TerrainTronics 6x6 Puzzle Room Kit

Contents

Document History

Version	Date	Notes
1.0	1/19/2022	Initial Release. Document not complete, but enough for customers to evaluate.

TerrainTronics 6x6 Puzzle Room Kit Version 1.0
1/19/2022

Credits

Maps Designed using: https://probabletrain.itch.io/dungeon-scrawl

Using some icons etc. from 2 minute tabletop: https://2minutetabletop.com/

Schematics created using Microsoft Visio: https://www.microsoft.com/en-us/microsoft-365/visio/flowchart-software

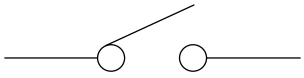
Other icons sourced from the noun project: https://thenounproject.com/

3D designs created using Fusion 360. https://www.autodesk.com/products/fusion-360/overview

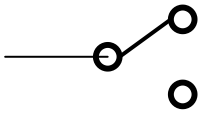
Additional Animal Icon from Brass Badger Workshop: https://www.brassbadgerworkshop.com/

Shoutouts to folks that have provided feedback on this document etc. – John at Tabletop Witchcraft, Tim Chemgeek (on TTW's discord server).

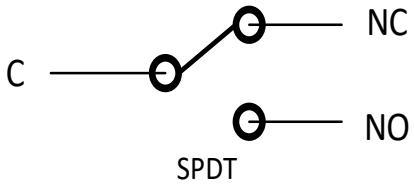
Guide to symbols in this document



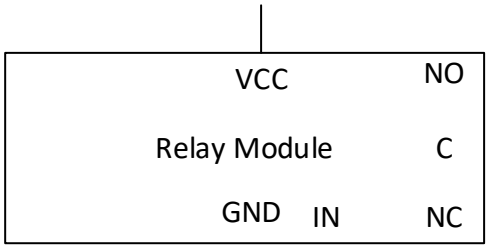
A Simple switch. This is the Switch "open" – where electricity cannot pass. When the switch it closed, an electrical connection is made between the input and output. This kind is known as a SPST (Single Pole Single Throw). It is either Open or Closed. There is no other condition.



This is a SPDT Switch. It has one Common signal, and two switched signal. When you switch it, the common signal gets routed to one of two switched outputs. Most mechanical switches do not care which may the signal flow. This a SPDT would be single input, dual output, OR dual input, single output.

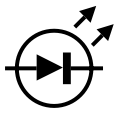


Relays are where things can get interesting. Most cheap relays use an electric signal to switch between a NC (Normally Closed) and NO (Normally Open) signal. No signal – the Common pin is connected to the NC. With Signal, C is connected to NO. Whilst there are many smarter ways to do things like NOT gates etc. – we can do lots of clever things with relays.



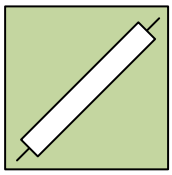
In this diagram of a relay, you can see six signals. This is what a typical "Arduino relay module" looks like. NO, C and NC pins are described above. The VCC is your positive signal and typically connected to your battery +. GND is typically connected to your Battery-. Switching C from NC to NO is done by connecting the IN pin to GND. In this document, we

connect reed switches (that detect a magnet) from the IN pin to GND, so that when the magnets are in the right place, we connect C to NO.

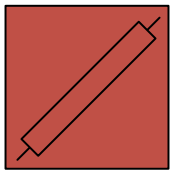

D1

An LED. A regular diode does not emit light. Electricity can only flow one way (you can imagine the flow going one way (follow the triangle) but being stopped from going in reverse by the wall! We have to be careful with LED's. If you simply hook them up to a power source, most of the time, they break. You need to limit the flow (current) of energy through them using a resistor or something like a Conwy board. The amount of current flowing through an LED determines it's brightness. As a reference, any more than 20mA (mili amps) of current will be "burn your retina" bright AND shorten the lifespan of the LED.

A resistor. Traditionally used to limit the amount of current flowing in a system with an LED. Not much concern here – but used in these diagrams to be correct. Many systems using a CR2032 battery omit these, as they are often "built in" to the battery. (i.e. the batteries are so poorly made, they have an inherent current limitation).

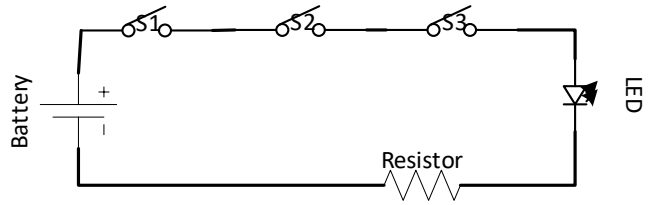


A terrain tronics Reed Switch PCB. Very simple board simply holds a reed switch and puts a little space for Velcro to attach it to your playfield. A green version shows it's used to detect when a player is on top of it.



A Red version of the terraintronics reed switch is exactly the same. It's shown diagrammatically to show that if a player/item is on top of them, it should stop the output from working.

How do these puzzles work?

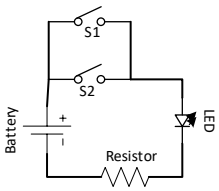


I hate this bit. I really do. There's some high school science here. Stick with it. Re-read it. Watch a youtube video. It's worth trying to understand the next page and a half. I promise. 😊

Magnets! Each of the small circuit boards has a reed switch attached to it. Reed switches don't pass electricity when there isn't a magnet nearby. The presence of a magnet will cause them to close and pass the signal from one side, to the other..

