

Riddle 3: Smart Mirror, the Neural Network, Little Timmy Robot, and the Door Lock

Once you have entered a right code to the Keypad in the second riddle, Smart Mirror, which is placed on the wall above the desk, will active. and give you instructions for the third riddle. It will also give you a 3-digit number that you can use to open one of the desk drawers. The drawer contains a double-layered wheel with signs and numbers that you will need to use in order to connect loose Neural Network wires correctly. The Neural Network wires are in a wooden box placed on the desk. Once you connect the Neural Network wires correctly, Little Timmy Robot activates and will point to a door hidden behind the bookshelf placed in the back of the escape room. The door is secured with a Door Lock that unlocks when Little Timmy Robot starts pointing at it. Through the door you can get to the second room of the Escape Room.

A teaching about Artificial Intelligence (AI):

- AI uses Neural Networks to process and connect information fed to it.
- The teaching is shown as a text in the Smart Mirror in the following form:

AI uses Neural Networks to process and connect the information fed to it.

Neural Networks work in the same way as human brain, but human brain is way more advanced. In fact, no AI can work without humans.

Do you see the blue Timmy Robot on the table and the Neural Network wires in the box?

Your task is to connect the wires correctly so that Timmy Robot's AI starts working. Connect only the wires on the right, the others are already connected.

Good luck for the task!

The Smart Mirror

The circuit diagrams can be found in code and diagrams folder

The smart mirror is the 3rd riddle of the room and contains a raspberry pi, which has a kiosk mode on bootup. An apache server hosts a webpage which has a finnish voice recognition. The language can be changed pretty easily by replacing the FI to EN in the code.

The circuit is a general raspberry with the webpage code attached in the in the folder, runs in kiosk mode.

Components needed:

1. One raspberry pi with SD card and HDMI display
2. Transparent mirror with frame (we used photoframe)
3. single sided mirror tape
4. Monitor with HDMI
5. USB Mircophone
6. Input from the relay of the keypad to microusb of the raspberry pi

To setup a raspberry pi, in case this one fails, follow the following commands

1. `sudo apt-get update`
2. `sudo apt-get install apache2 -y`
3. This default web page is just an HTML file on the filesystem. It is located at `/var/www/html/`
Copy the contents of the folder in html folder and remove the already existing index.html
4. setup kiosk mode with the webpage <https://localhost> and use this link for kiosk mode
<https://obrienlabs.net/setup-raspberry-pi-kiosk-chromium/>
5. Make sure that the USB mircophone is working
- 56 Also you might need to always allow the microphone in chromium in order to automatically detect the voice

