friends race to defuse bombs quickly before time runs out!”

Their version is a software game. Our version takes the idea and realizes it as a physical device with buttons, switches, and more! Although our version can be played just like theirs, players can interact with both the bomb and this document at the same time (i.e., players can both defuse the bomb and serve as the “Experts”, using this document to help disarm the phases).

The backend of our version of the game is a Raspberry Pi<sup>2</sup> computer that combines a typical computer with the ability to interact with the outside world through sensors. The underlying software is written in Python<sup>3</sup> and is the result of a final group-based project in CSC 102 (The Science of Computing II) in the Computer Science Program at the University of Tampa.

## Defusing Bombs

The bomb will “explode” when its countdown reaches 0:00 or when too many strikes have occurred. You defuse the bomb by disarming all of its “phases” before the countdown expires.

### Phases

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<sup>1</sup><https://keeptalkinggame.com/>

<sup>2</sup><https://www.raspberrypi.com/>

<sup>3</sup><https://www.python.org/>

## Defuse the Bomb | A CSC 102 Project Introduction

The bomb has **four** phases, each of which must be disarmed to defuse the bomb. **The phases can be disarmed in any order. Once a phase is disarmed, it becomes inactive and changing it doesn't affect the bomb.** Instructions for disarming the phases are provided in this document.

### **Strikes**

A mistake in disarming a phase results in a strike. Get as many as 5 strikes, and the bomb “explodes”.

### **Information**

A different version of the bomb is randomly presented each time it is “booted”. There are **6,720** unique versions of the bomb with a whopping **1,176,000** possible variations!

Disarming some phases will require specific information about the bomb. Pay close attention to the “bootup” text on the bomb's screen.

## Regarding the Toggles

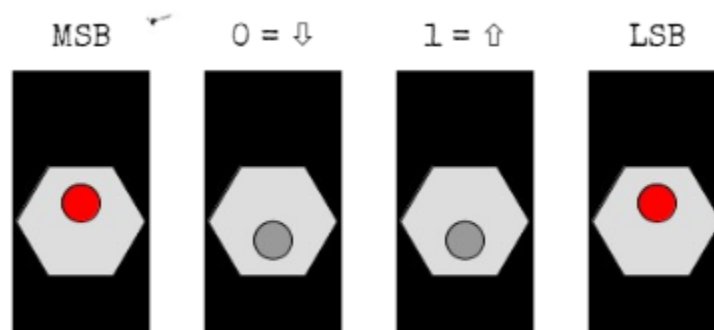
The correct state of each toggle switch is based on the bomb's serial number.

You must first add the numeric digits in the serial number together to obtain a target value. Convert this value to a 4-digit binary number.

Toggle the switches to represent the binary number. Converting a number to binary (base 2) can be done by placing a 1 in the appropriate powers of two represented by the columns of the table below that, when added together, sum to the value. A 0 is placed in the remaining columns. The left-most digit of the binary number is known as the MSB (most significant bit), while the right-most digit is known as the LSB (least significant bit).

| $2^3$ | $2^2$ | $2^1$ | $2^0$ |
|-------|-------|-------|-------|
| 8     | 4     | 2     | 1     |
|       |       |       |       |

The left-most toggle switch represents the MSB, and the right-most toggle switch represents the LSB. The LED on a toggle switch lights up to represent a binary 1. Use the diagram below to assist you (which, by the way, represents the value 9).



## Regarding the Button

At some point, you will need to press the button. However, releasing it is the hard part. The button has a lighted ring around it that can be red, green, or blue. Release the button according to the following instructions:

| Button color | Release instructions   |
|--------------|--|
| Red          | Release when the second number of the serial number appears in the seconds on the countdown timer. |
| Green        | Release when the first number of the serial number appears in the seconds on the countdown timer.  |
| Blue         | Release when the last number of the serial number appears in the seconds on the countdown timer.   |

## Regarding the Keypad

Important information about the keypad is provided in the bomb's “bootup” text.

The correct combination can be determined by first decrypting a keyword with a key using an alphabetic substitution cipher – and then looking up the result in the table below to obtain a passphrase.

A substitution cipher with a numeric key represents a rotation of the alphabet. For a key of 5, for example, the alphabet is shifted five places such that A becomes F, B becomes G, ..., and Z becomes E. Using this shift, for example, the word “THEY” encrypts to “YMJD”. Decrypting “YMJD” back to “THEY” is merely doing the reverse, effectively “subtracting” five positions from each letter.

To enter the passphrase correctly, you must enter its numeric combination on the keypad. To do so, press each button on the keypad with the required letter only once.

| Keyword    | Passphrase | keyword  | Passphrase |
|------------|------------|----------|------------|
| AUSTIN     | POVERTY    | KENNEDY  | BOULEVARD  |
| BOATHOUSE  | COMMUNITY  | MINARET  | CLIMB      |
| CHAPEL     | RELIGION   | PLANT    | HALL       |
| FERMAN     | ARTS       | RIVER    | WALK       |
| GRAND      | CENTER     | SKYES    | BUSINESS   |
| HEALTH     | SCIENCE    | TECH     | COMPSCI    |
| INNOVATIVE | STARBUCKS  | ULTIMATE | DINNING    |
| JENKINS    | BATHROOMS  | VAUGHN   | FOOD       |

## Regarding the Wires

The correct wires to “cut” are based on the color of the button and, in some cases, the bomb's serial number. The wires are labeled as follows, depending on their orientation on your bomb:

“Cut” the wires based on the color of the button according to the following instructions:

| Button color “Cut” instructions | Button color “Cut” instructions          |
|---------------------------------|--|
| Red                             | Unplug the first four wires.             |
| Green                           | Unplug wires labeled D and E.            |
| Blue                            | Remove the first, third, and fifth wire. |