

## Overview

MITKA is a system to sort automatically different types of materials in trash cans. This is done by placing identifying tags on the materials so that the sensors inside the trash can activate a separator to sort them in their right places.

## Why do we need MITKA

- Easily sort the recyclable materials
- Everybody can easily implement in your home

## Materials needed

For power transmission:

- 2 coils with a wire length of about 5 meters. Coil diameter - 3 mm, number of turns - 30.
- Resistors: 1kOhm
- BJT transistors: 2N3904
- Keyes SRly Relay module circuit
- 3V battery (1.5v \*2)
- LEDs of different colors.

Sensors & Servo Motors (separator) :

- Adafruit APDS9960 Proximity, Light, RGB, and Gesture Sensor
- Servo motor \*2 (depends on the number of different materials)

Microcontroller :

- Arduino
- 9V battery

For display : (optional)

- LEDs of different colors
- 10kOhm potentiometer 306E

- LCD display

Others :

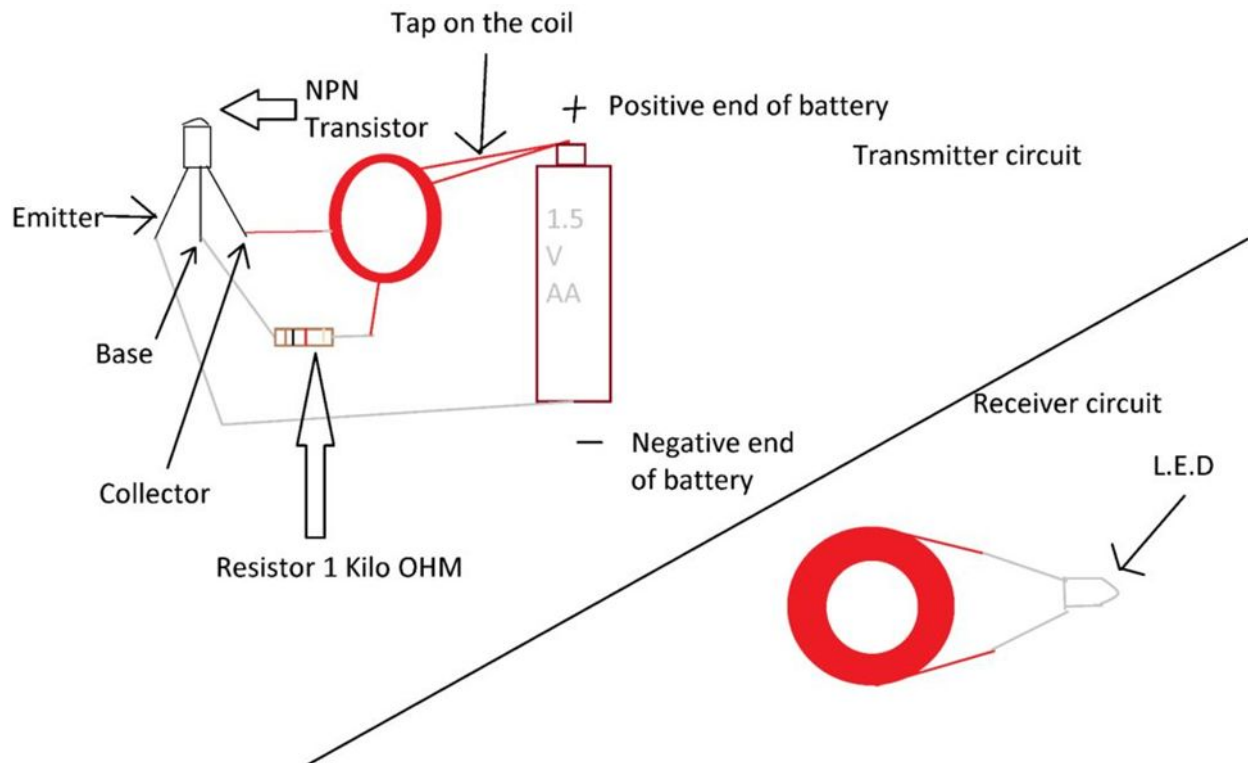
- Wires and breadboard

## HOW DOES IT WORK?

The sensing technology is based on wireless power transmission by using the phenomenon of induction.

Basically, it comprises of two coils. One of them, the transmitter, is used to transmit energy to another one, the receiver, connected in series to an LED. The transmitter circuit is placed on the bottom of the trash can while the receiver circuit is placed in the bottom of the material we want to sort (e.g. plastic bottle, milk carton etc).

In the transmitter coil circuit, a BJT transistor is used to generate an AC current component. This creates a varying magnetic field, which in turn induces a voltage in the receiver coil. This induced voltage lights up the LED which is a tag of the material, whose color is detected by an RGB sensor. With the color detected (using Adafruit APDS9960 Proximity, Light, RGB, and Gesture Sensor), the separator (Servo motor) is able to separate materials accordingly.