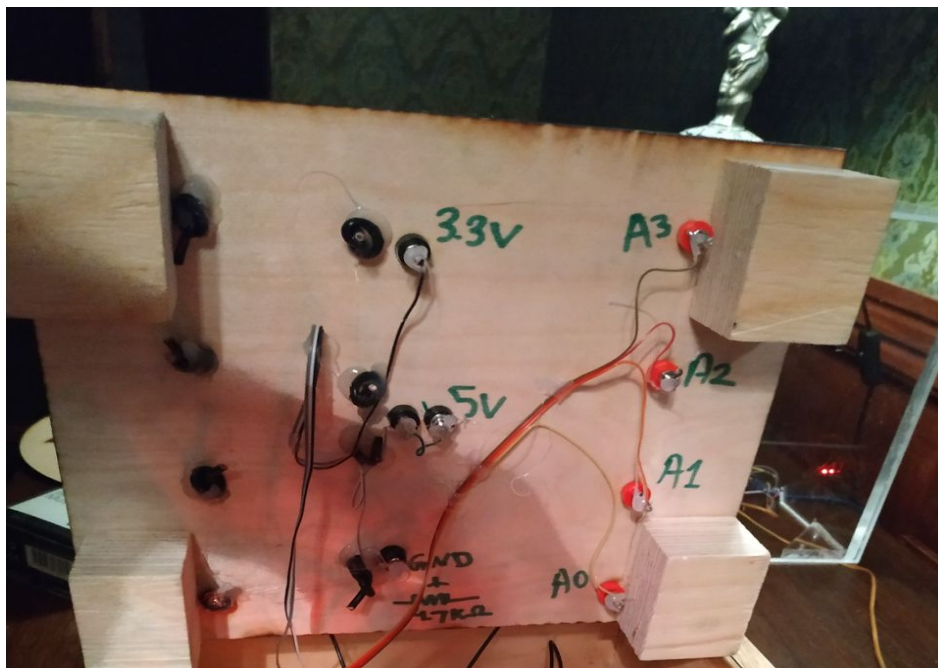
The Neural Network riddle

The circuit diagrams can be found in code and diagrams folder

The neural network riddle has the circuitry working between the middle row as output connected to 3.3V, 5V and ground respectively. As shown in the figure. The last pin i.e. the ground pin has an 4700 ohm resistance in the pin 10 to avoid any short circuit when the connections are made. The pin 7 is connected to next part of the riddle, timmy robot which wakes up when the correct connection is made.

Components used for NN:

1. Arduino UNO
2. RED and GREEN LED
3. Banana connector (male and female)



The connections are as follows

Pin of Arduino	Connection
3	Wire coming from keypad
7	Signal output to Timmy robot
8	Red LED on the Neural network
9	Green LED on the neural network
A0, A1, A2, A3	Connected to right most rows to sense the signals
3,3V	for the middle row 1 st pin of Neural network
5V	for the middle row both 2 nd pins of Neural network
10	Connected to last row with 4.7K ohm resistance

To create your own circuit, follow the circuit diagram and the images as reference. Read the code to get a detailed idea.

Little Timmy Robot

The design and ideas were taken from this source <https://github.com/bhm93/littleTimmy> for the robot. The 3d print files can be found with a few changes in the design folder.

The code has been changed a lot from the original version, image recognition has been removed from the initial version.

The following components were used in building this robot

1. Arduino nano
2. Arduino Nano pin expansion module
3. 2 servo motors for tilt and pan - SG90
4. Active High Buzzer
5. 0.96" OLED Display
6. Blue LED
7. 5V 1A micro usb power supply

The circuit diagrams can be found in code and diagrams folder

The connections have been done in the following way,

Arduino Pins	Connections
3	Servo Tilt motion
9	Servo Pan motion
8	Blue led for mouth
7	Sends signal to door lock circuitry
12	Connected to the buzzer
SCL SDA of expansion board	SCL SDA of one OLED
A4,A5	SCL, SDA of 2 nd OLED
2	Wire coming from neural network circuit

To Replace timmy with its spare,

- 1.remove the 2 wires from neural network from PIN2 and ground.
2. Remove the 2 wires going to the lock in pin 7 and ground.
3. Replace the substitute prototype and connect back the pins removed to pins above pins removed in part 1 and 2.

To build your own design, follow the circuit diagram and look for comments in the code. The 3D print files are located in the folder Design

The Door Lock

When a correct neural network connection is done, Timmy robot sends a signal to the magnetic lock that has been connected to the bookshelf. The bookshelf hides a door behind it through which you can enter another room.

On pressing one of the emergency button or if Timmy sends a signal, the bookshelf door opens for 30 seconds. Also, if the room is not reset after every 30 seconds this lock will start giving warning beeps to reset the room.

The components used to make this door lock

1. 12V 2A power supply for the lock
2. 60 kg electromagnetic door lock
3. Big Push buttons with inbuilt LED for dark room
4. 12V 2A relay
5. Buzzer (active low)
6. Arduino Nano

The circuit diagrams can be found in code and diagrams folder

The connections are according to the circuit diagram and the following table

Arduino Pins	Connection
12	Switch room2 connected between 12 th pin and ground
11	Red LED of room2 button
10	Switch room1 connected between 10 th pin and ground
9	Red LED of room1 button
8	Relay signal pin
7	Signal wire coming to Timmy between pins 7 and GND
3	Buzzer which is active on low signal

When the neural network puzzle is solved, Timmy robot wakes up and point towards the door in the end, during his last loop of the code, it sends a signal to the bookshelf lock circuit, where the Arduino detects the signal and turns off the electromagnetic lock, which is ON by default.

Replacing this part is a bit tricky, if any problem arises, remove the lock power supply and it will make the door open by default.