

用於聚光光伏發電的開環控制太陽最大功率自動跟蹤系統

Auto Solar Maximum Power Point Tracking System under a special open loop control for Concentrating Photovoltaics (CPV)

使用雙軸最大功率點跟蹤太陽，開環無傳感器控制方法，更實用簡潔提高太陽能發電功率

2 axis maximum power point tracking system without the solar sensor for high efficient solar energy generation with open loop control method

項目摘要

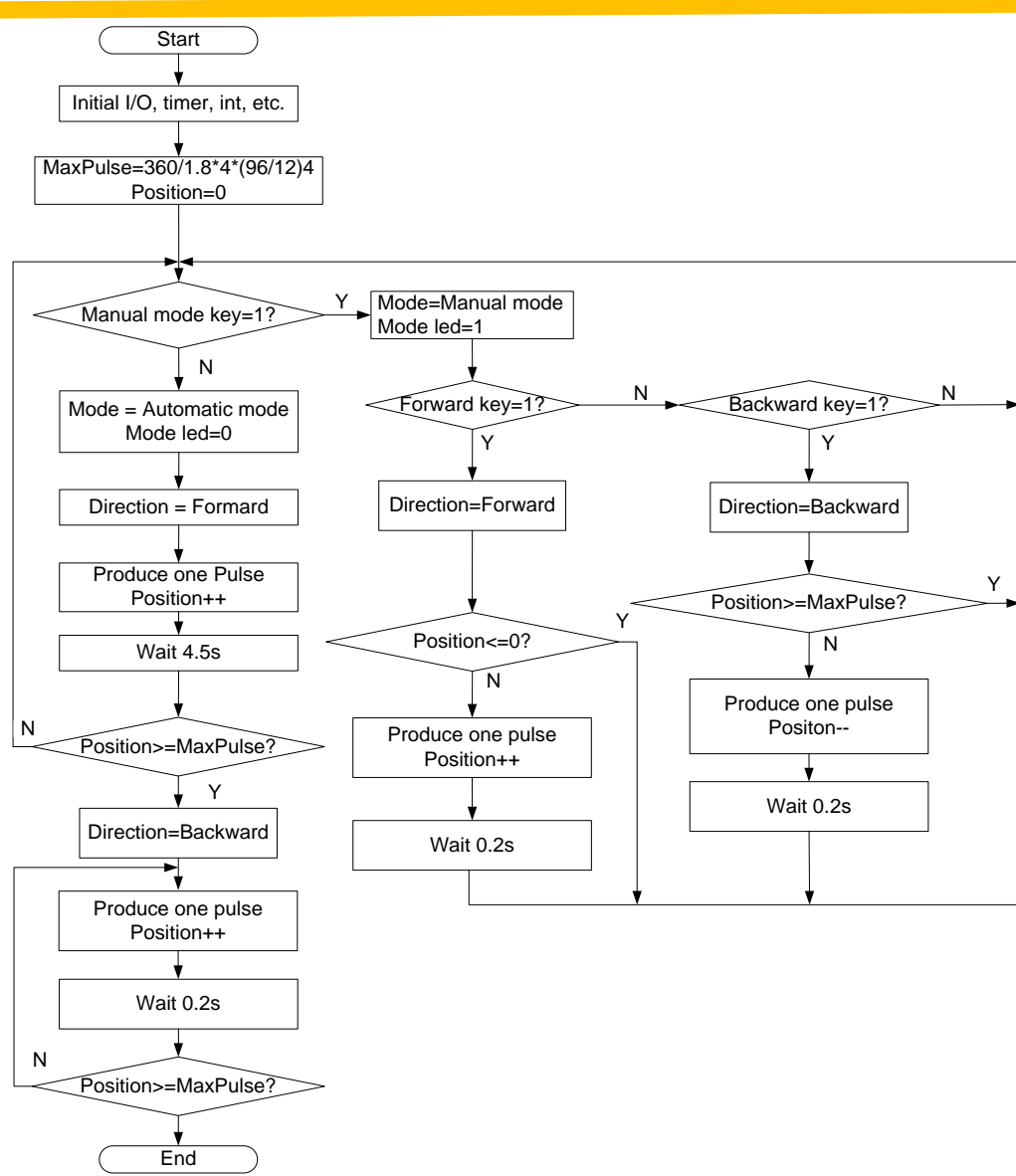
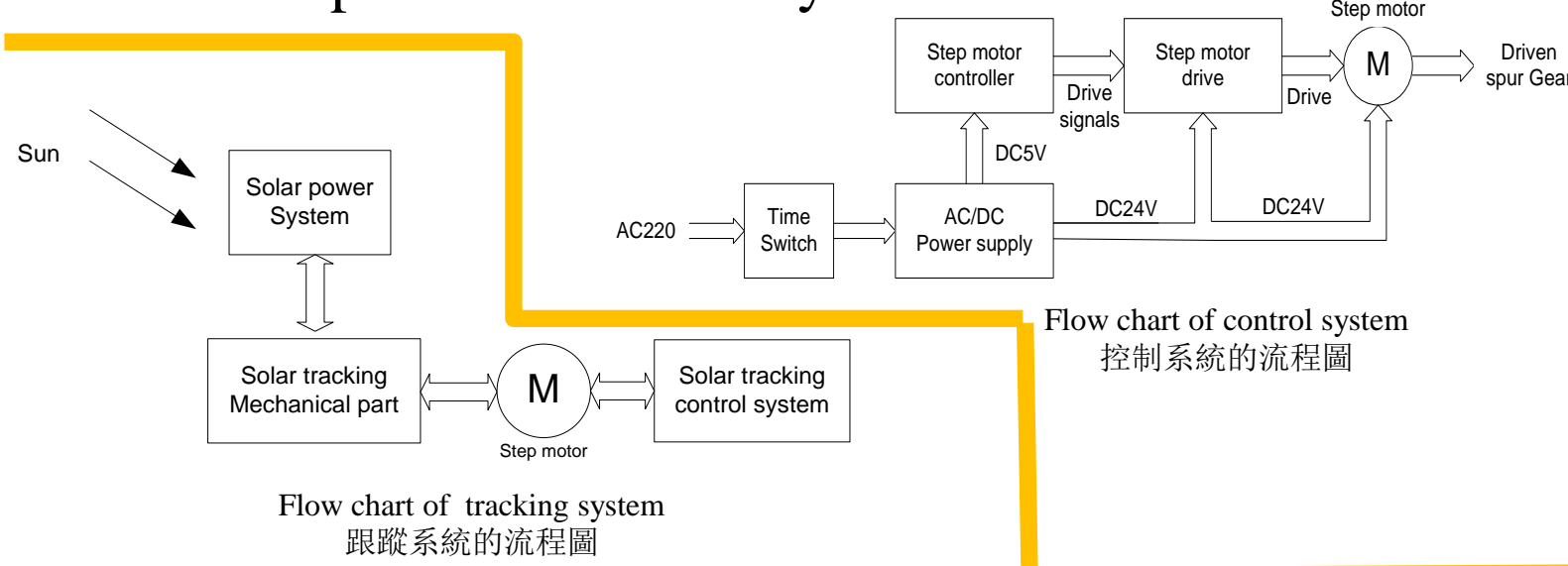
太陽能是一種無污染，清潔，可靠性高的資源，於是人們使用各種科學技術試圖獲取它的能量。但是，如果沒有政府的支持，常規太陽能發電系統的安裝成本過高和較低的發電效率，維護也需要大量的人力及昂貴的費用，這些都大大影響了它全世界範圍內的推廣及應用，於是傳統的光伏產業被認為回報率過低。因此，許多國家開始削減補貼，而典型的回報週期是20年。

