

# EE Project Sub-lecture 1

Overview on Solar Energy and Sun tracking

# Traditional Energy



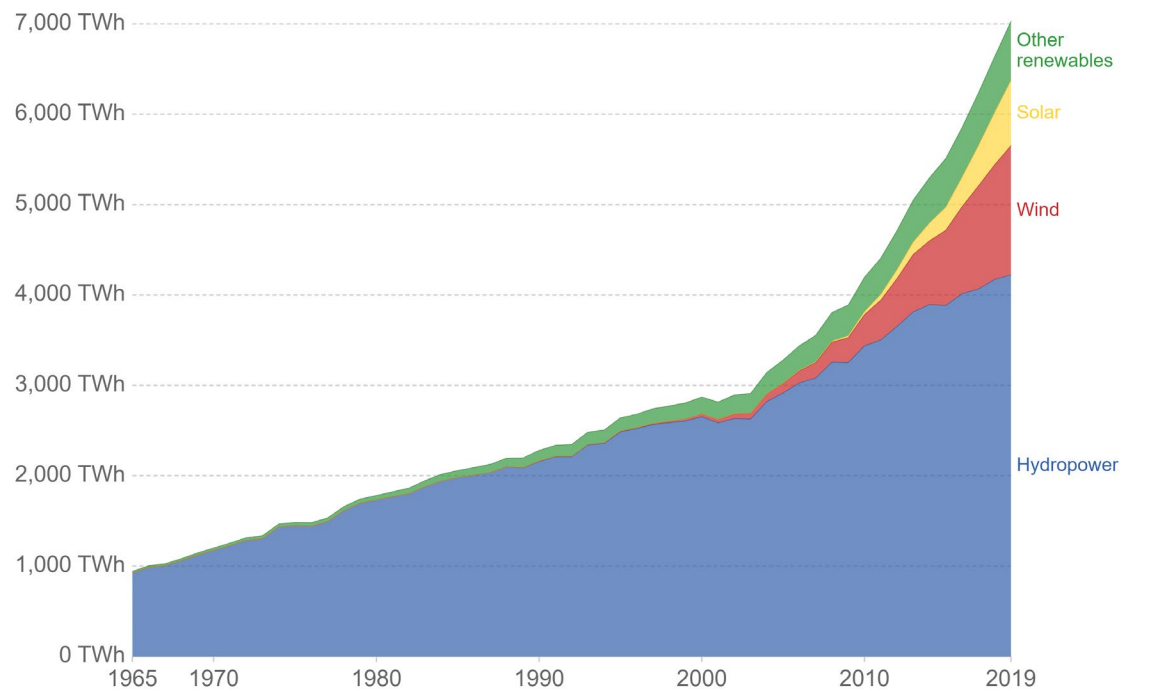


# Clean Energy



# Renewable Energy

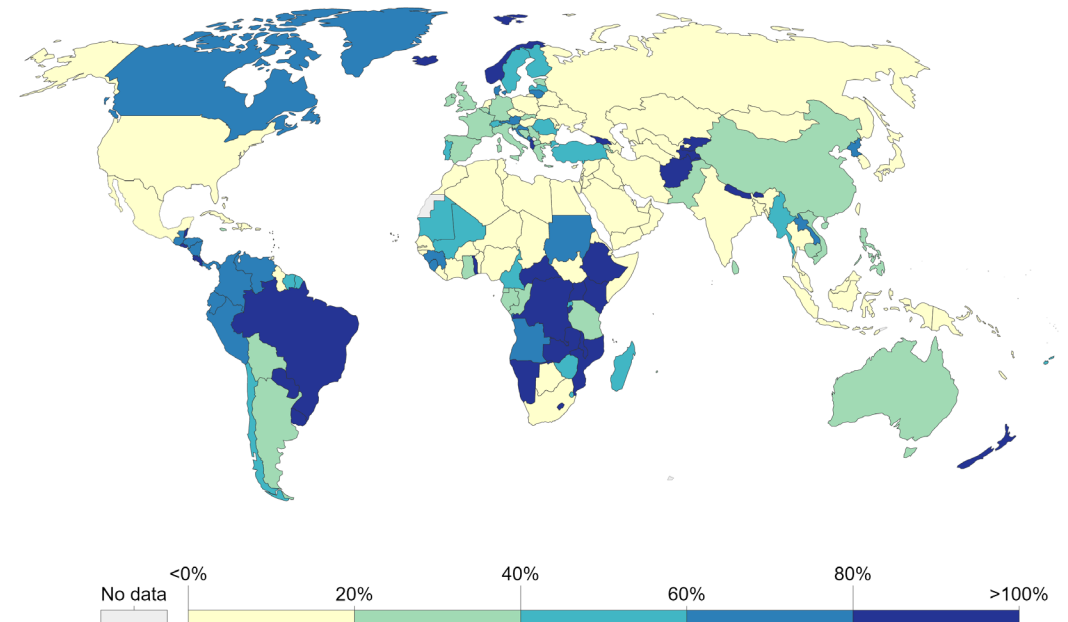
Renewable energy generation, World



Source: BP Statistical Review of Global Energy  
Note: 'Other renewables' refers to renewable sources including geothermal, biomass, waste, wave and tidal. Traditional biomass is not included.

## Share of electricity production from renewables, 2019

Renewables includes electricity production from hydropower, solar, wind, biomass, and waste, geothermal, wave and tidal sources.