By gluing magnets into the bases on each player (or scatter terrain item required to solve the challenge) when the players stand above the reed switch, electricity can flow through that switch. That allows complex puzzles to be created by using combinations of switches.

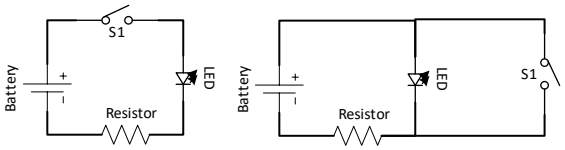
For instance – want all the players to stand in specific places before a light switches on? Daisy chain the switches one into the other. This is known as a "logical AND" operation. S1 (Switch 1), S2 (Switch 2) and S3 (Switch 3) in the diagram below must all be closed (magnets nearby) to make the light switch on!



However, if we don't mind which one of two places has a player standing on it. We can set up the switches so that it doesn't matter which switch is closed to make the signals pass. This is known as a "logical OR".

In a logical OR, you can see that it doesn't matter which one of those switches is closed, the power/signal is going to get from the battery to that LED!

Finally, it's possible to use these switches in a "logical NOT" configuration. Logical NOT would mean that If a magnet IS closing the switch, it will STOP the LED from lighting. Think of a room where you want all the lights to go off when a player is in a certain place. E.g. stepping into a shadow. Have a look at the two examples below:

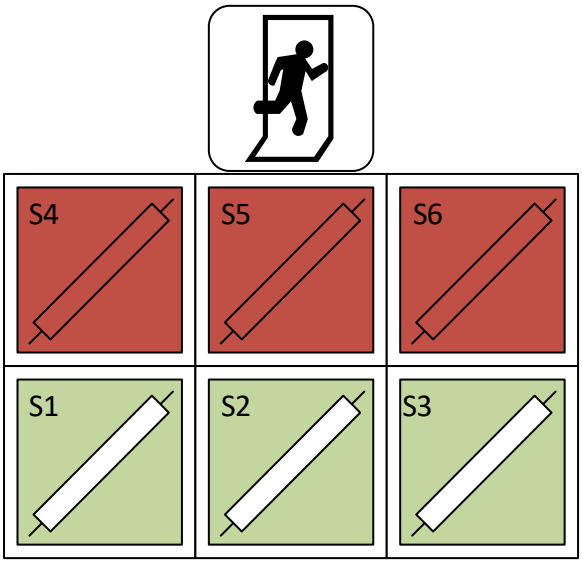


In Example A, when the switch is closed (Magnet Present), the light switches on. We can see how the flow of electricity moves from the + of the battery, through the switch, through the LED and through the resistor.

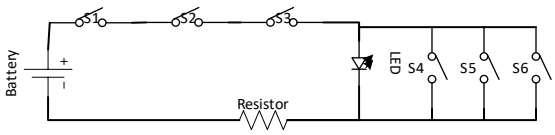
In example B, when the switch is OPEN (no magnet!) the electricity constantly flows through the circuit. The LED is constantly ON. But – When the Magnet shows up and the switch is closed, the electricity takes the easy path! It bypasses the LED, and goes straight to the resistor. Therefor, the LED stays off!

Combining this logic to make your own puzzles.

Example. To switch on a light, All 3 players should stand near the door, but not directly in front of it.



This means we need to AND S1, S2 and S3 … but we should NOT S4, S5 and S6. Something like this:

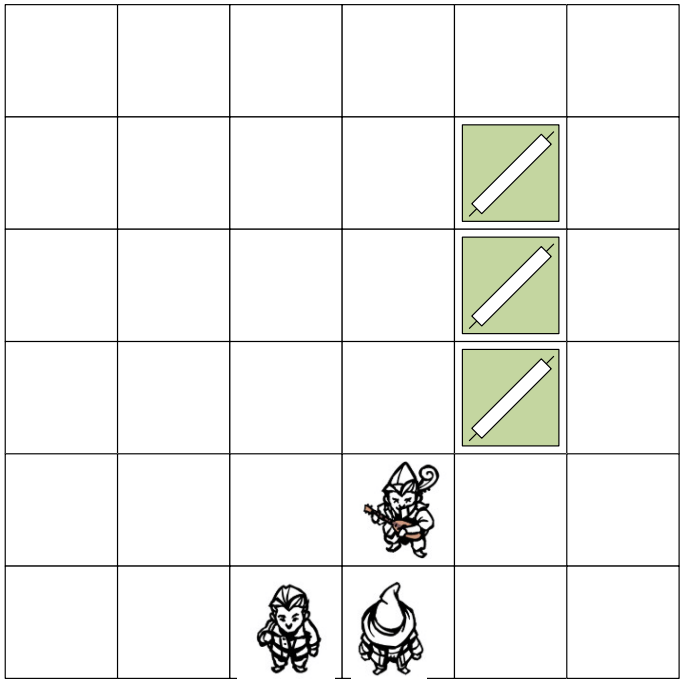


Any more complex like this should have a little microcontroller to do this… but for now – you'd be amazed what you can do with this!

Now on to a few example puzzles.