太陽能發電系統一般都是在室外安裝及工作，受環境影響大，如何克服惡劣的天氣而使系統可以穩定的工作。基於對這些問題的考慮，我們開發研究了一種新型開環控制下最大功率點跟蹤太陽的自動發電系統，該系統是在現有的太陽灶的基礎上，增加了自動跟蹤的機械部件以及控制系統。

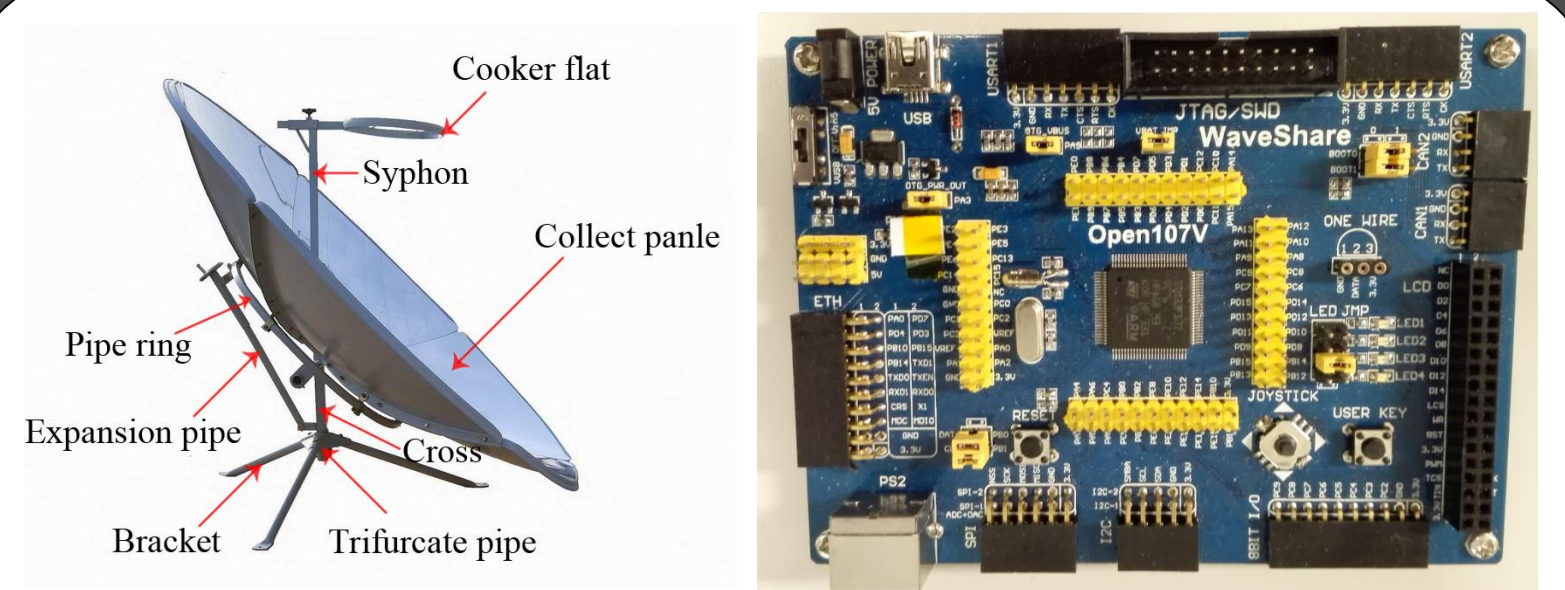
Introduction

Solar energy as a consistent and reliable energy source is still energy that attracts general public using various techniques to derive its energy. However, without supports from governments, the low efficiency and high installation cost of the conventional solar power generation system will have greatly impact on its large scale promotion worldwide. Also the maintenance of the system needs considerable manpower and fee. Conventional Photovoltaic can only be considered as a low return and therefore many countries started to cut the subsidies. The typical return is more than 20 years.

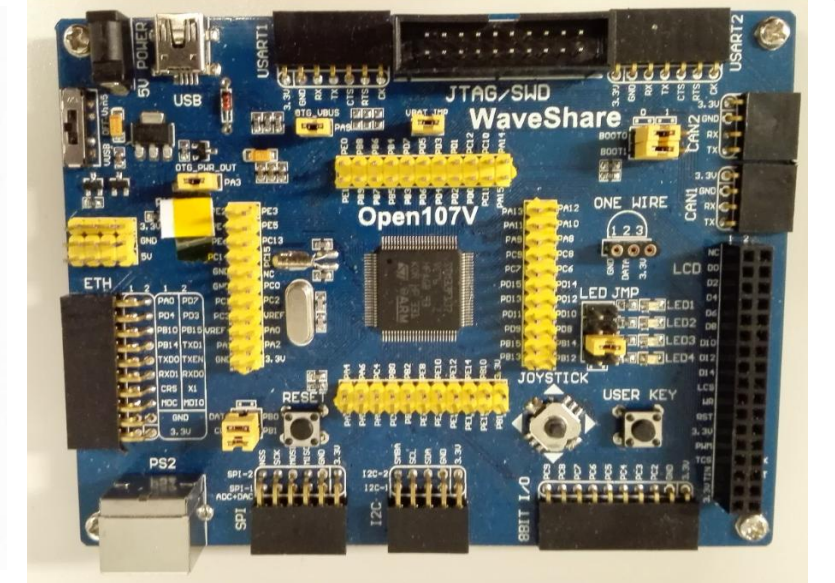
Solar power systems are generally outdoors, harsh environment and require long-term stable and reliable work. The project is based on these considerations, a novel open-loop automatic tracking system. The system is retrofitted in existing solar cooker, increases automatically track mechanical parts and control systems.



