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Artificial intelligent platform to increase the performance of energy production of solar panels

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Outline

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Introduction

We use artificial intelligence neural network (ANN) to solve the dust problem on the solar cell surface by depending on the factors that reduce the performance of the solar cell .



Problem statement

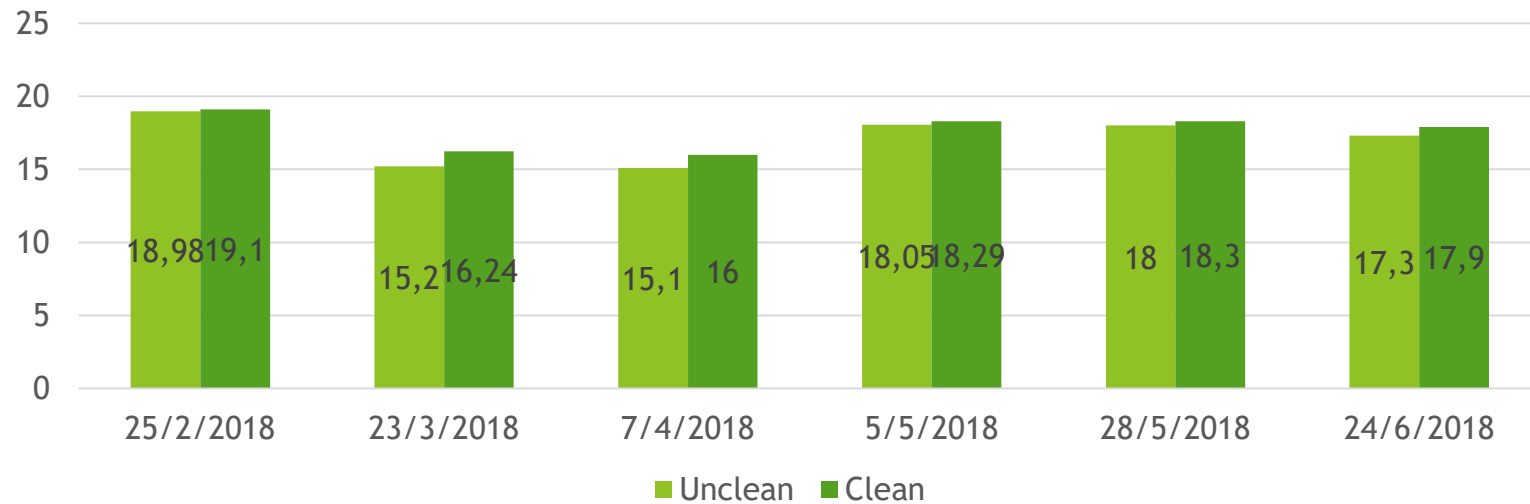
The main problem to reduce the performance of the solar cell is dust