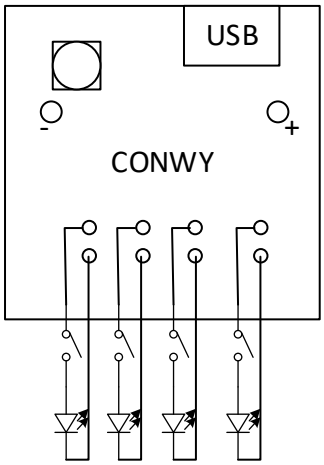
Puzzle Name: Battleships

Playfield: 6x6 array. No specific requirements for scatter terrain. Align reed switches in a line, just like the classic game “Battleships”. There should only be as many reed switches as there are members of the party.



Connecting Up The Electronics

There are many complex ways to hook this one up, with Arduino’s, Raspberry Pi’s and all sorts of weird and wonderful stuff. Or you can keep it terribly simple! Using a terraintronics CONWY board, and simply use the switching in the same path as the LED’s as shown.



Follow the usual instructions for hooking up a Conway board (shown in it’s manual. But rather than connect the wires directly to the LED, take them “through” the magnetic reed switch. Each LED should then only shine when a magnet (on the base of a player) closes the connection. Each Conwy board can support up to 4 reed switches, LED’s and players!

How to DM this challenge.

Players enter the room, DM should give as little description as possible. The walls should have a nautical theme, and a painting of a boat on the wall with [number of players] flickering bulbs in them – unlit at this time.

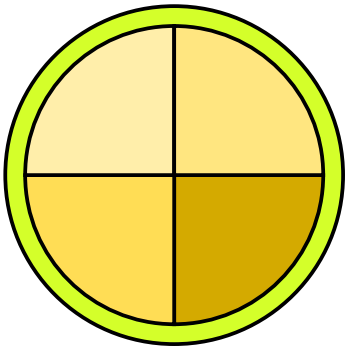
The door to the north is locked with two small bars. The door players entered through is also locked. Only one way out – work out what the puzzle is, then solve it.

For every move made, the DM should mutter “MISS” unless they stand on the right point. To add tension to the game, the DM may respond to a player move by saying “DM Fires” and throwing a D6 dice. On a 6, the players should roll for damage.

When All LED’s on the painting are illuminated, the challenge is complete.

Puzzle Name: Social Animals

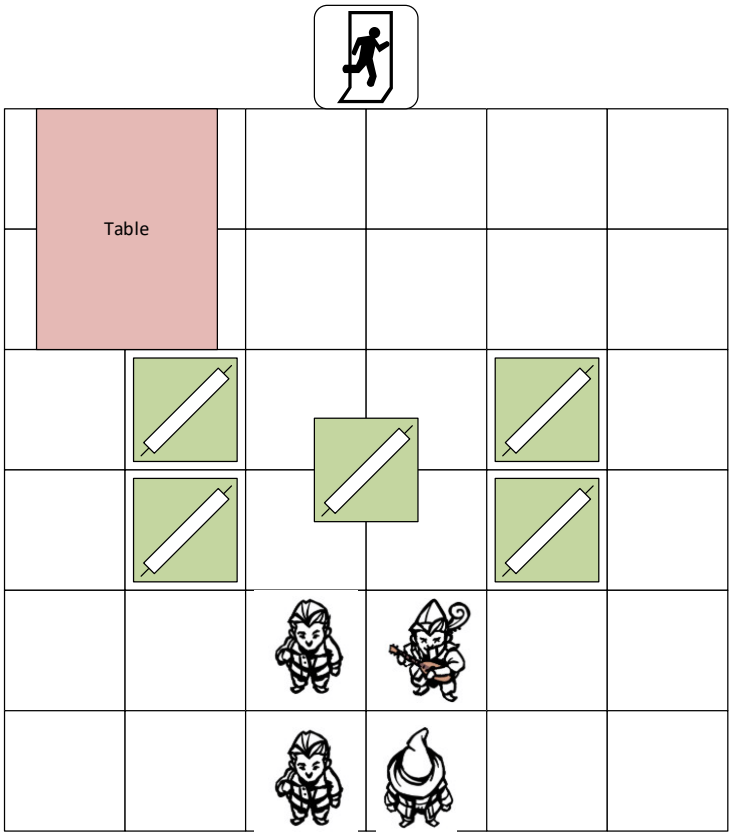
Playfield: 6x6 array. Scatter terrain needs a Table off to one wall. (one that takes 2x2 tiles). The table should contain a magnet in the center of its base to detect when it is moved to the center of the room. Room should be dimly lit, with a few torch LED's on the wall, minimum brightness. The door should have 5 LED's arranged into it.



The outer ring should be to show the table in its right place. With the table in place, none of the inner quadrants should light up. Then as each player takes a place around the table the quadrants should each line up.

If there are only 3 players, then an additional statue should be placed in the room, with a magnet built into its base.

