Solution 1: Smart Street Light System based AIOT (SSLS)

* Overview:

Enormous electric energy is consumed by the street lights, which are automatically turn on when it becomes dark and automatically turn off when it becomes bright. Even if there are no people or cars, the street lights turn on. This is the huge waste of energy.

ssls proposed solution to using solar energy to saving energy and apply the AI algorithm to adjust the light system to operate adaptively.

* Target:
  + Using renewable energy: building lighting systems that rely entirely on solar energy
  + Reducing energy consumption: Apply AI / ML / DL algorithms to make the system smarter, self-adjusting brightness level to suit conditions such as traffic flow, energy level now available.
  + Reduce maintenance time: By using sensors to quickly and accurately identify broken lights, then send notices to technicians for timely treatment.
* Architecture

send data to include light sensor value, battery level to the gateway via Lora. After the gateway continues to forward this data to the edge server to handle. This data will be sent to the webserver to save and retrain the model.

In the gateway running AI model to give control command. Control command is the percentage of light bright. This information will be sent to ESP32 on the street light.

* Implementation:
  + Predict sola radiation -> predict power obtained by solar panel
  + Predict traffic flow => give the schedule of brightness level by the time
* Solar radiation prediction: using input of weather condition using LSTM model to train model.
* Power obtained prediction: base on data of power and radiation in history to build model. After that when give radionation as input, we can get power obtaint predict value
* Traffic flow prediction: using data of traffic flow and using LSTM model to build model.
* Finally, build model using powed obtained predict value and traffic flow prediction value to build model for adjust light brightness.