

## Overview

*Phystick* is the perfect project to learn the basics of programming, electronics and physics. But most importantly, it is the best project to have fun.

In the course of the project we will teach you:

- How to create a complete project in C++.
- How to change the blinking frequency of a led.
- To develop an application on arduino NANO, one of the most popular microcontrollers.

This pointer is controlled by an arduino Nano, which activates an stroboscopic light that changes its frequency with a touchscreen or the rotation of the stick.

The main utility of the *Phystick* is to show the aliasing effect; when a light blinks with a frequency equal to the rotation of a spin (like a simple fan), it creates the visual effect of “freezing” the spinning movement.

There are many other experiments that you could try with *Phystick* in your home, like stopping the falling of water, experimenting with the Huygens-Fresnel principle or whatever you can think of.

If you are a teacher, the stick can be used to explain physics theorems in a more enjoyable way.

## Components

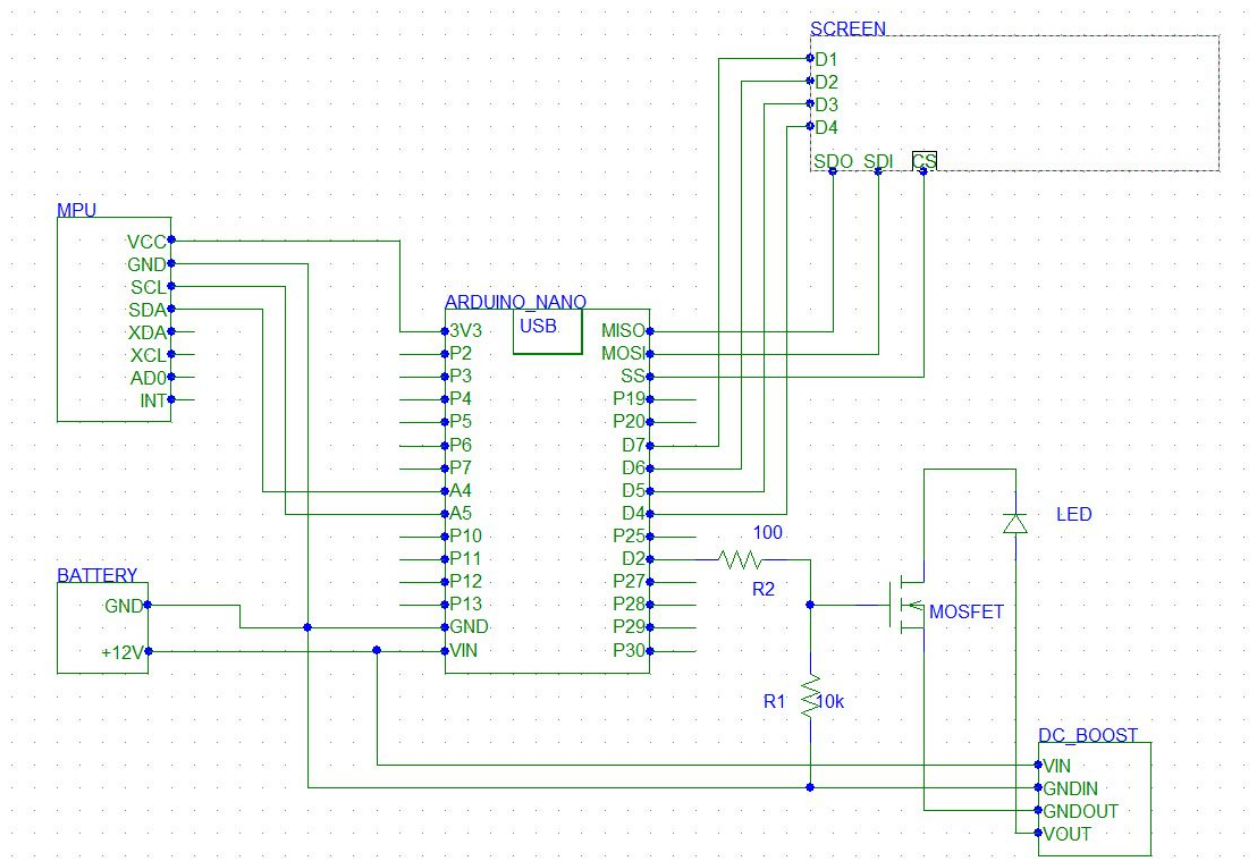
- Arduino Nano
- TFT LCD touchscreen 2.8” IC ILI9341

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- 50W White LED Diode
- MPU6050 module with analog 3-axis gyroscope + 3-axis accelerometer sensors
- 3.7 V 1500mAh LiPo battery
- DC Boost
- Protoboard and wires

## Assembly

You have been given a perfboard and wires, now it's time to have fun, let's solder your Phystick. Here you have the schematics that you need to follow:



## How to use

In order to properly use *Phystick*, we basically need to know two things: how to change our light frequency so that we can adapt it to the frequency (or sub-frequencies) of the spinning movement we are pointing at; and also how to control our LCD touchscreen or our smartphone app.

First, if we want to modulate the light with a higher frequency, we must rotate our *Phystick* to the right side from the starting position (touchscreen upwards). In the same way, if we want to decrease the frequency, we have to rotate the *Phystick* to the left.

With regard to the LCD touchscreen, it's important to remark that *Phystick* has two models available: *Phystick-S* and *Phystick-W*. The difference is that *Phystick-W* includes a WiFi module to replace the LCD screen with a smartphone app.

In both cases, once we power on *Phystick*, we will have a home menu where we can select basic options such as the sensitivity (Hz we increase from the starting frequency depending on the angle of rotation), .... Also, we will be able to see the current frequency our LED is blinking at, so that we are able to know at the same time the frequency of our rotating object and whether we have to increase or decrease the blinking speed.

## FaQ