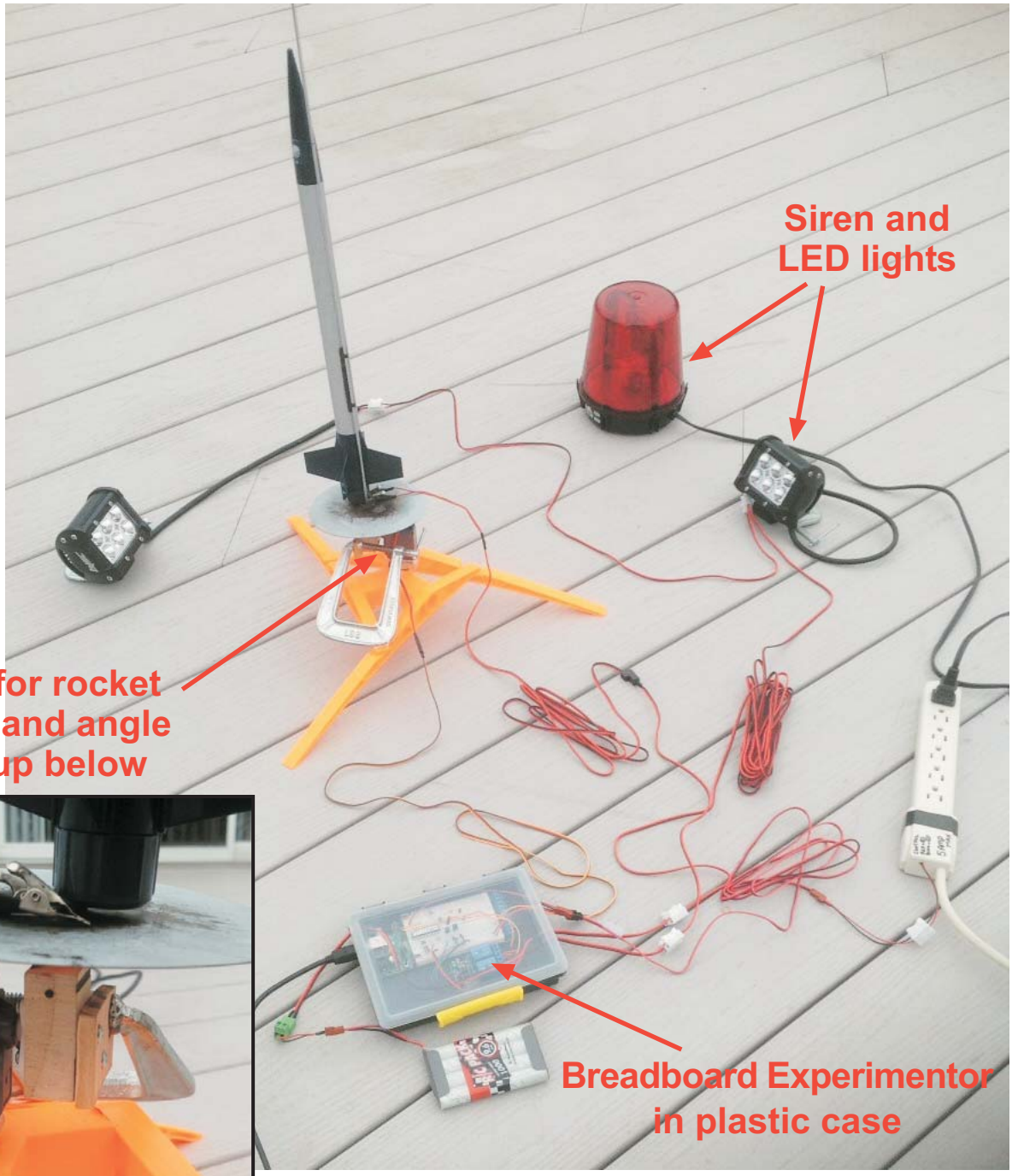
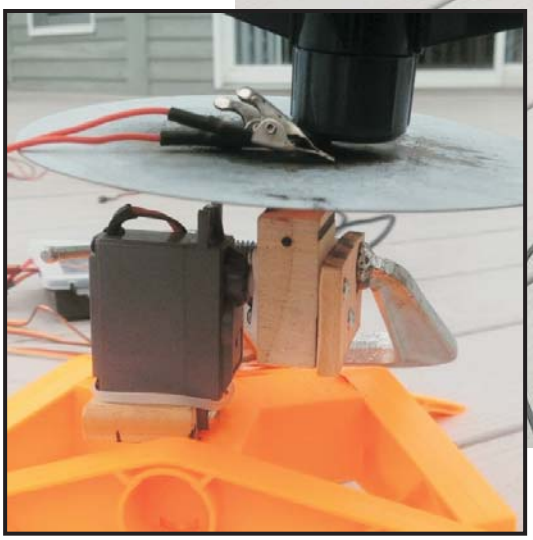
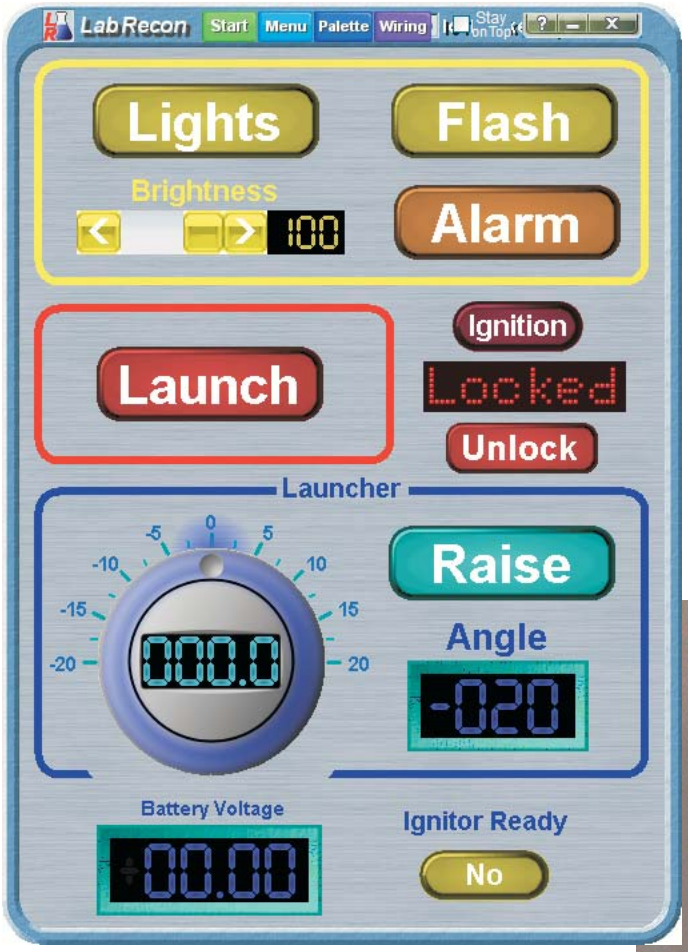
A LabRecon Breadboard Experimentor and software was used to implement an Internet controlled rocket launcher as shown below.