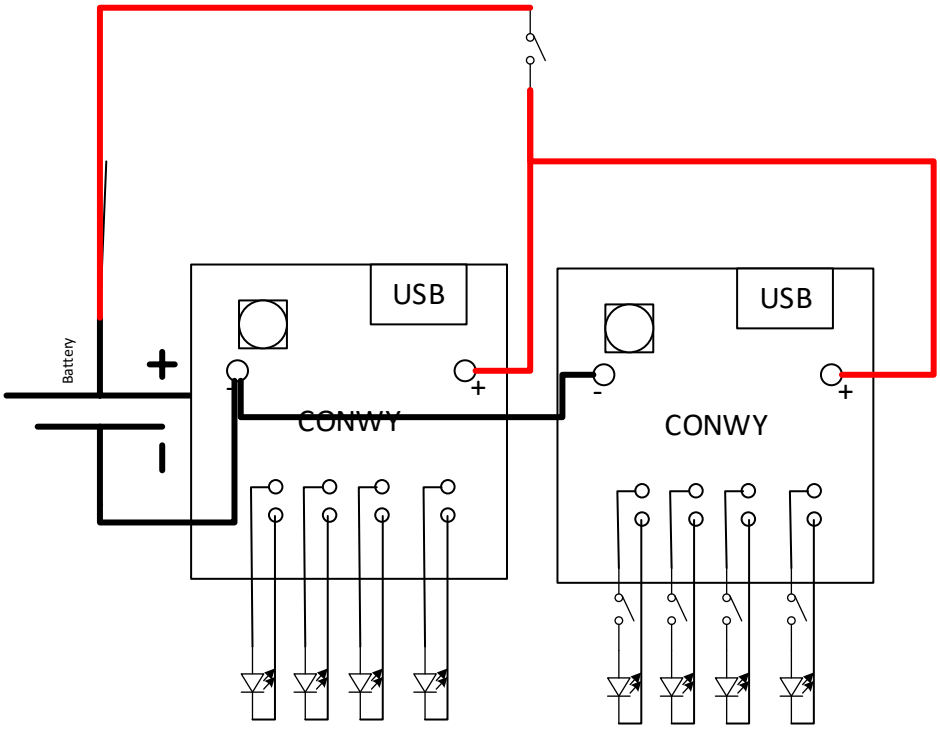
Walls should be made to look like a hall for feasting.



Connecting Up the Electronics

There are 5 LED's in play here. I would use 2x Conway boards, first one for the outer ring, the second for the inner quadrants.

The Table detection switch can be termed as S1, with S2,3,4,5 used for player position.



All LED ON when S1 (Table) Closed

Individual LED's on when each switch is closed

How to DM this challenge

The table should not be in the middle of the room when the players arrive. The table should be against a wall. A paper icon of a chair should be next to the table, with a skeleton on it. Another 3 paper icon chairs should be around the room.

The skeleton seems to have died reading a book. Investigation of the book should give some clues.

"A table for four, brings light to us all!"

"A guest never has his back to the door"

Investigation of the room should reveal that there was once a beautiful chandelier above the middle of the room. A hint that the table was once there.

If players have never moved terrain in the room before, a hint can be given.

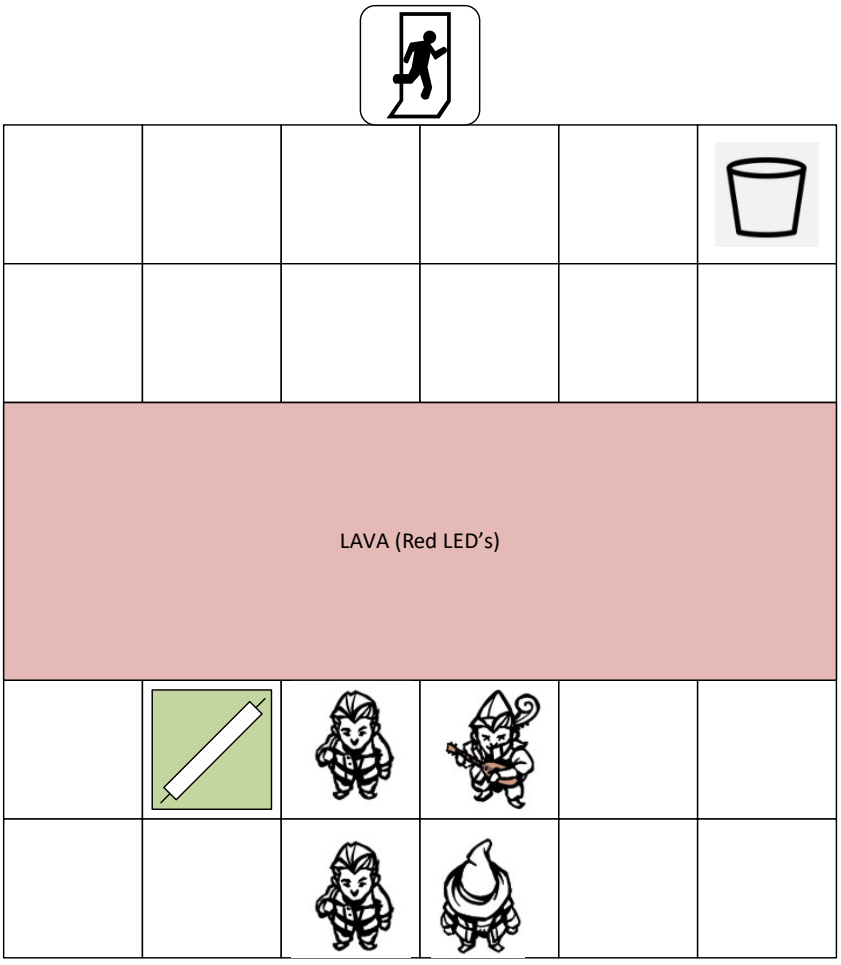
Puzzle Name: A River of Lava

Playfield: 6x6 or bigger. The field should have a red LED strip running through the middle this can be a simple 5V LED strip (Red, ***without*** a remote control etc). By default, it should be ON.