Dust Test

This chart shows the effect of the dust on Voltage

Open Circuit voltage Curve of clean and unclean Solar Panel



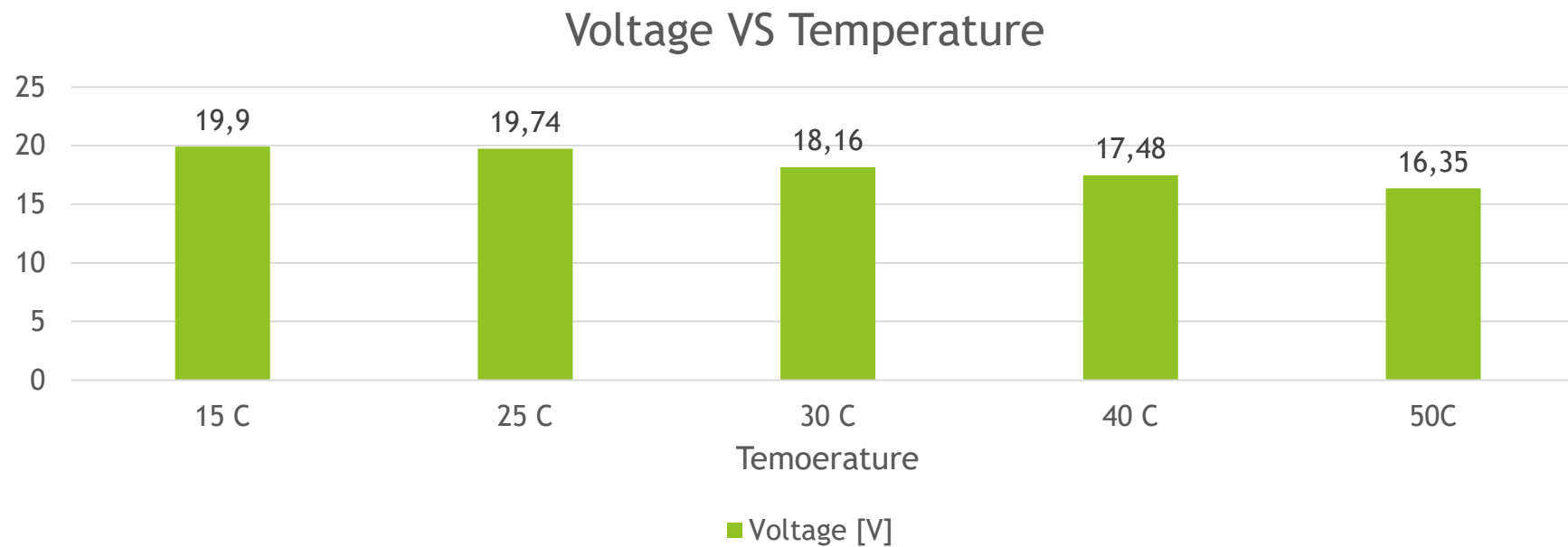
The factors effect on Solar cell

- ▶ Temperature
- ▶ Humidity
- ▶ Weather



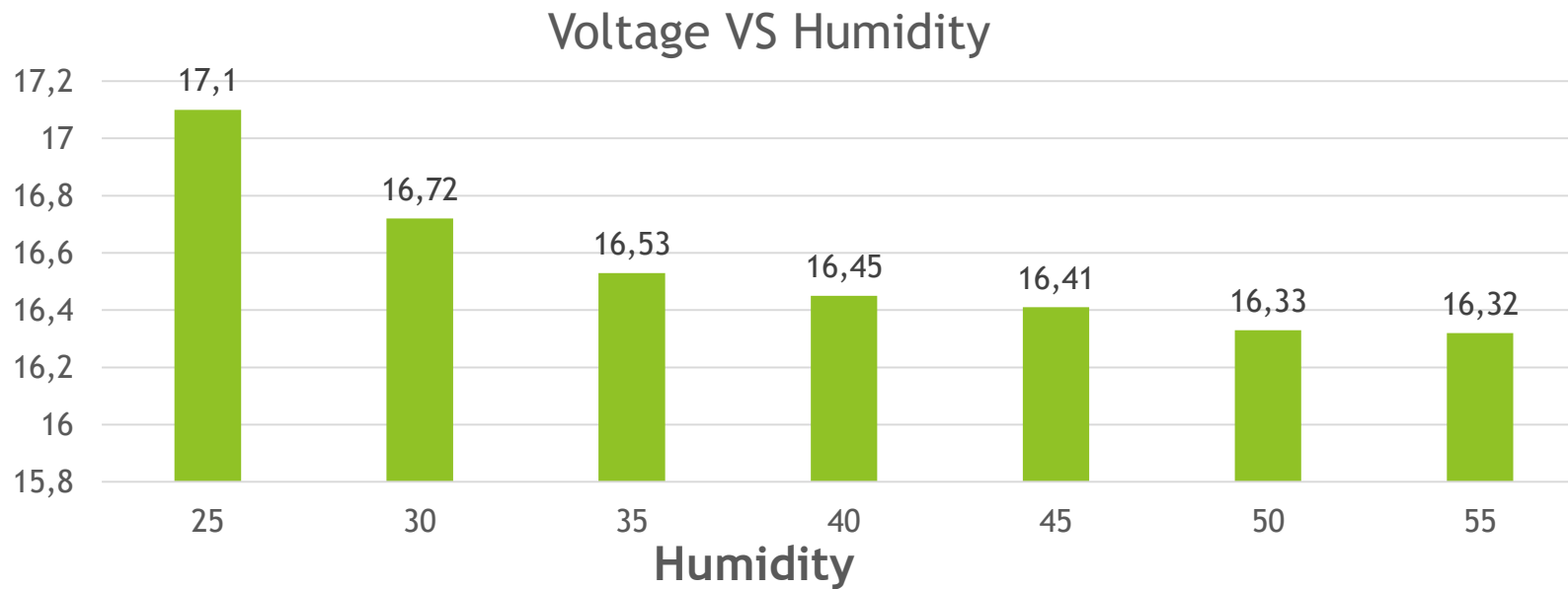
Temperature

This chart shows the effect of the Temperature on Voltage



Humidity

This chart shows the effect of the Humidity on Voltage



Weather

This table shows the effect of the weather on solar cell

| Day | Monocrystalline | Multi crystalline |
|------------|-----------------|-------------------|
| Sunny Day | Higher power | Higher power |
| Cloudy Day | Low power | Low power |