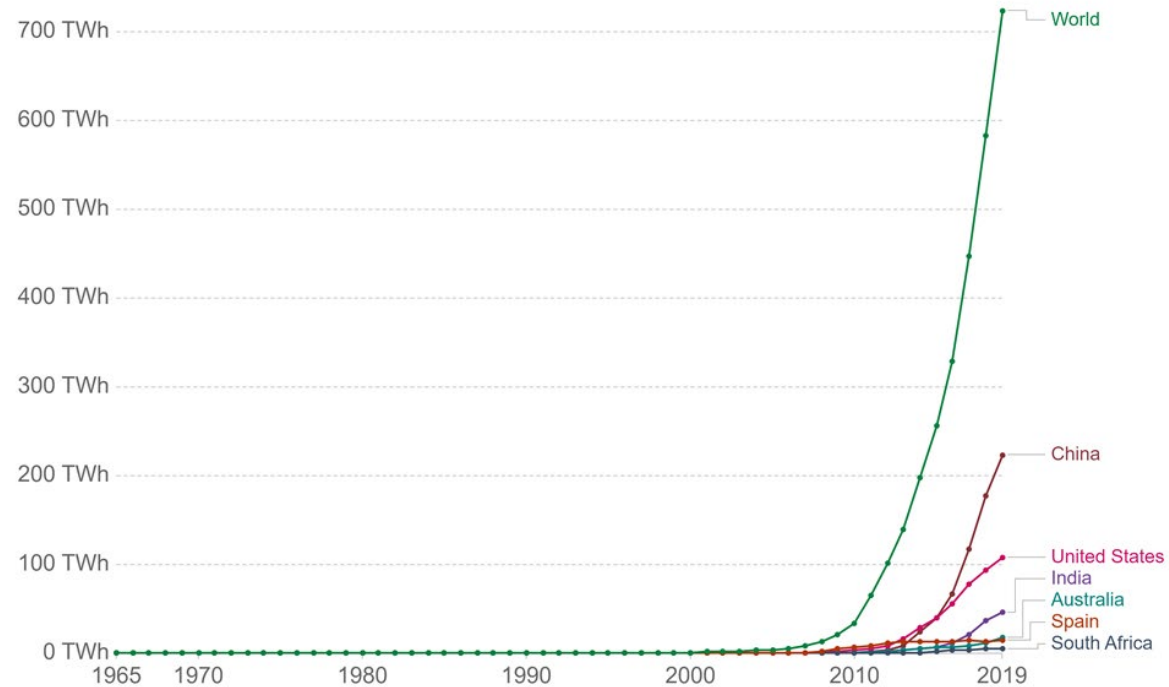
Source: Our World in Data based on BP Statistical Review of World Energy & Ember (2020)

OurWorldInData.org/energy • CC BY

# Renewable Energy

## Solar power generation

Electricity generation from solar, measured in terawatt-hours (TWh) per year.

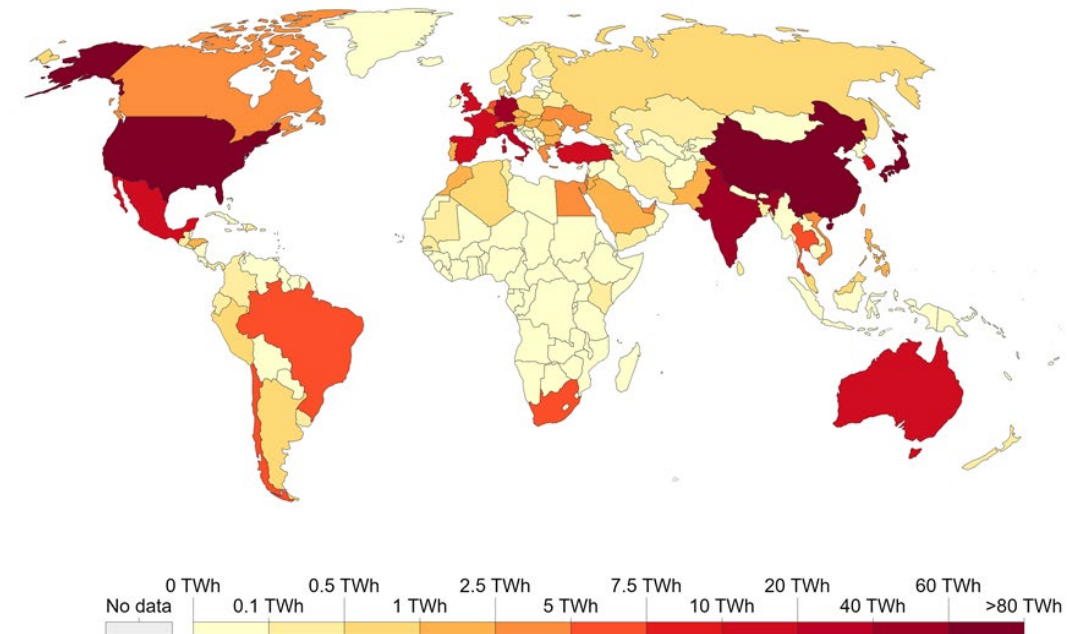


Source: Our World in Data based on BP Statistical Review of World Energy & Ember

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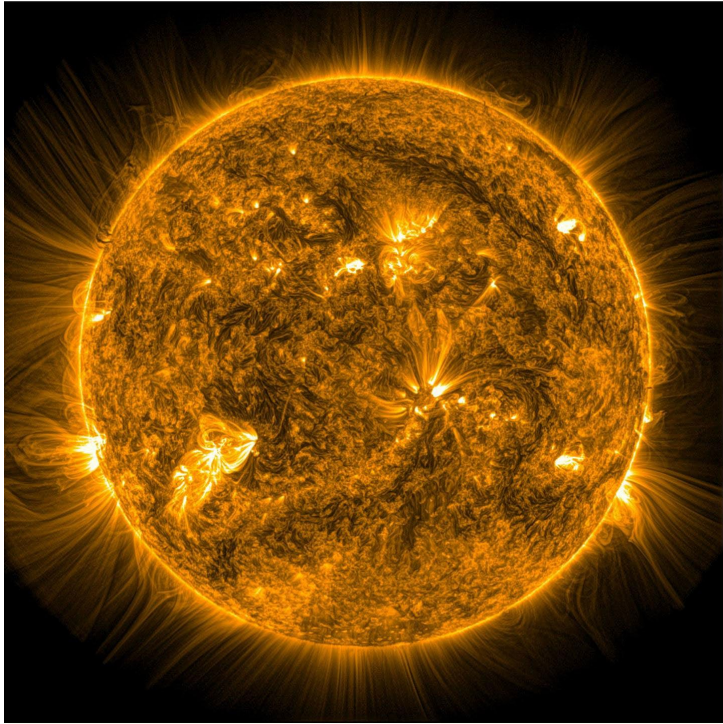