Prerequisites: Dungeon should contain a water source. Players will leave to go back to it.

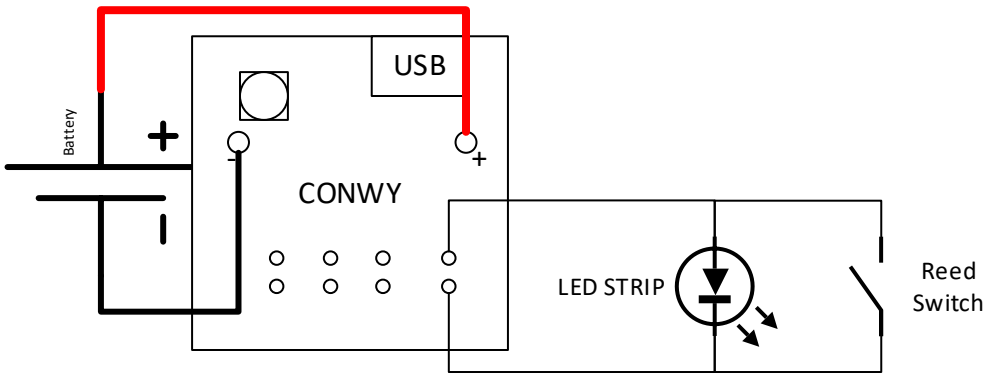
A pressure plate is on the entrance side. Fully visible to players. When stepped on, the LAVA flow should stop. This allows for the team to cross, other than the person stepping on the plate. The moment the person steps off the plate, the flow continues, and the player is left behind.

Solution: Bucket should be picked up by the team, and taken back to a water source. The bucket can then be filled and placed on the pressure pad.



Connecting Up The Electronics

This one is best done with a Conwy board, as the Conwy board has current limiting included. There are many 12V single color red LED strips. These usually come with an integrated current limiting resistor, but as we're going to short/bypass the LED strip, we need a circuit that will adapt.



How to DM this challenge

Not much to explain here. It's important that the players understand that an empty bucket will not be enough to weigh down the pressure switch. This challenge is best placed in an underground dungeon, with many nearby rooms.

In another room, make sure there is a water source where they can fill the bucket with water. Add a puzzle or battle element to get to the water source to add some variety.

Puzzle Name: The Pentagram

Playfield:

7x7 or bigger. The floor should have a pentagram drawn on to it. The 5 points of the pentagram need to be on specific tiles, so that LED Candles can be places on them. LED torches should be wall mounted and run until the pentagram is complete. LED candles need to have magnets attached to their undersides.

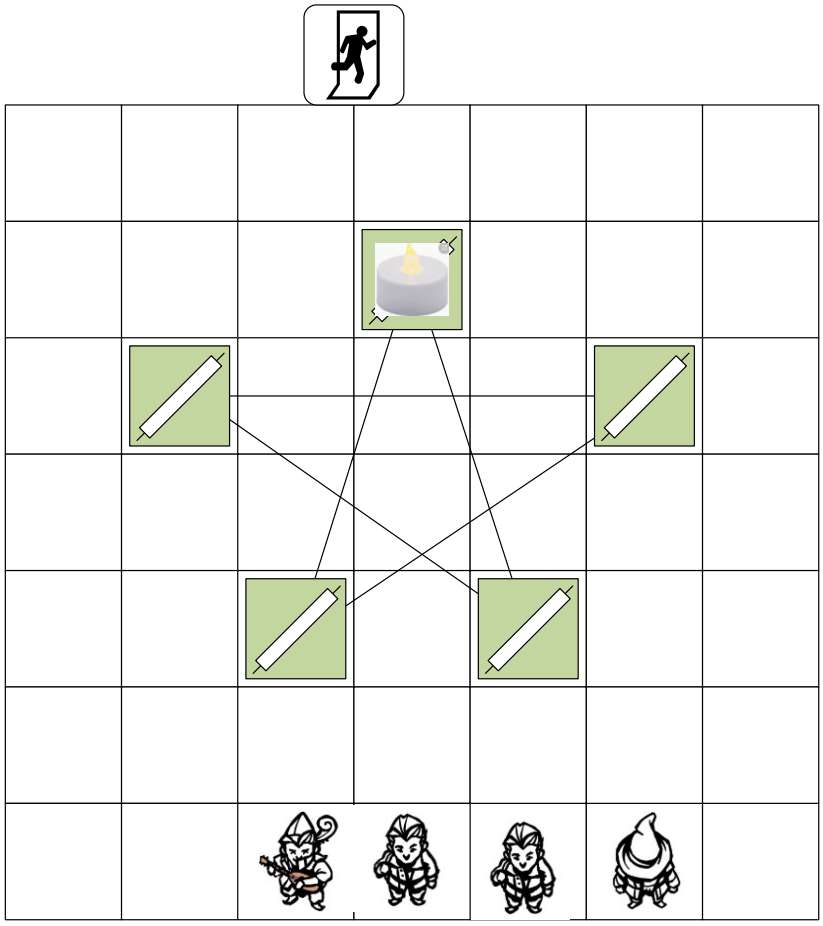
This puzzle only works if there are 4 or less players, as players may trigger the switches if they stand on the points.

