

AUTOMATED MINIGRID DESIGN TOOL - VIP

```

continue

elif self.distances[gate_idx, node_idx] == 0:
    continue

elif self.distances[gate_idx, node_idx] < min_distance:

    if self.connections[gate_idx, node_idx] == 0:
        min_distance = self.distances[gate_idx, node_idx]
        temp_best_node_idx = node_idx
        temp_best_gate_idx = gate_idx

tradeoff = self.distances[gate_idx, 0] - min_distance

if tradeoff > 0 and tradeoff > best_tradeoff:
    best_tradeoff = tradeoff
    best_gate_idx = temp_best_gate_idx
    best_node_idx = temp_best_node_idx

if best_gate_idx == None or best_node_idx == None: # no new candidates
    return False, False
    
```



What?

- Design and write an **algorithm** that improves minigrid designs to reduce material costs by **20%+**
- Create **user interface** to increase value and access to tool

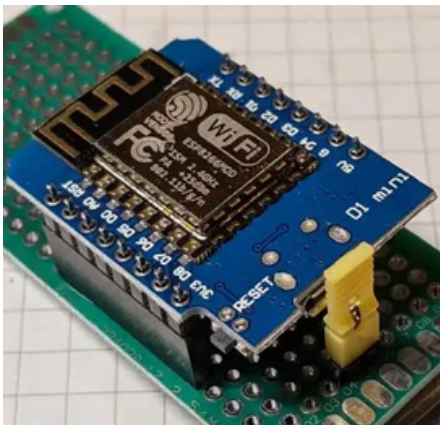
How?

- Used **Python** and **Flask** to create interactive design tool
- Applied test against real minigrid to validate process
- Used **K-means clustering** algorithm to group customers for design process

Results

- The tool fulfilled its purpose by reducing cable material costs by **22%** of physical case studies, such as the Malawhi project above.

INDUSTRIAL DOOR MANAGEMENT SYSTEM - STAR REFRIGERATION



```

WiFi.begin(ssid, password);
Serial.println("Connecting");
while(WiFi.status() != WL_CONNECTED) {
    delay(500);
    Serial.print(".");
}
Serial.println("");
Serial.print("Connected to WiFi network with IP Address: ");
Serial.println(WiFi.localIP());

Serial.println("Timer set to 10 seconds (timerDelay variable),

// Random seed is a number used to initialize a pseudorandom number generator
randomSeed(analogRead(0));

void loop() {
    //Send an HTTP POST request every 60 seconds
    if ((millis() - lastTime) > timerDelay) {
        //Check WiFi connection status
        if(WiFi.status()== WL_CONNECTED){
            WiFiClient client;
            HTTPClient http;
        }
    }
}
    
```



What?

- Design system using **open energy monitor** to notify users when refrigerator door is open, meaning loss of energy.
- increase door management.
- Reduce energy consumption of industrial refrigerators.

How?

- Used **ESP8266** with **Wifi module** microcontroller to process light data.
- Used **SolidWorks** to Design casing to withstand extreme temperatures.
- Used **Arduino IDE** to design and write C scripts that program module

Results

- Human operator error was reduced by **14%**
- Implemented light sensing to reduce energy consumption of industrial fridges.