Source: Our World in Data based on BP Statistical Review of World Energy & Ember

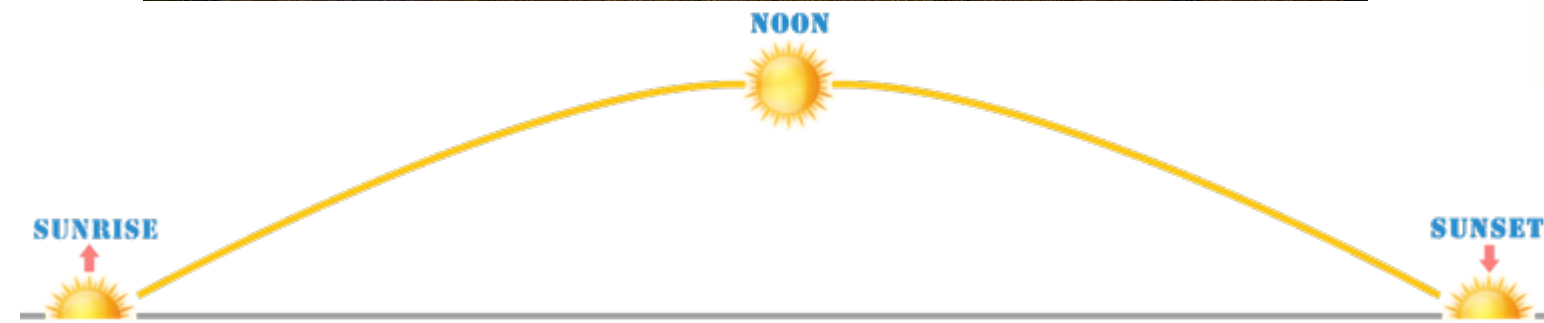
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# Solar Energy

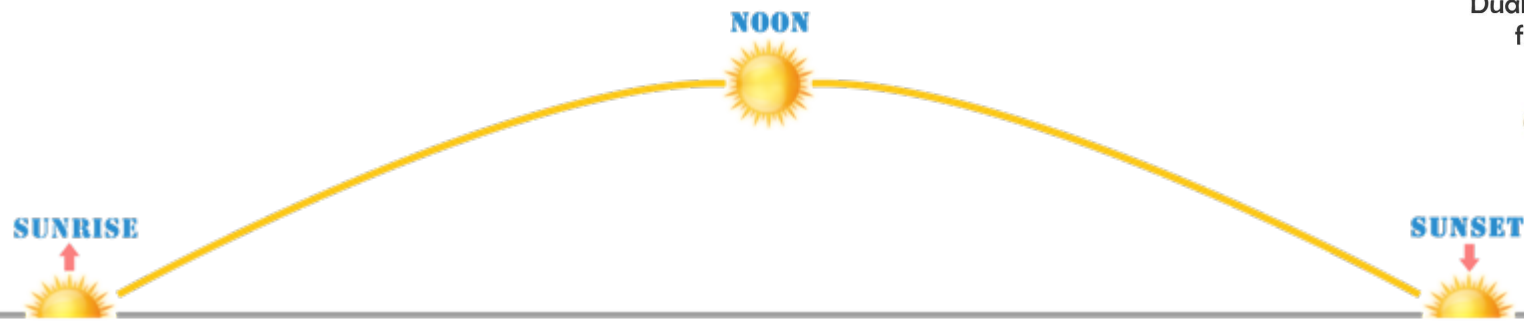
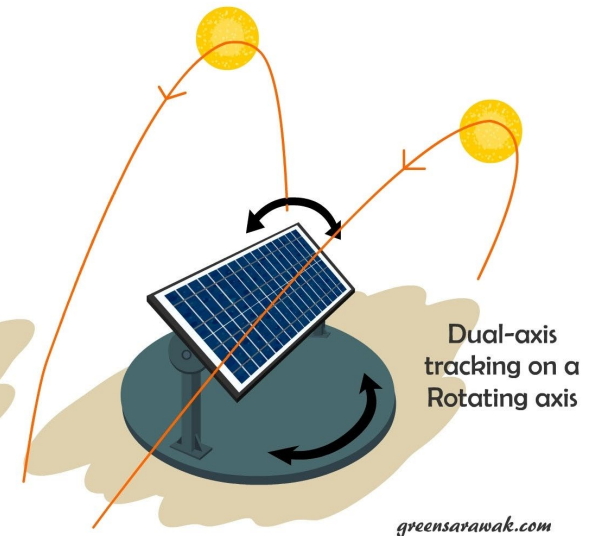
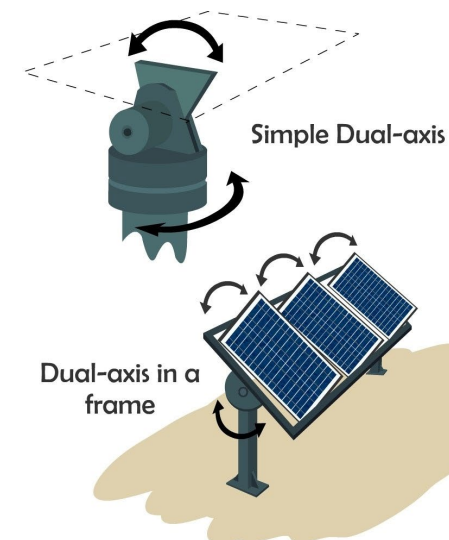
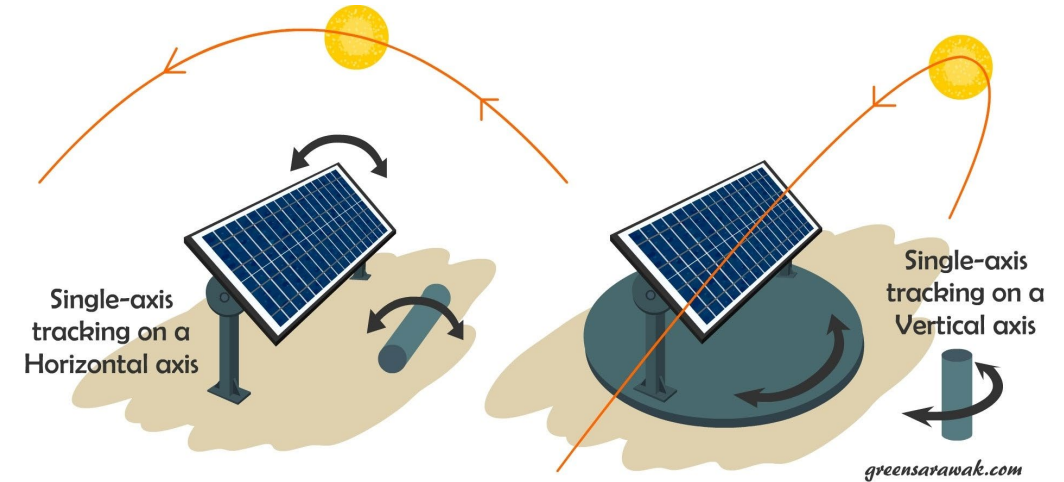