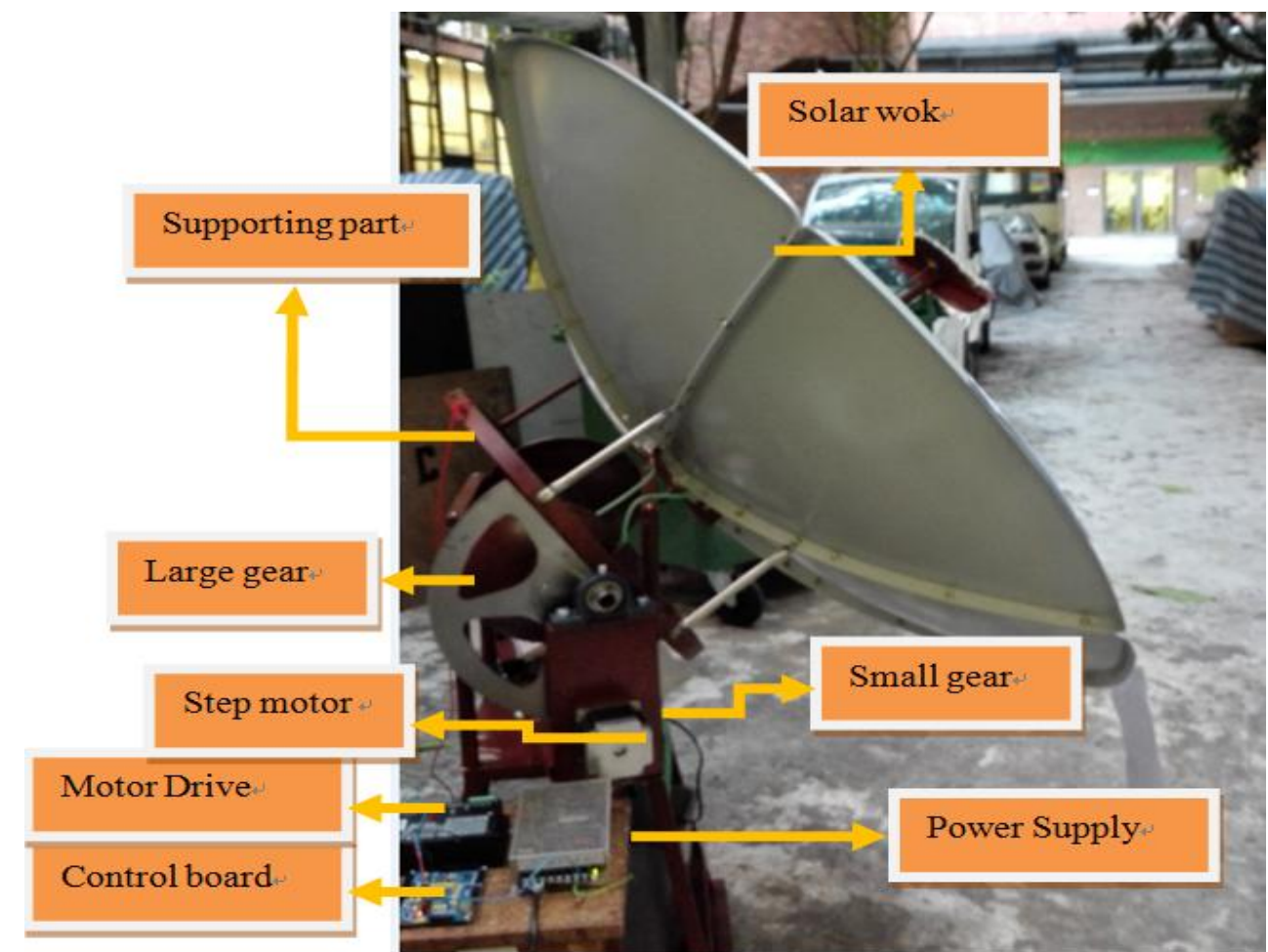
Flow chart of software system 系統軟件的流程圖



Configuration of system 系統結構圖



Controller of system prototype 系統控制器原型



Tracking control system prototype 跟蹤控制系統原型



The system prototype 系統原型

特點與優點

Special Features and Advantages

- 在開環控制下，無光敏傳感器的最大功率跟蹤系統，給整個發電系統帶來了超強的穩定性。
The system is without light sensors, so the reliability is increased.
- 在新型的機械結構下，控制一個電機進行多維度跟蹤，同時減少一半的能量損耗。
Only one motor is used and the power consumption is decreased half compared with two-motor tracking system.
- 可以動的底座便於實驗與演示。
Movable platform is designed to facilitate the system test.

應用

Applications

聚光光伏太陽能系統
CPV solar energy system

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