**Senior Design**

For traffic control:

[Senior Design Projects for Electrical Engineering Students (skyfilabs.com)](https://www.skyfilabs.com/blog/good-senior-design-projects-for-electrical-engineering-students)

For solar panel orientation:

[Intro to Solar Orientation [Solar Schoolhouse] - YouTube](https://www.youtube.com/watch?v=OR8EQ0DWpPw)

**Smart Intersection:**

* Solar automated Traffic Controller system
  + Autonomous traffic control system that directs traffic in real time
* Using Arduino
  + Program system to change lights automatically.
* IR sensors
  + Detect traffic density.
* Powered by solar energy.
  + Solar tracking panel with ups system
  + Operates intersection and charges back up UPS system while in operation.
  + Land power back up if system is low on power or faults.
    - Transformer
    - Rectifier
  + Automated switching between power sources
* Solar panel mounting location.
  + A suspended rectangular shaped structure will be utilized in the middle of the intersection with the solar panels mounted on the structure.
* Grid power backup system
  + Includes a rectifying and transformer component.
* Streetlights
  + Controlled by photocell.
  + Use 3D printer.

**Problem:**

* Wait times and traffic build up in Odessa/Midland area due to outdated traffic systems and growing population.
* Nighttime wait times are similar to daytime wait times.
* Creates long wait times and dangerous situations because people run red lights and disobey traffic laws.
* Strain on power grid consumption
* Lack of road lighting

**Inputs List:**

* IR sensors inputs for traffic Density.
  + 3 vehicle positions per lane.
* Solar direction input
  + for solar panel orientation
* Solar intensity input
  + for streetlights and traffic lights
* Solar panel
  + system operation okay
  + fault
* Real Time Clock
* UPS system
  + system operation okay
  + fault

**Outputs List:**

* Traffic lights
* Streetlights
* Solar tracker
* Operate using solar panel.
* Operate using UPS system.

**Required Materials:**

* 2x20 IR-LED Sensors
* Red, Blue, Yellow LEDs 1x20?
* White/Light Yellow LEDs 1x10?
* Arduino
* Photocells
* Servomotor
* Lighting poles
  + <https://www.thingiverse.com/thing:1341507>
  + <https://www.thingiverse.com/thing:2220722>

Needs Statement

Due to increasing population and economic activity on road vehicular traffic in the Permian Basin is increasing both during