# Solar Tracking Technologies





# Solar Tracking Technologies

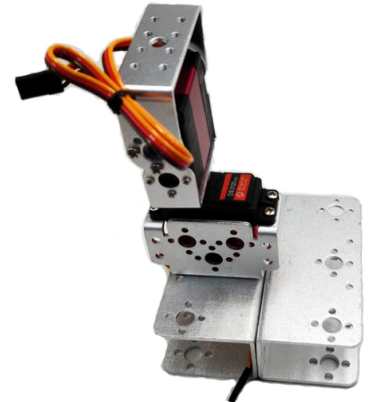
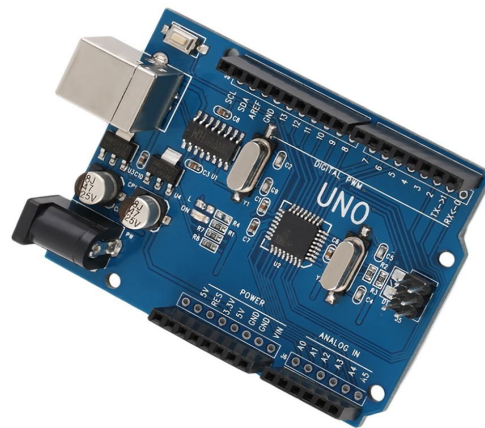
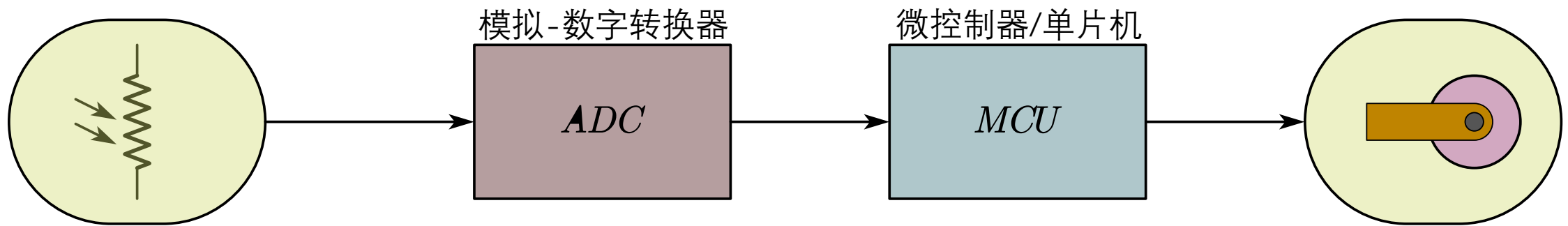




