World as Witness: Power of One Device

Overview
Domestic violence is a big problem in the United States. The goal of the Power of One Device is to cut down its prevalence. This is to be done by creating a small device that allows for the seamless collection and transmission of photographic evidence.

Objectives
The objective was to design a device that will take a digital picture, attach accurate location coordinates, and then transmit this combined data payload wirelessly to a local law enforcement agency. This should be completed within one minute and with one push of a button. The device shall be small enough to fit into a pocket or worn around the neck.

Approach
- The team began by conceptualizing a high-level design of the device.
- Various components were then researched and selected to fulfil all project requirements.
- The components selected include a JPEG color camera, an integrated GSM/GPS module, and a microcontroller.
- Simple microcontroller code was written in C to begin initial testing of each individual component.
- Specified serial commands were sent to the camera to test the transmitted digital picture data.
- The GPS was connected to the computer to showcase the successful outcome of accurate coordinates.
- Power requirements for all of the components were collected and then the team designed the power circuit utilizing voltage regulators to get the correct voltage to each component.
- A prototyping board was purchased and the power circuit was constructed and soldered by hand.
- By use of a digital multi-meter, each output was repeatedly tested to ensure proper and safe power output.
- The power circuit was then connected to the microcontroller and camera to ensure that all devices were capable of being powered by the finished power circuit.
- A plastic circuit case was purchased and physically modified so that buttons and switches could be attached through the side and appropriate circuitry was constructed to allow user input to trigger the device.

Outcomes
- The device, while not complete, shows the feasibility of this design.
- The JPEG camera component can be successfully triggered by the user to return picture data to the microcontroller.
- Accurate GPS coordinates were achieved by the integrated GPS/GSM module.
- The GSM module was able to successfully connect to the AT&T network and was able to ping various servers as requested.
- Future teams can build off of the component selection, microcontroller code, and power/control circuit design to complete and optimize the device.