Prerequisites:

Dungeon should contain a way to get/find 5 different tea-lights.

Solution:

5 candles should be found and placed on the correct points. When all 5 are in place regular yellow torches should switch off and be replaced with Red LED strip --- and a Demon to fight that appears in the middle of the Pentagram. Upon defeating the demon, regular lights come back on and door should open.



Connecting Up The Electronics

In the absence of smart RGB LED's and a Microcontroller, Two sets of lights are used here. The yellow flickering room lights, and a red strip light. The red strip light should be hidden when not lit. Before the demon appears, the yellow flickering lights will be fine. As soon as it appears, Yellow lights to disappear and red lights should appear.

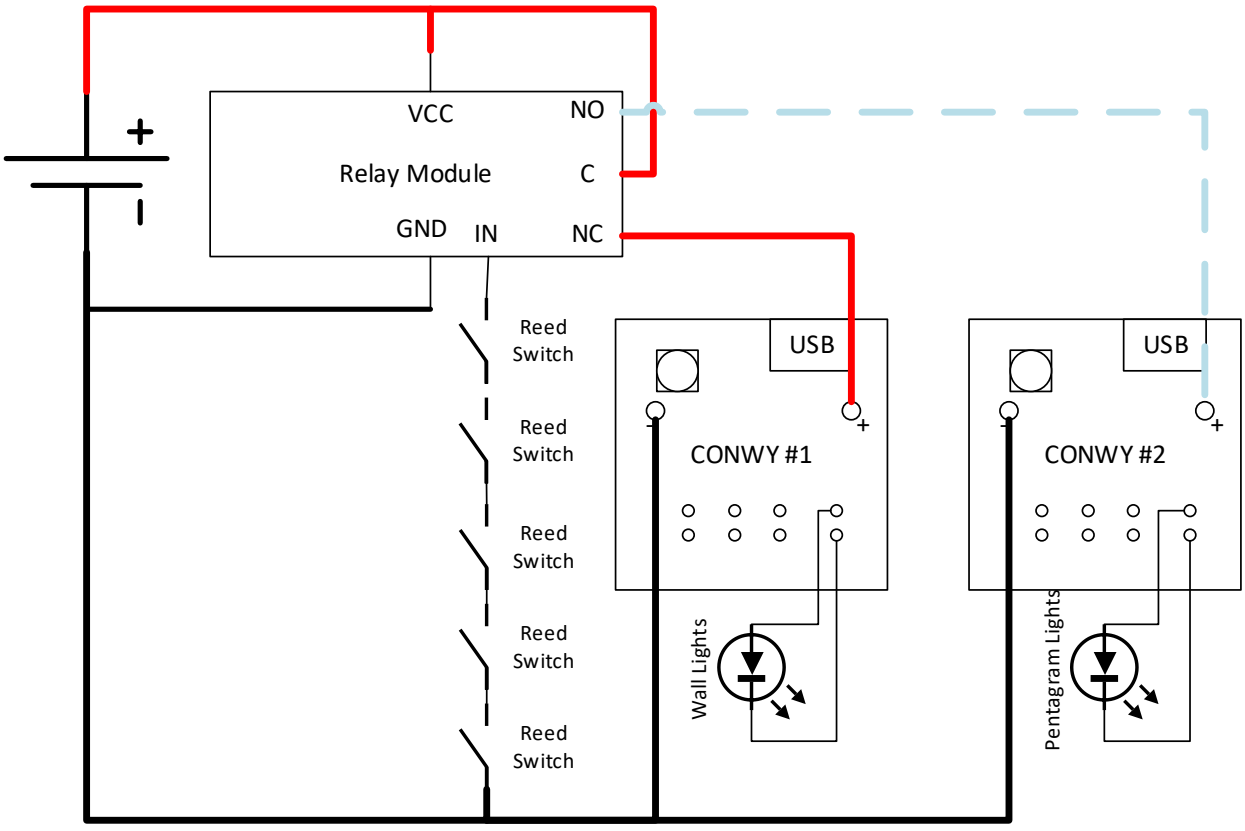
This might easily be handled by an Arduino – but for the sake of mental gymnastics, lets work this one out.

Rules for the lights.

Room lights (mounted on the walls) should be ON normally, but when the Pentagram is complete (all reed switches closed), the lights should switch off.

Pentagram Lights (built into the floor, or shining red from the walls) should switch on, when the room lights are off.

This can be achieved using a $1 Relay module from Amazon. Yes. This could be done with an Arduino etc, but this is a simpler, lower cost, easier to hook up solution!



How the hell does this work?

When less than 5 of the Reed Switches are closed, the power source for Conwy's goes from C to NC. That switches Conwy #1 ON – which is connected to all of your wall lights.

As soon as all the switches close, and pull the IN control signal to GND, then C (power) is connected to the blue NO line instead of the NC line. This switches OFF Conwy #1 and switches ON Conwy #2.