Weather forecasting system

► Weather



Sunny
Good



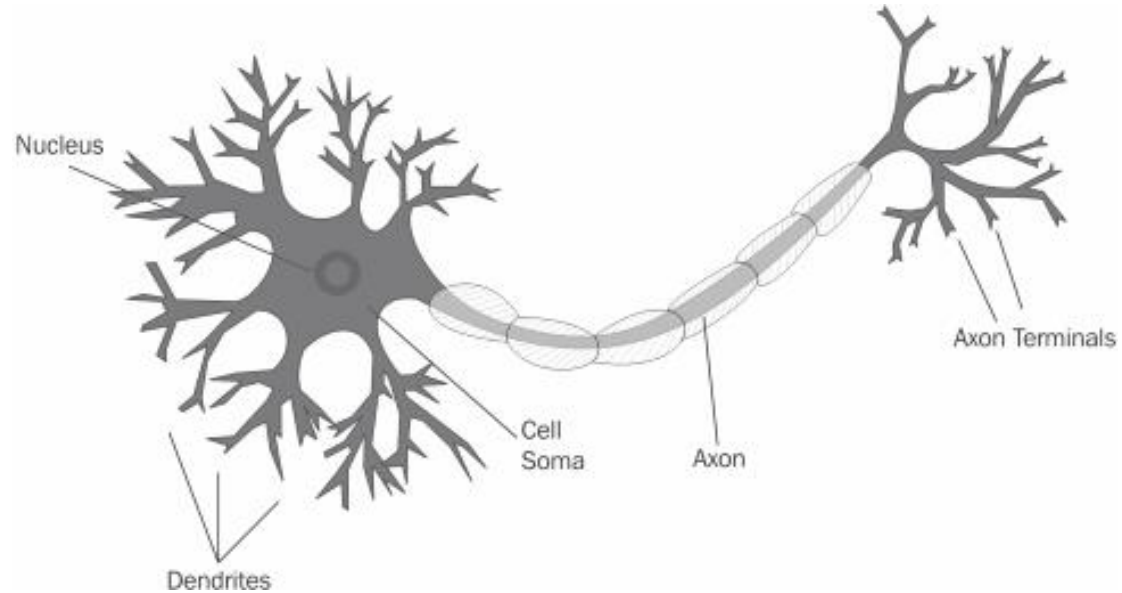
Partially Cloudy
Bad



Rain
Very bad

Artificial neural network

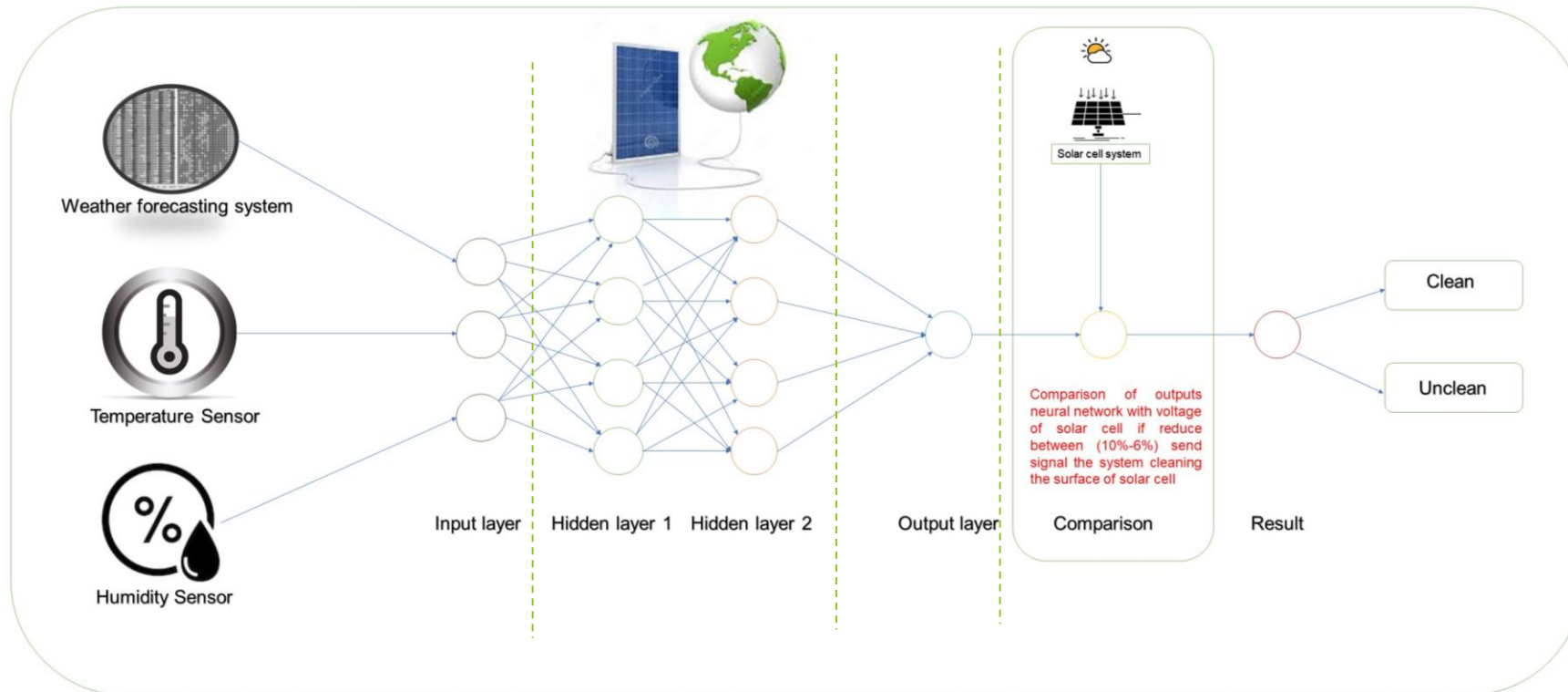
A computer system similar to the human neural system