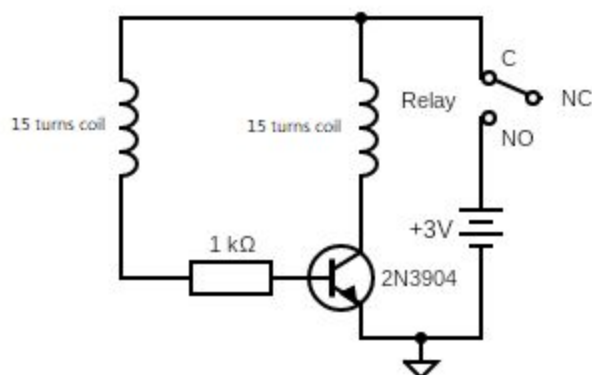


Trash can

Bottle

## Mounting the wireless power transmission circuit

The circuit schematic is shown below.



<https://crcit.net/c/7a0e5284>

### **First part is making the coil**

There two inductor in this circuit. We will make these two inductor into one coil.

In the following step, we will teach you how to make it step by step.

First, we need copper wire. Make it as circles with 15 turns.



Readme **митка**

Second, we will make a tap to connect it to the positive side of battery.



Third, we will make another 15 turns. Then, we have made two inductors using a single wire now.

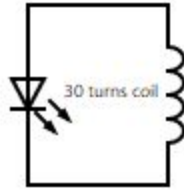


**Second part is connecting all the components in the circuit.**

connect the resistor and the NPN transistor according to the schematic on the bread board. Note that the tap of the coil will be connected to the battery through the relay circuit, so we can switch on the circuit only when needed to extend our battery life.

There are 3 pins in the relay: common (C), normally connected (NC), and normally open (NO). We connect tap of the coil to the C of relay and NO of relay to the positive side of battery.

## Mounting the tags for the materials



<https://circuit.net/c/99e2394c>

In this part, the only thing we need to do is make a 30 turns coil and solder with LED to both extremities. It should look like these coils which we are putting in the bottom of the bottles in the following picture.



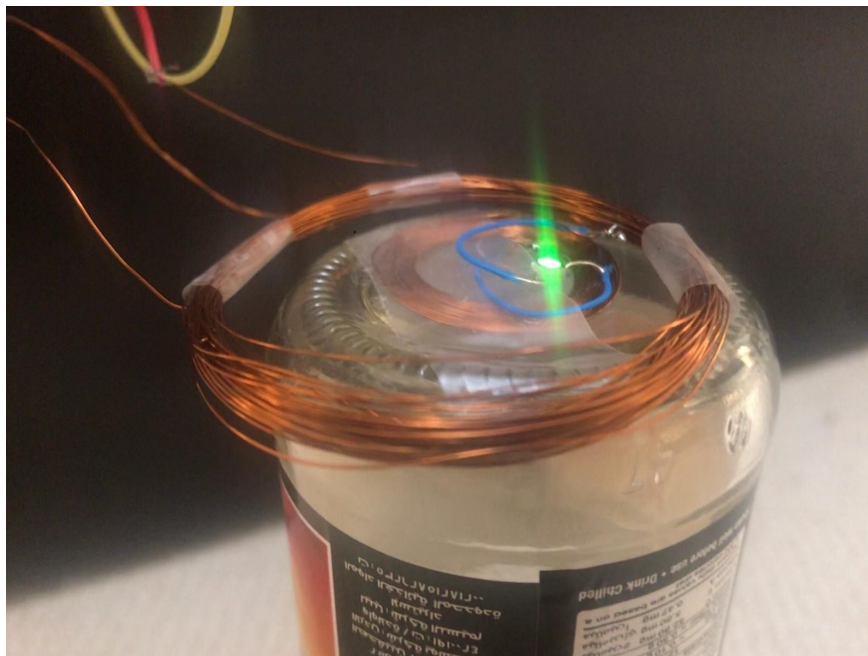


## Testing the wireless transmission system

With both transmission circuit and tags assembled, you are able to test them by placing them close to the other.



Put the tags on the bottles and we can use different LED colors to identify different materials!