# Part-I

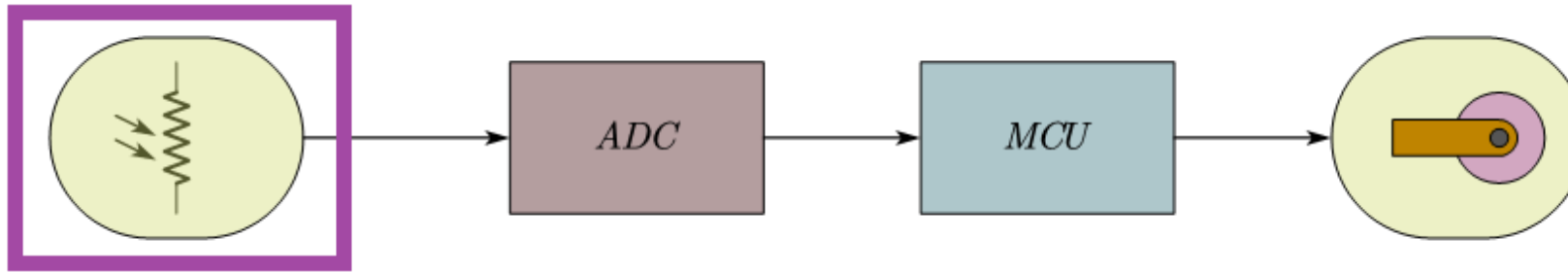
## Sun Tracking

# Framework

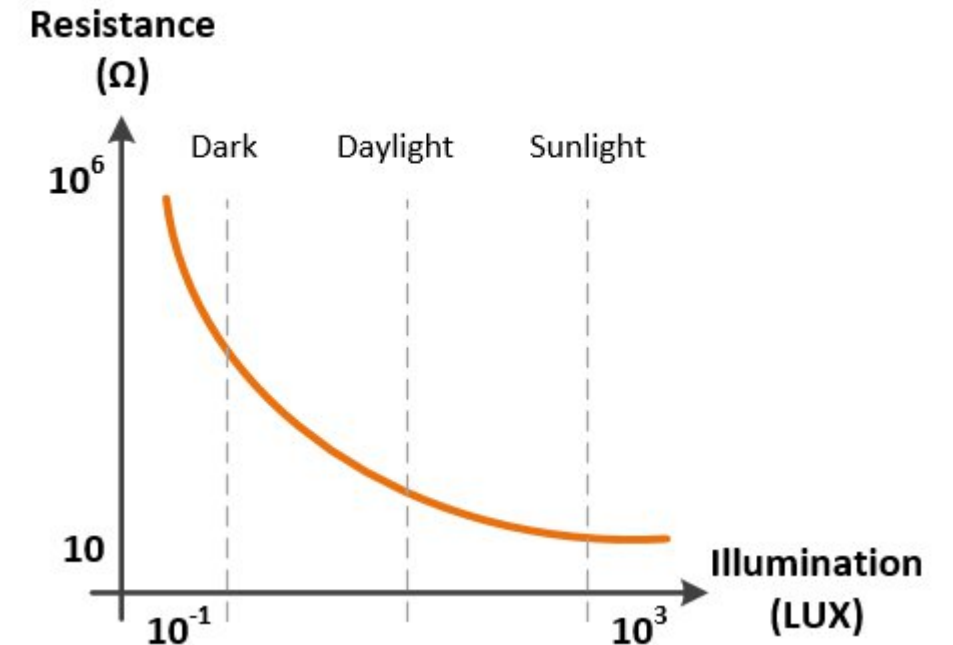




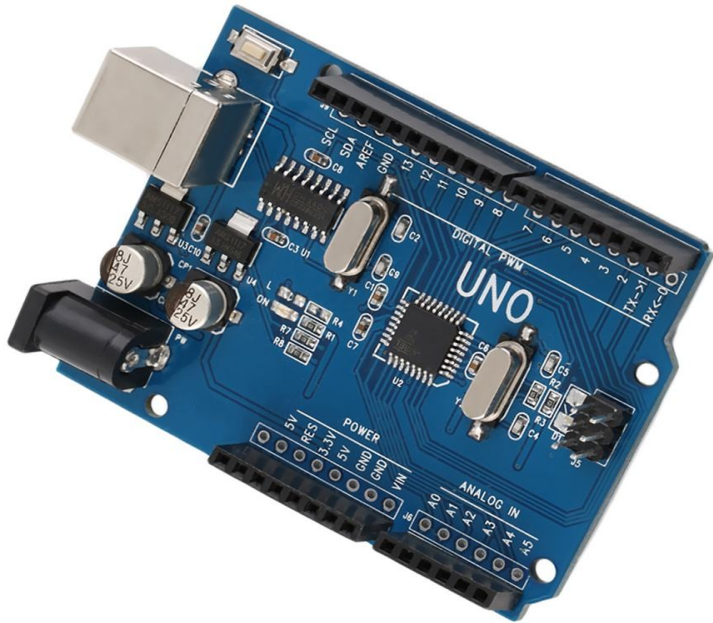
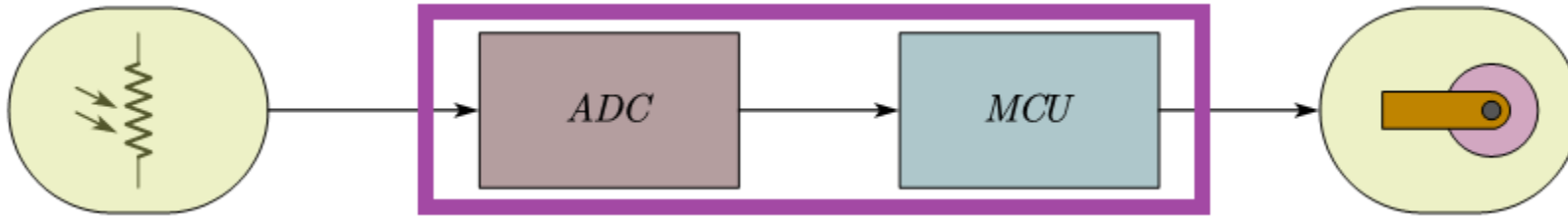
# Light Sensor



**Model:** GL5528  
**Maximum Voltage:** 150v DC  
**Maximum Wattage:** 100mw  
**Spectral Peak:** 540nm  
**Light Resistance:** 10K to 20K ohm  
**Dark Resistance:** 1M ohm  
**Response Time (ms):** Up: 20/ Down: 30  
**Material:** Carbon  
**Size:** 5 x 3mm/0.2 x 0.12"



# Arduino



Installation: <https://www.arduino.cc/en/Guide>

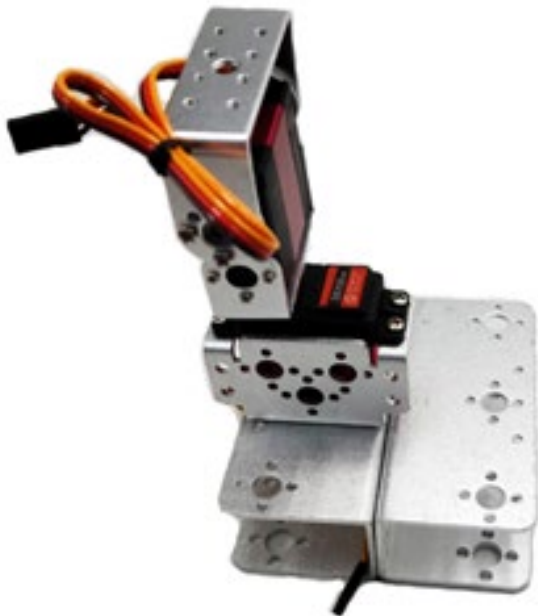
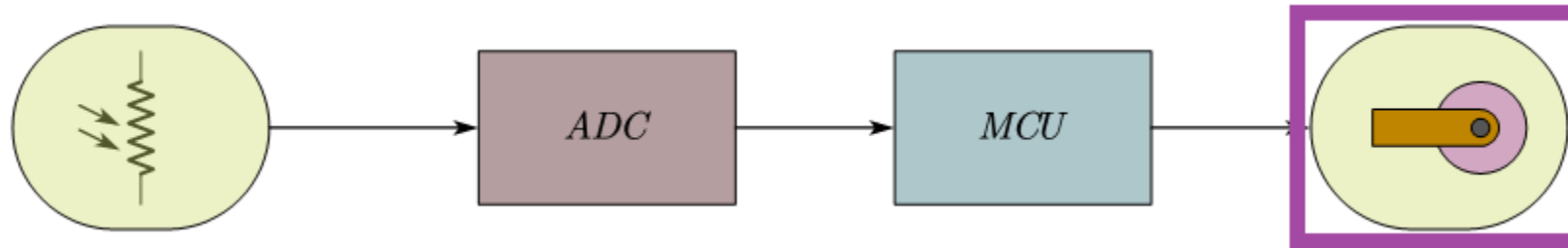
Examples: <https://www.arduino.cc/en/Tutorial/BuiltInExamples>