In the below photo a model rocket has been substitutued for the ICBM normally controlled to allow the Breadboard Experimentor to be seen.





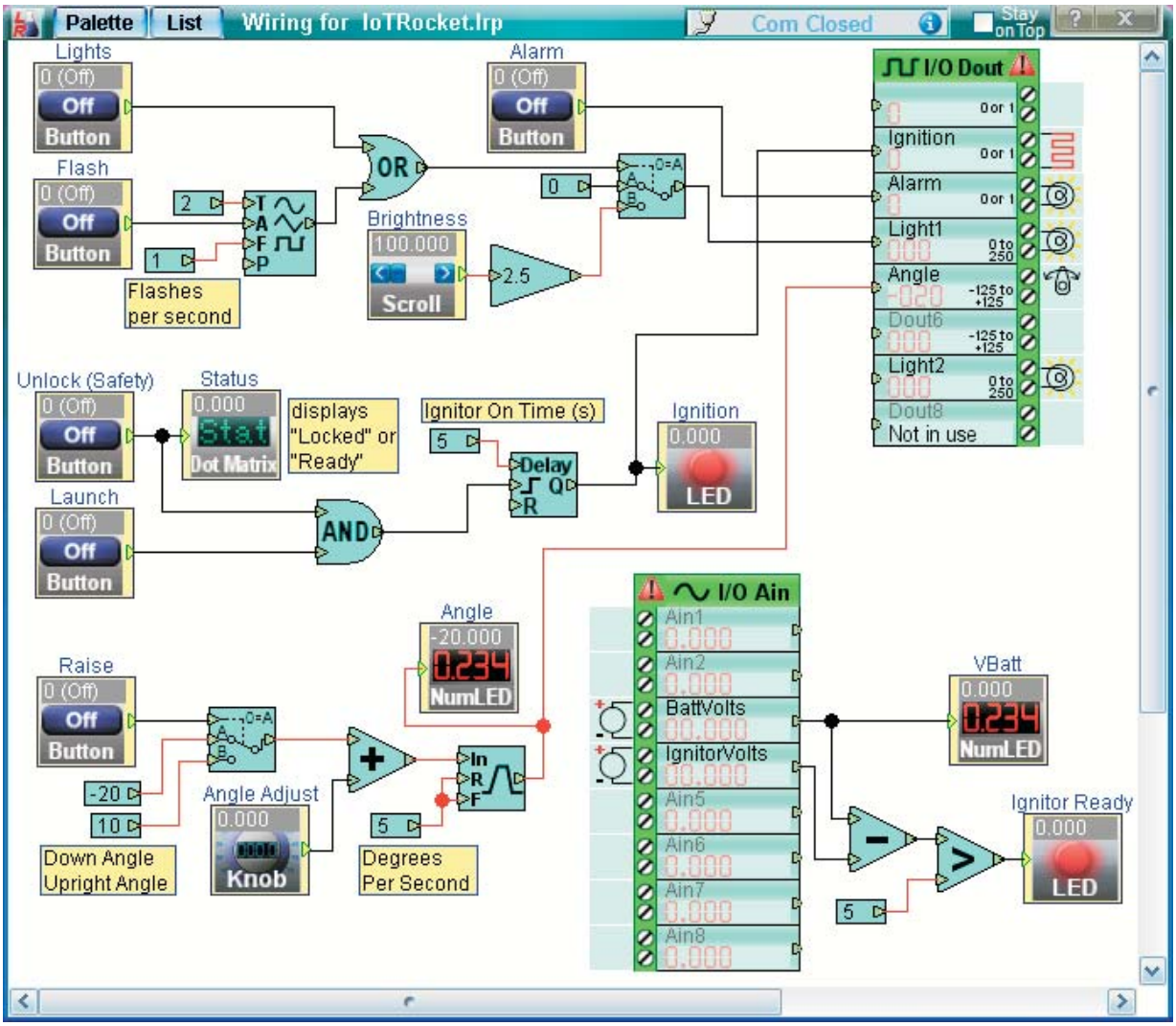
The full implementation is discussed on the following pages.



LabRecon's **drag-and-drop Panel builder** was used to create the Web page interface.

Below is the Web page on an iPhone. The browser on any smart phone, tablet or computer can open the Web page to operate the launch site.

LabRecon's drag-and-drop Wiring was used to implement the interface functionality. The various sections are discussed below.



Lighting:

The "Lights" button will turn on the LEDs continuously and the "Flash" button will cause the LEDs to flash on and off according to the 'Flashes per Second" constant. If a power MOSFET is used for the LEDs a brightness other than 100% can be used.

The lighting section is wired to a PWM channel of the Dout block to control one of the LabRecon chip's PWM outputs.

Ignition/Launch:

