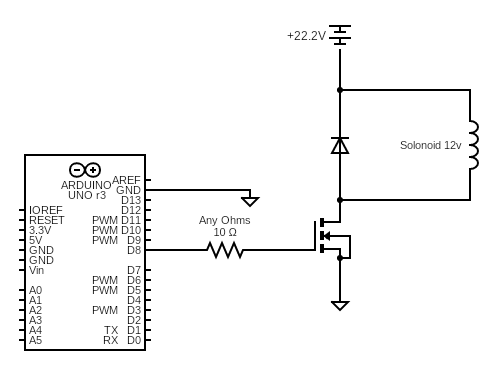
This document will highlight how the kicker V.1 was built.

**Background**

The first kicker is a simple design with a solenoid and the mosfet transistor being the main components of the circuit.

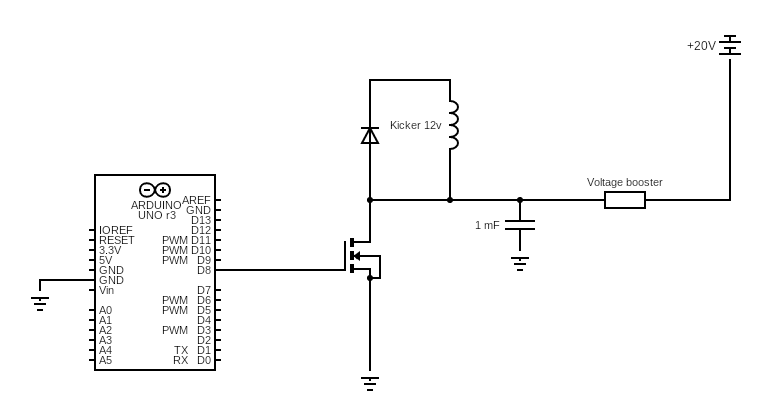
One of the first steps of understanding the circuit is the 3 points of the mosfet, that being the gate, drain and source. The mosfet is the switch that all0wos for the control of electricity to the solenoid. The gate is what controls the voltage going though the source and drain, which require a small voltage to allow for the passing of electricity through the mosfet. One main warning when using the simple circuit is to make sure the mosfet is working and is able to withstand the amount of current being placed. Through the making of this simple circuit the mosfet often got destroyed due to excceding the voltage rating.

The selection of the mosfet is also important, the Gvs is the minimum and maximum voltage the gate needs to activate, in which if your Gvs is too high the gate will not work. A diode is placed parallel to the solenoid to prevent back flow of the current which occurs.



This simple circuits can also be found on youtube by Matt Inglot, whose schematics is practically the same.

A problem faced after the initial design of the circuit was the lack of force generated by the solenoid. To combat this we used a capacitor, in conjunction with a voltage booster to make the solenoid hit harder, the voltage booster increased the voltage of our battery to around 200v to instantly charge the capacitor. When the gate is activated, the capacitor discharges the voltage into the solenoid instantly.

As you can see it's not much different to the previous design, this change also allows us to control the voltage we put into the capacitor therefore, controlling the voltage of solenoid therefore the power of the kicker. 

The design aslo has its short coming as its simple design make it limited, as we need to physically change the voltage booster pin to increase the power of the kicker. This has it limits as when in a game, we would need to be able to change the power of the kick on command. Another major downside is the space that the arduino and voltage booster takes, as we have to account for the space the dribbler takes aswell.

The commmunination between the kicker and the main computer is going to be facilitated via USB cable. The serial protocol for now is also quite simple, as if

**Parts and Building**

If this circuit is being build you would need something to measure the voltage coming form the booster, to ensue it does not exceed the capacitors ratings.

The capacitor for this design can be any value, as long the voltage of the capacitor is not excceded by the booster.

The mosfet for this circuit, would need to be able to hangle the voltage your want to push though the solenoid, and make sure the gound to sources volaget of the chapictor is not too high, if the minimum Gsv is not met the gate will not open, and if it exceeded it the mosfoet will get damaged (no mosfets were harmed).

Another thing is that this circuit was done on a breadboard so it will be on a perf board moving forward,

**Future Improvemnts**

For now one of the unknowns about the kicker is the capacitor and the relationship between its voltage and microfared rating, we will see if a capicatpor with a lower voltage but a higher micro Fared rating be able to produce more kick power, this will potentially allow us to remove the booster saving us alot of realastate.

The kicker will aslo implement a reusable fuse to make it alot safer.

We are also looking into a h bridge of the kicker .