Arduino 中文社区: <https://www.arduino.cn/>

中文教程汇总: <https://www.arduino.cn/thread-1066-1-1.html>



# Servo Steering

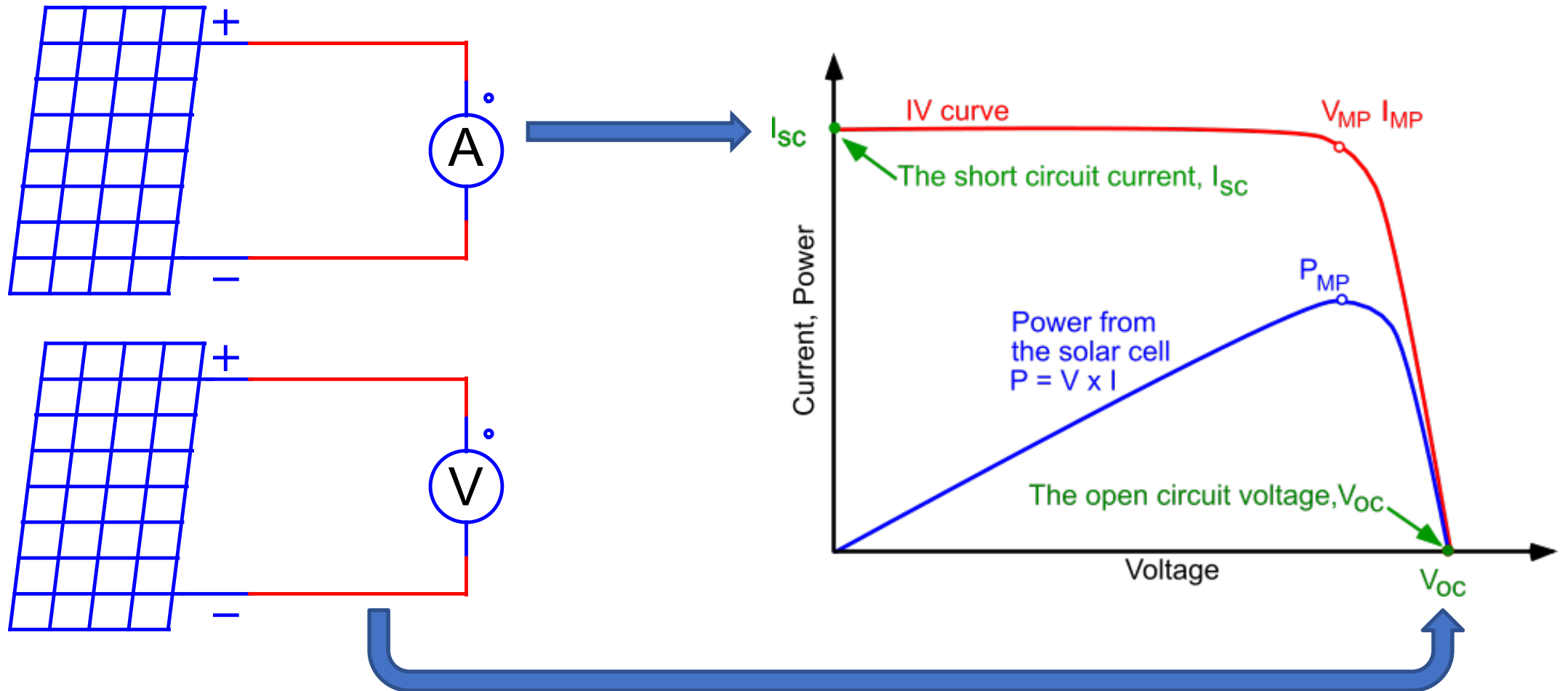


Part-II

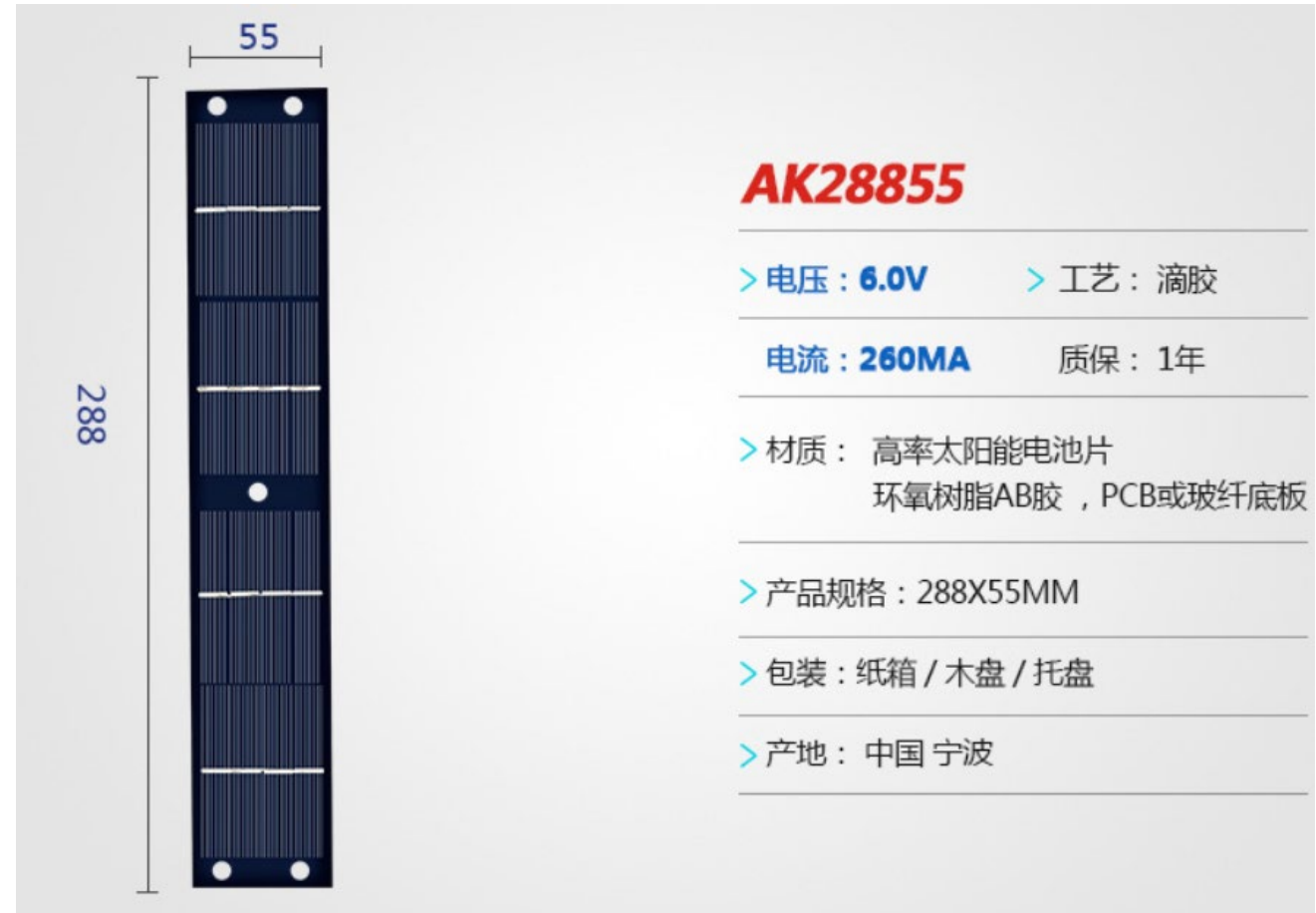
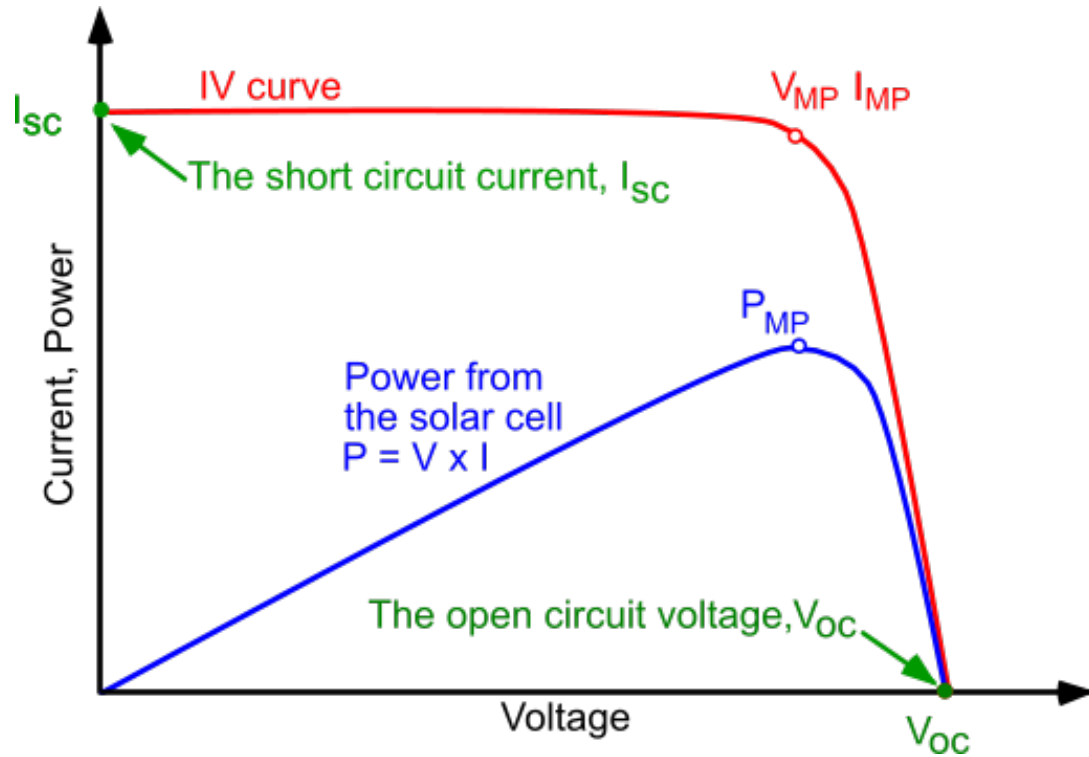
Power Management and Use