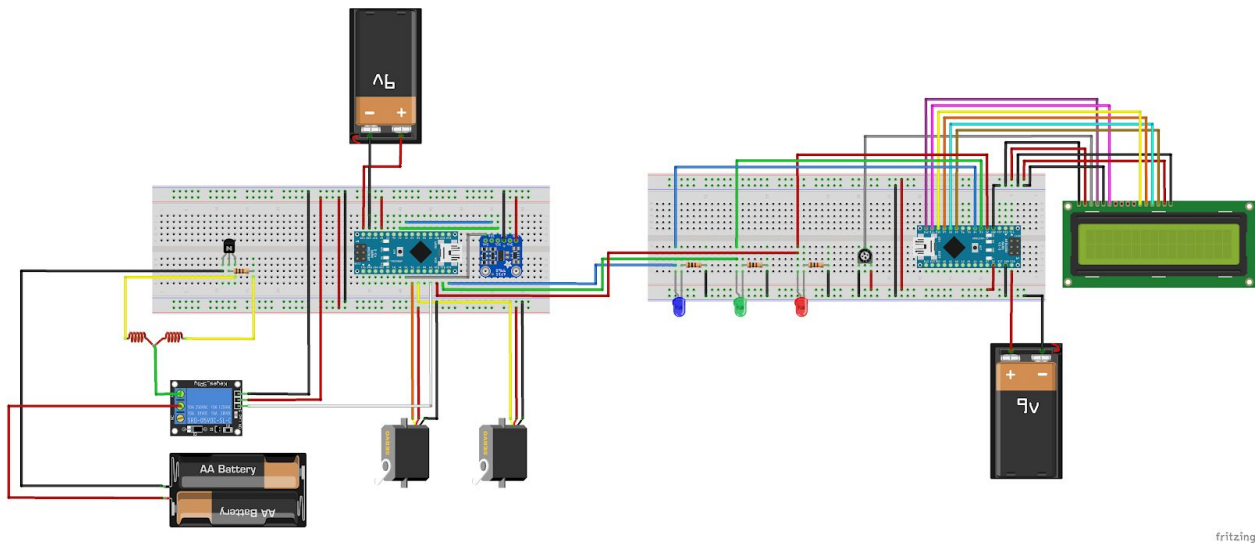




## Microcontroller part

In this example, we are using an Arduino, an easy-to-use microcontroller board, to control our sensors and actuators. First, download the Arduino IDE (integrated development environment) [from the Arduino web site](#). For more information about how to use the IDE please visit [this guide](#).

## Wirings

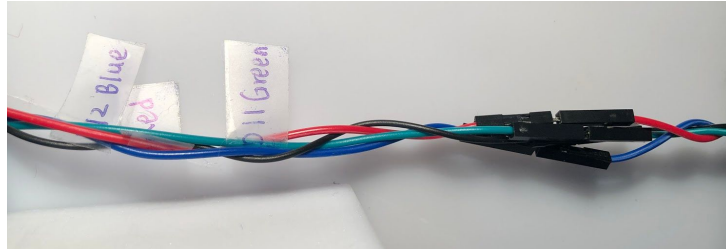


## Placement on the breadboard

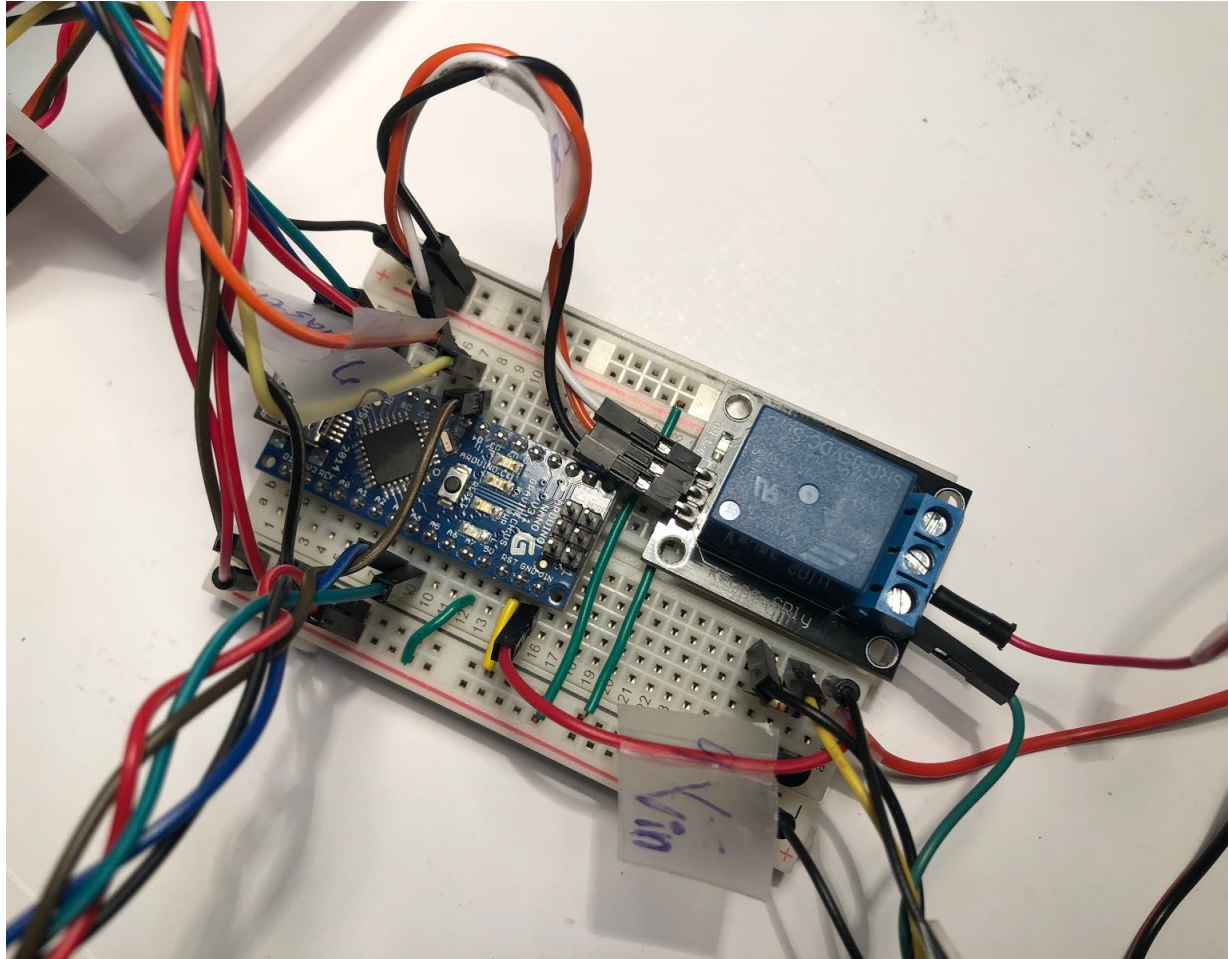
We recommend using colorful jumper wire kits to make easy to connections and keep things organized.

