

## Instructions for Operation:

The below instructions are to be provided to the group's sponsor, Dataspeed Inc, so that they can operate the system for their own tests and modifications.

Power to the system is delivered by the battery and is controlled by two switches: A switch control power to the pump on the North side of the cart (towards the camera) and another switch enables power to the Jetson Orin Nano, which is found on the West side of the cart (closer to the handlebars). Once the Jetson receives power, the fan on top of the computer should start spinning as it boots. One important thing to note is that the display settings on the Jetson Orin Nano were modified to allow a completely headless remote connection to a laptop. This may result in the user experiencing a lack of display output if they are using an HDMI converter in the DisplayPort input on the computer. If the user plans on using a DisplayPort cable for a DisplayPort output to a monitor, then they should be able to use the computer as expected. If this modification to the system settings is not preferred, it can be restored by reflashing the Jetson with a new Linux SD card image. TeamViewer is also downloaded on the Jetson Orin Nano and opens on startup if the user would like to take advantage of a remote desktop session without ever plugging in a display, as was done for the demonstration of this project.

If the user encounters any prompt for a password, they can use the password that was created below:  
*"spray4weed"*

Once the user is logged in, they can run the program by executing VisualStudio Code and navigating to the `~/jetson-inference2/jetson-inference/python/kill-weed/` folder and running the program `"detect2GPIO.py"`. This can also be done alternatively by navigating to the same folder in a terminal and running the `"python3"` command with the name of the script mentioned previously. The program will not run unless the camera and the Elegoo Uno R3 microcontroller are connected correctly. The Elegoo Uno R3 should already contain the arduino code used for the project, but if it must be reprogrammed, the Arduino IDE is installed on the computer for this purpose. If the user decides to use a new USB port for the device's connection to the microcontroller, then the python program may need to change the serial port that it is reading (either `/dev/ttyACM0` or `/dev/ttyACM1`). The Jetson Orin Nano should be shut down before the switch connecting it to battery power is turned off.

The black box that the Jetson Orin Nano rests on covers and protects many components of the electrical subsystem. The box is not secured to the cart in any way. It simply rests on the plywood base and can be easily removed, being mindful of the wiring. If the user encounters any issue with a solenoid valve not spraying when they are very confident that it should have, it could be the result of a component on the breadboard getting unplugged. Most, but not all, of the components hidden under this black box are glued down or secured in another fashion. Power is distributed to each of the components via the DIN rail; these connections may also be checked in the event a valve is not fired when it should be. Additionally, the small black boxes within the larger black box house the MOSFET drivers. These boxes simply snap open and close. The fluid system includes a valve that can switch the hose between an open or closed loop. The pressure is upheld and the full system operation is best when the valve is closed (handle is perpendicular to the hose).

A link to GitHub with project code:

<https://github.com/aidangallagher2024/my-git-repo/blob/main/kill-weed/detect2GPIO.py>