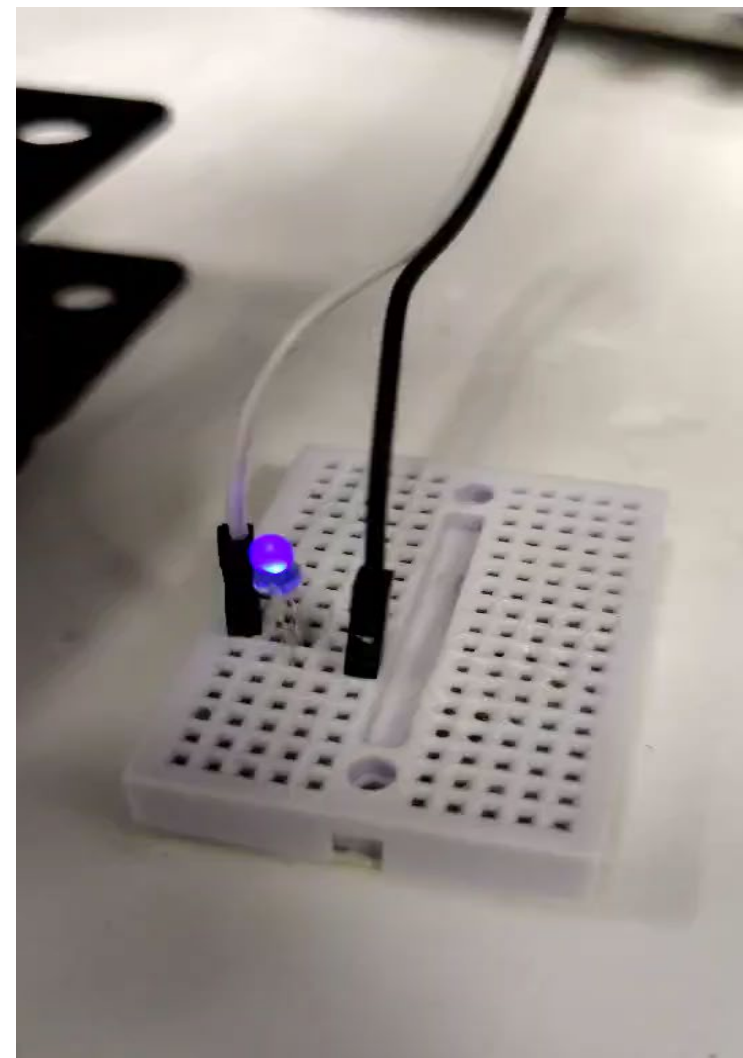
# Solar Cell Properties



# Solar Cell Parameters

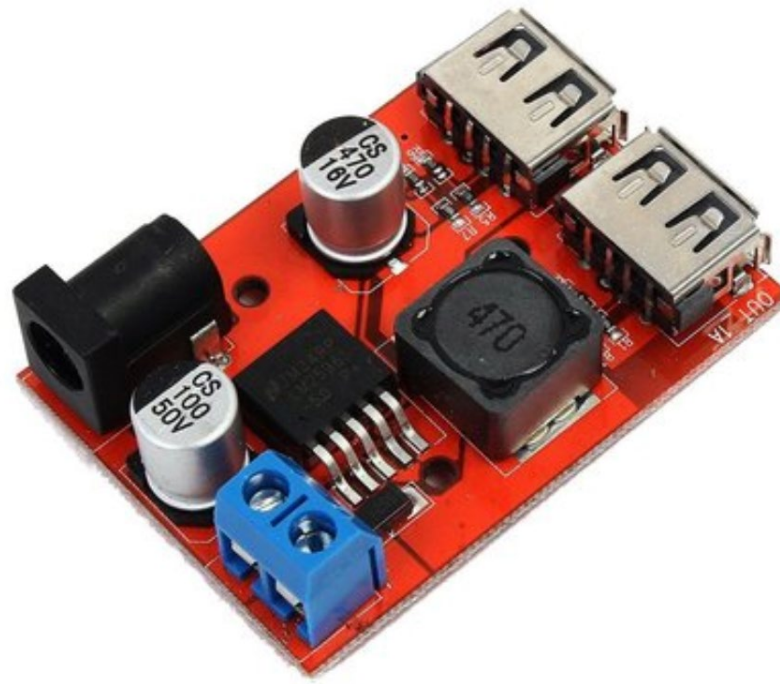
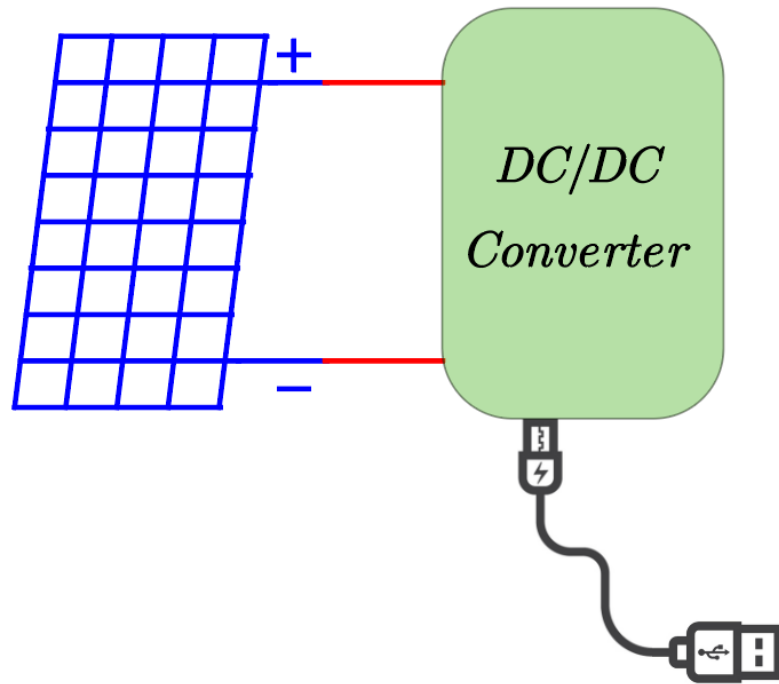