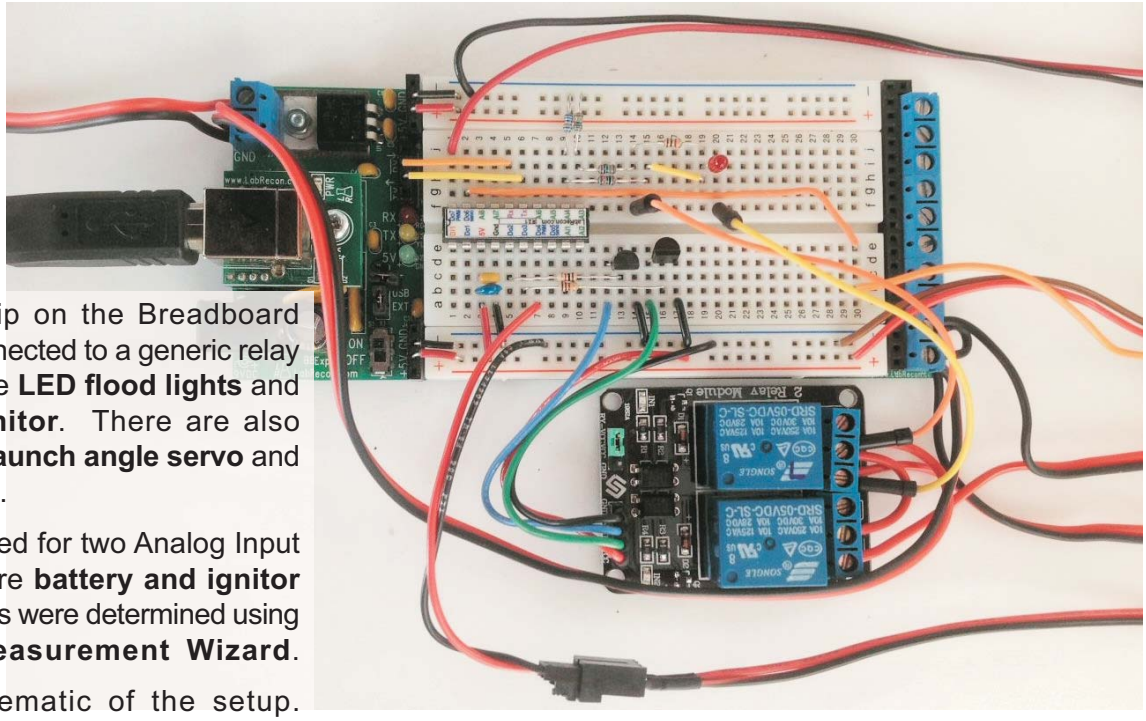
The "Unlock" button, which will invoke a "Ready" message on the Panel, must be active before the "Launch" button will cause a launch. A quick press may not allow the ignitor to heat up adequately so a Delay/Pulse is used to maintain power for 5 continuous seconds.

Launch angle:

The "Raise" button invokes the raising of the rocket from its rest position to vertical. The "Angle Adjust" knob controls the final launch angle. A slew rate function slows the movement of the servo. The output of this section is wired to a Servo channel of the Dout block to control one fo the LabRecon chip's Servo outputs.

Battery/Ignitor voltages:

LabRecon's **Measurement Wizard** was used to configure two channels to read 0 to 15V for the 9.6V battery pack and ignitor continuity circuit. This circuit consists of an LED (anode connected to 9.6V) in series with a 1K resistor and ignitor. If the ignitor is not properly connected the LED and resistor will pull the ignitor output wire to 9.6V. A voltage near 0 indicates that the ignitor is ready.