Remember to buy a Relay Module that matches the voltage of your battery. A 3V or 3.3V one should be used with a CR2032, a 5V one should be used with a USB Power Brick.

How to DM this challenge.

A clue should be given, either with a book or a sign in the room that talks of waking the beast that can lead the way out of the dungeon. Consider adding a tea light (with a magnet on its base) in the room – so that players quickly identify what they are looking for.

They need to find 4 more of these tea lights. They should be scattered around the dungeon. It is left as an exercise for the DM to create the appropriate challenges for players to find the other tea lights. (battles, puzzles, mini-quests, convincing NPC's etc)

Once all tea lights are placed in position and the room lights turn off, to be replaced by the red lights, a Monster/Demon should be placed in the middle of the Pentagram and a final battle commence. It's up to the DM to decide the strength and qualities of the demon.

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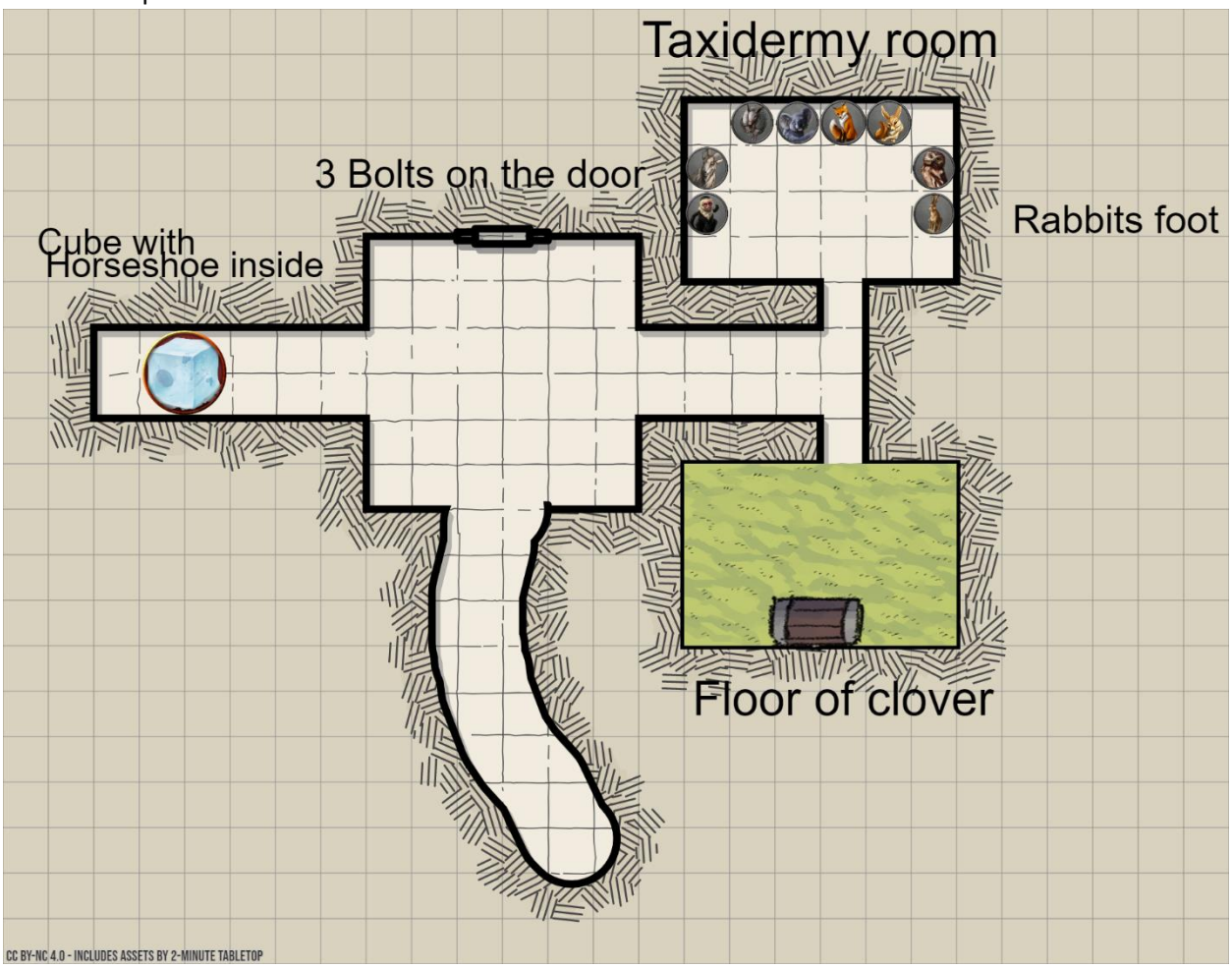
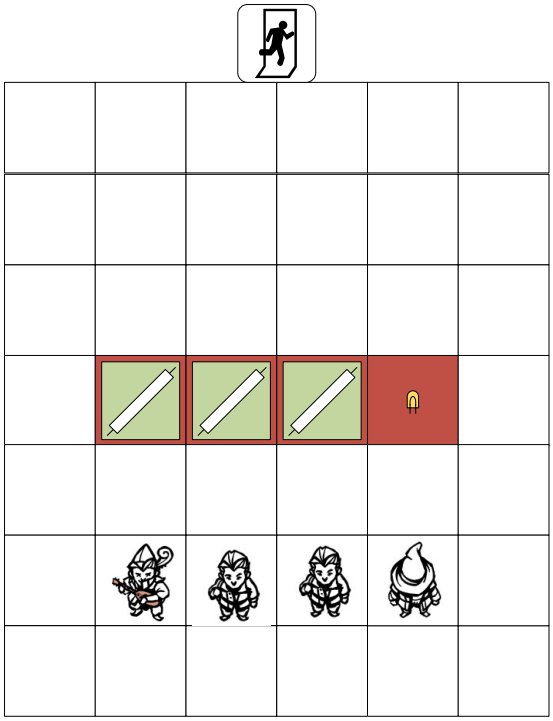
Puzzle Name: Door of the lucky