Biological neuron model

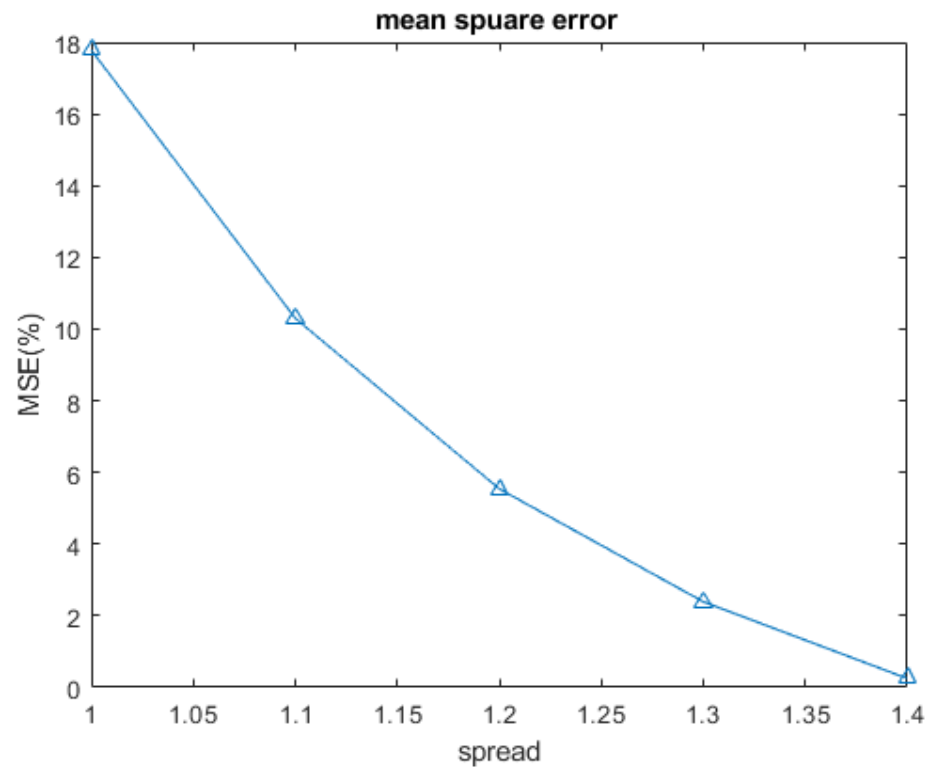
Methodology

Artificial Intelligence System to Predict Dust on Solar Cell surface



Result and testing

We apply on (Arduino, raspberry pi, Matlab) the results of the test lead to the error rate (0.25) the below chart shows that



MATLAB simulation

System advantage

- ▶ **Water:** The system uses 75% less water than manual-cleaning methods.
- ▶ **Automatically management:** This system can be used in any place (forestry, desert, mountains, hills snow area)
- ▶ **Less energy:** Due to less times of cleaning.
- ▶ **smart and autonomous:** Sensors help in receiving the data that are related to weather, then start the cleaning process keeping in mind the weather condition
- ▶ **Remote management:** the cleaner's system help monitoring and manage the cleaning of solar panels from any place.

Conclusion

we find If solar cells are not cleaned for a month, solar cells performance will be reduced to 50% which means we must clean the surface of the solar cell always.



**THANK
YOU**