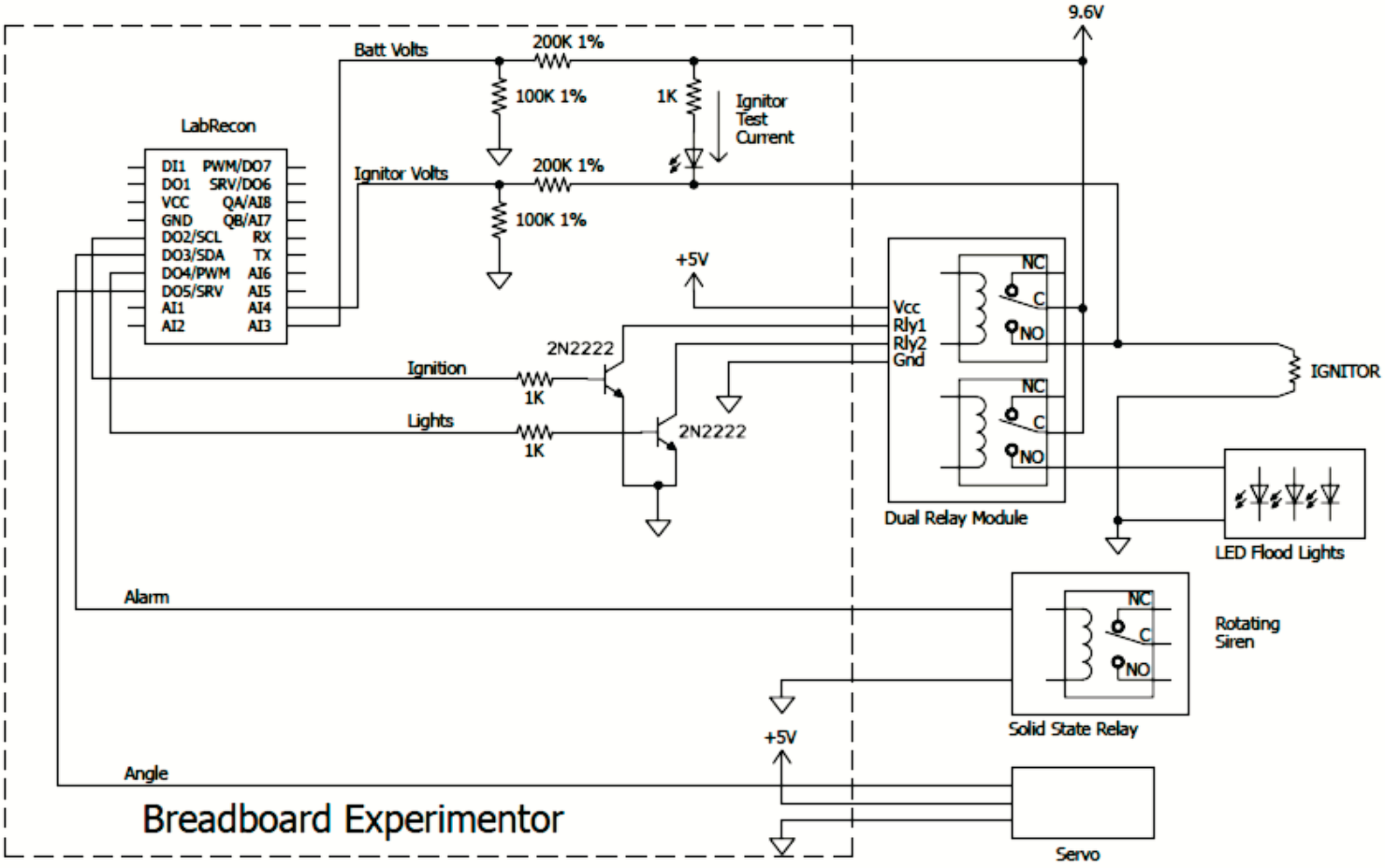
The LabRecon chip on the Breadboard Experimentor is connected to a generic relay module to power the **LED flood lights** and **rocket engine ignitor**. There are also connections to the **launch angle servo** and **rotating siren light**.

Resistors were added for two Analog Input channels to measure **battery and ignitor voltage**. Their values were determined using the LabRecon **Measurement Wizard**.

Below is the schematic of the setup.

It should be noted that Estes ignitors can have a low resistance of around 1 ohm and thus can draw current of several amperes so wires of at least 20 gauge should be used.