Playfield: The main room with the door is a 6x6 door with one major locked door that has an area for 3 items to be placed





Prerequisites:

3 other rooms/corridors are required to get the ingredients to open the door. A gelatinous cube (or some other monster) has a lucky horseshoe. A Taxidermy room has multiple animals in it and a room with a floor of clover.

Solution:

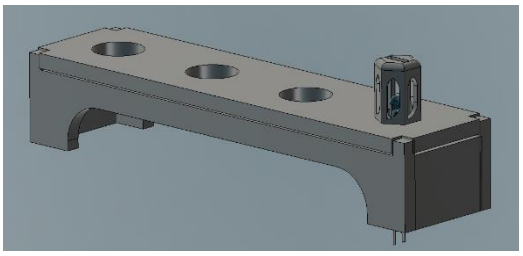
Credit where credit is due. Inspiration for this comes from Wally DM.
https://www.youtube.com/watch?v=pI54T4hNoN0

He has an excellent book that I read from cover to cover that is worth getting if you want to put together some smart puzzles! http://www.wallydm.com/journal-puzzle-encounters/

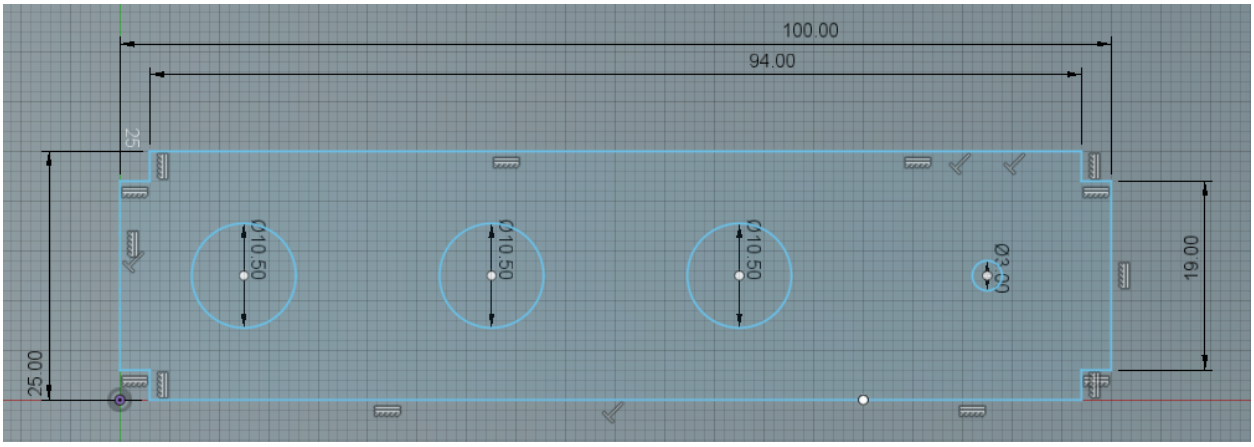
The puzzle requires finding 3 different lucky items and placing them on a table near the door. The table has a lamp on it's end that will light when all 3 lucky items are placed upon it.

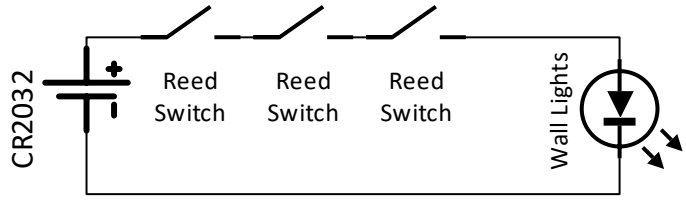
Connecting Up The Electronics

The room doesn't have the electronics in its floor. The Table does! A battery with 3 reed switches connected in series. The table should have three slots to insert the physical items that the players pick up – namely a 4 leaf clover, a lucky horseshoe and a rabbits foot.



The table is 4inches by 1 inch. The first 3" have holes in the surface that fit the magnets I have to have – 10mm diameter. (10.5mm diameter). The final 1" has a gap for an LED to shine through.





Three switches in series ensure that a magnet (item) is placed over each. Care should be taken, this diagram does not contain a current limiting resistor, if it's used with a low cost CR2032 battery. A bettery battery may provide much more current that would blow the LED.

How to DM this challenge.

TBD 😊 – if you read this far, please send me a message on IG or Facebook. 😊

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1/19/2022

Puzzle Name: Example Puzzle

Playfield:

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Prerequisites: Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation

Solution:

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation

Connecting Up The Electronics

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation

How to DM this challenge.

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