# LED as Load





# Regulations



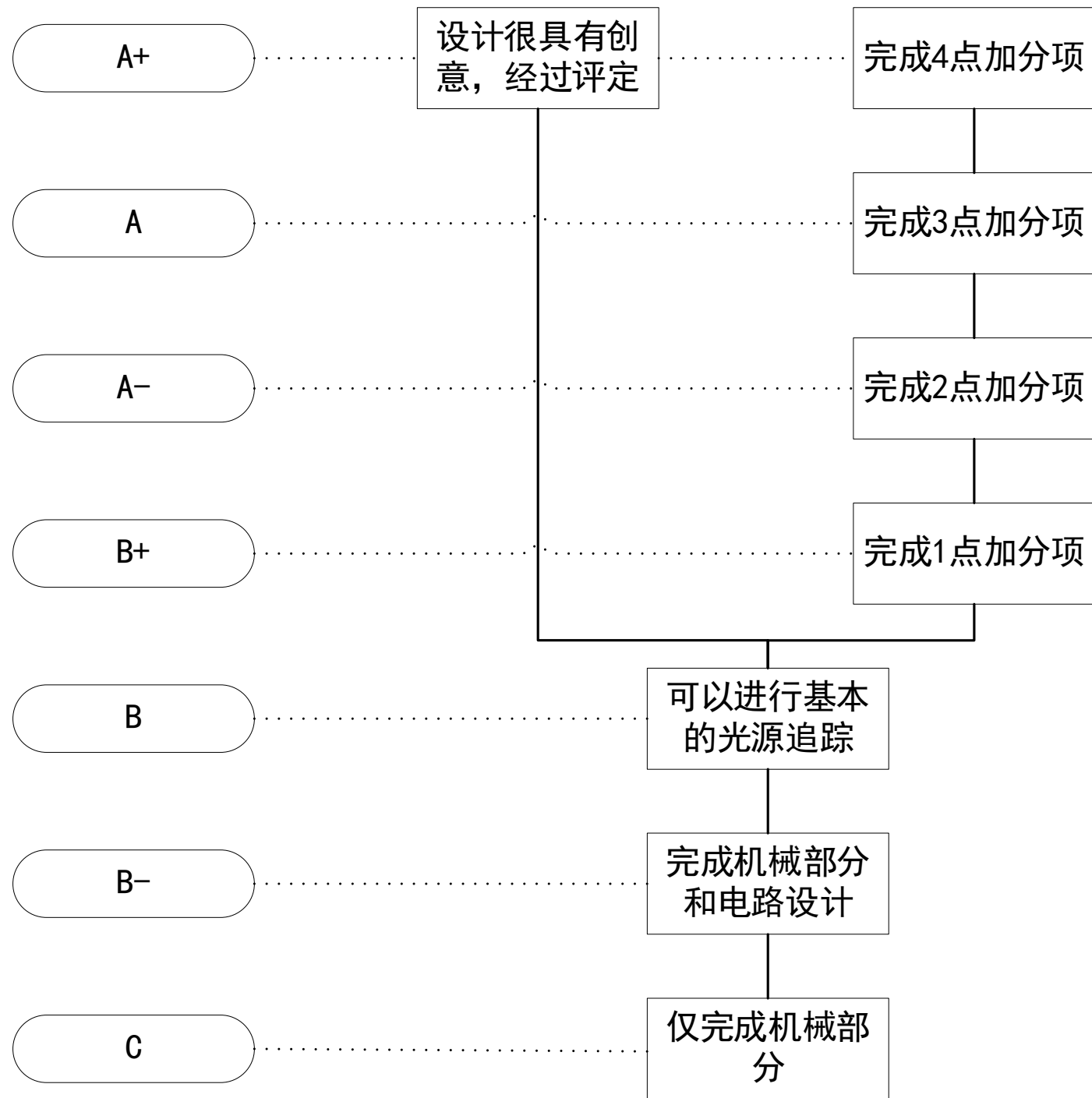
# Project Arrangement

# Course Arrangement

- 1. Overview on solar energy & sun tracking (this lecture)
- 2. MCU special topic (09 Dec.)
- 3. 3D Print & PCB Design (11 Dec.)
- 4. Sensors & Interfaces (16 Dec.)
- 5. TBA



# Rubrics



# Bonus Points

- 3D print pinboard or socket
  - 3D打印转接结构
- PCB design (mounting holes can be integrated in PCB)
  - 印刷电路板设计
- Control optimizations
  - 控制优化（例如暗光复位，极限复位等）
- DC/DC regulation design
  - 稳压电路设计
- DC/DC maximum power point tracking (MPPT) design
  - 最大功率追踪电路设计
- Others intelligent applications of solar energy
  - 其他创新点，可提交评定
- ...

# Project Rules

- 保护好实验器材，结束后器材将进行回收。
- 组内明确分工，平衡组员工作量。
- 组间可交流思路，但切忌抄袭。
- 对于有3D打印和元件焊接等需求的小组，后期将公布可预约时间。
- 每周进行一次进度交流。



玩得开心！