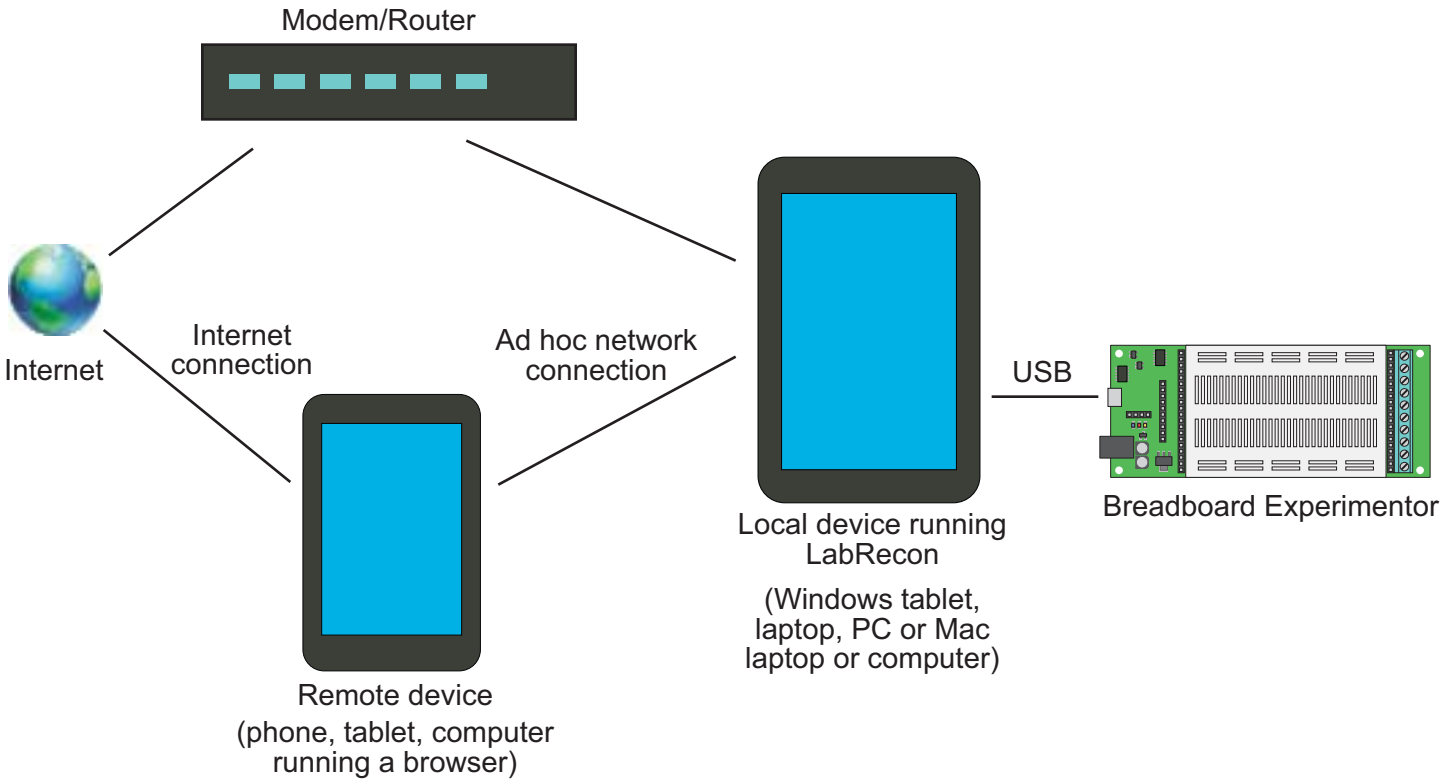
One relay handles the ignitor current and the other handled the LED flood light current. If LED dimming is desired a MOSFET can be used instead.



Here LabRecon is running the rocket launch project on a $100 WInBook TW700 Windows tablet, which is connected to the Breadboard Experimentor.

The LabRecon Server is also running in the upper left corner to serve the generated Web page. A simple batch file script was run to allow the tablet to create an ad hoc network, wherein it broadcasts a user defined SSID for nearby phones or tablets to connect to. Alternatively, the Web page can be accessed over the Internet by configuring port forwarding on the local wireless router. The launcher can also be controlled directly from the tablet.

A Mac laptop or computer running OS X can also be used to run LabRecon to serve the Web page.



Additional Documents at www.LabRecon.com/Documents

LabRecon - Getting Started with the IoT (Internet of Things).pdf
LabRecon - Getting Started with the Measurement Wizard.pdf
LabRecon - Getting Started with Simulations.pdf
LabRecon - Getting Started with Robotics.pdf
LabRecon - Chip Datasheet (rev 2.0).pdf
LabRecon - MiniDAQ Datasheet (rev1.0).pdf
LabRecon - Chip Quick Start Sheet.pdf
LabRecon - Breadboard Experimenter (rev0).pdf
LabRecon - Photovoltaics.pdf
LabRecon - Reflow Oven PID Control.pdf
LabRecon - Measurement Configuration.pdf

Instructional Videos

www.LabRecon.com/videos

Revisions to this Document

Rev 0 Initial release

Support

www.LabRecon.com/help
support@LabRecon.com

Contact

info@LabRecon.com

Recon Industrial Controls Corp.
9 East Sheffield Ave.
Englewood, NJ 07631
201-894-0800

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