Since we are dealing with many wires at the same time it is wise to assign colors to each connection first to avoid mistakes and do fast troubleshooting in case of any problem.

It is also a good practice to intertwine cables which go to the same sensor/actuator and label it as we can see in this picture.

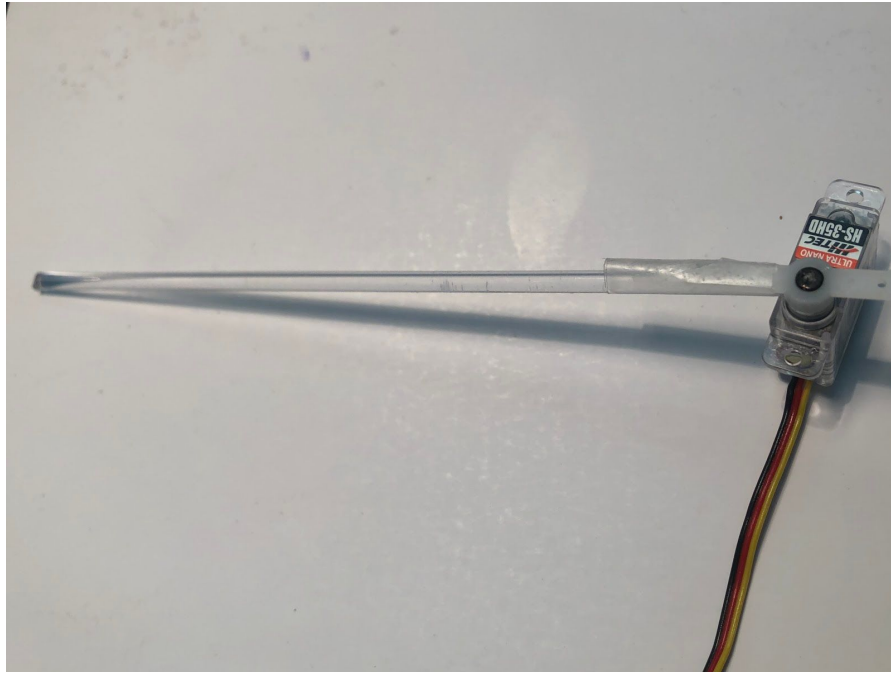


At the end, your breadboard should be looking similar to this.



**Servo Motor propeller**

Make an extension of the servo motor propeller by using by taping any hard and light material with straight shape as the example photo,



## Running the code

Before running the code, you need to install the [Adafruit\\_TCS34725.h](#) library to use the RGB sensor. More information about installing libraries can be found there

<https://learn.adafruit.com/adafruit-all-about-arduino-libraries-install-use>.

Download the code for **miTKa** available in this page (name\_of\_code.c) and open on the Arduino IDE. Connect your Arduino with the USB cable and upload the program to the board.

<https://github.com/teamTHRASHERs/thrasher>

## Testing the circuit

You can now test if your circuit is working now. The video on this github page illustrates how it should work.

<https://github.com/teamTHRASHERs/thrasher>

## Making the trash can

Putting the circuit inside the trash can

## Authors

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**MITKA**