# Wi-Fi station & Solar Powered Smart-phone Chargers with a Money Multi Coin Selector

ABDELHADI SLAMI, MAMA BOUCHAOUR, LAAREJ MERAD

University of Tlemcen, Faculty of Sciences, Department of Physics
Unité de Recherche « *Matériaux et Energies Renouvelables* », URMER,
BP: 119, Tlemcen, 13000, ALGERIA

*Abstract:* -The main aim of this study is to present a Wi-Fi station and smart-phone chargers with a money multi coin selector operated through solar energy. Specifically, this study aimed to achieve the following objectives: 1) Determine a solar panel that is appropriate for providing power for a phone charging station. 2) Determine a suitable timing system for providing mobile phone charging services. 3) Determine the acceptability of the device based on the following: a) Physical features; b) Cost; c) Durability; d) Operation. This device is mainly aimed for commercial use since it can require a certain fee for a specified period to charge a mobile phone. It makes possible to highlight two principles of environmental conservation and green economy (using the solar PV) as well as the opening of the workstation.

*Key-Words:* -Wi-Fi stations, smart-phone chargers, solar celss, solar energy

Received: December 16, 2023. Revised: August 11, 2024. Accepted: September 15, 2024. Published: October 7, 2024.

## 1. Introduction

Carbon dioxide and other greenhouse gas emissions that contribute to global warming are not produced by solar photovoltaic energy [1]. It increases the flexibility of power systems in response to changes in electricity demand, lowers emissions and pollutants from conventional energy systems, lessens dependency, and minimizes expenditure on imported fuels, all of which contribute to improved access to clean energy sources [2, 3].

The primary objective of the solar photovoltaic system is to wirelessly transfer the electrical energy produced for use in a variety of small-scale power applications. Wireless power may be used to charge devices and serve as an input source for electronic devices like MP3 players and cellphones [3].

A cell phone is among the most widely used forms of communication available today, mostly due to technological improvements. It is also one of the most reasonably priced tech devices available [2].

On the other hand, the Strategy Analytics research projects that by 2023, there will be an average of 4.3 mobile devices per person, since the number of devices will keep rising. There is a race on to create a world that is ever more interactive, communicative, and linked. Autonomy, however, continues to be the primary barrier to this advancement. To combat this issue, substitute solutions have been created. [4].

The Wi-Fi station and solar-powered mobile phone charging station with a multi-coin selector are part of this set. Furthermore, offer Wi-Fi so that people may use their phones or computers to quickly and efficiently connect to and recharge both indoor and outside infrastructures. For this project, we decided to build a Wi-Fi station and a solar-powered smartphone charger with a money multi-coin selection.

## 2. Design and Realization

One of the most often used forms of communication nowadays is the cell phone. It is among the least expensive electronic devices available. The mobile phone is now a multifunctional device that can process emails, photos, and other data due to the integration of numerous systems and devices [5, 6]. Cell phones, like many other electronic devices, depend on electric current to carry out their various tasks, hence they need to be charged periodically. especially with Android phones, which drain batteries far more quickly than other types of phones.

To solve the problem, we decided to create a WiFi station with an Arduino-programmed multi-coin

selection and a solar-powered [7] cell phone charging station. It stands for a different approach to powering electronics.

Figure 1 presents the conceptual model. It is componed of Input, Process and Output [4].
Input: Take account on the setup of equipment's as well as materials.
Process: In the process all the equipment have to be tested.
Output: The output stage is the operational solar powered charging station. The project foretells also the limitation.

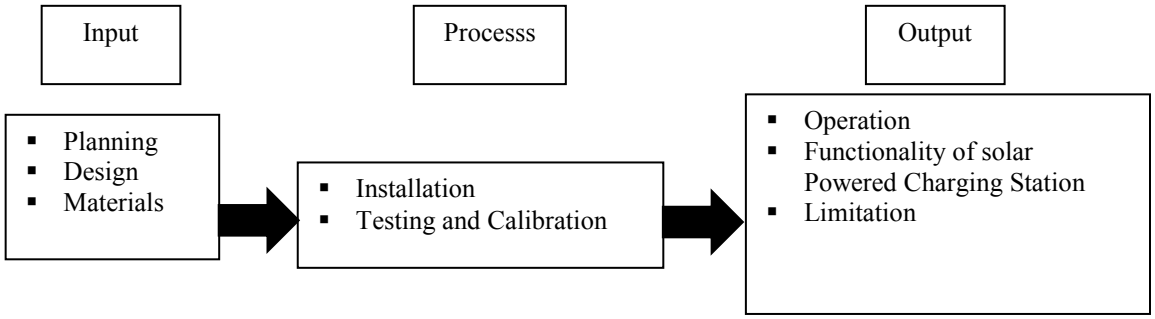


Figure 1. Conceptual model of the study.

The structure of the station is in aluminum, stainless steel or other non-corrosive material. It gives it greater stability. The station is mobile, with four wheels equipped with a braking system in order to facilitate its movement and positioning in complete safety.

These stations are equipped with multi-coin money detector programmed with the Arduino board.
The used type of multi coin selector is CH-926 type. The diagram of the Wifi station & solar charger is shown in figure 2.

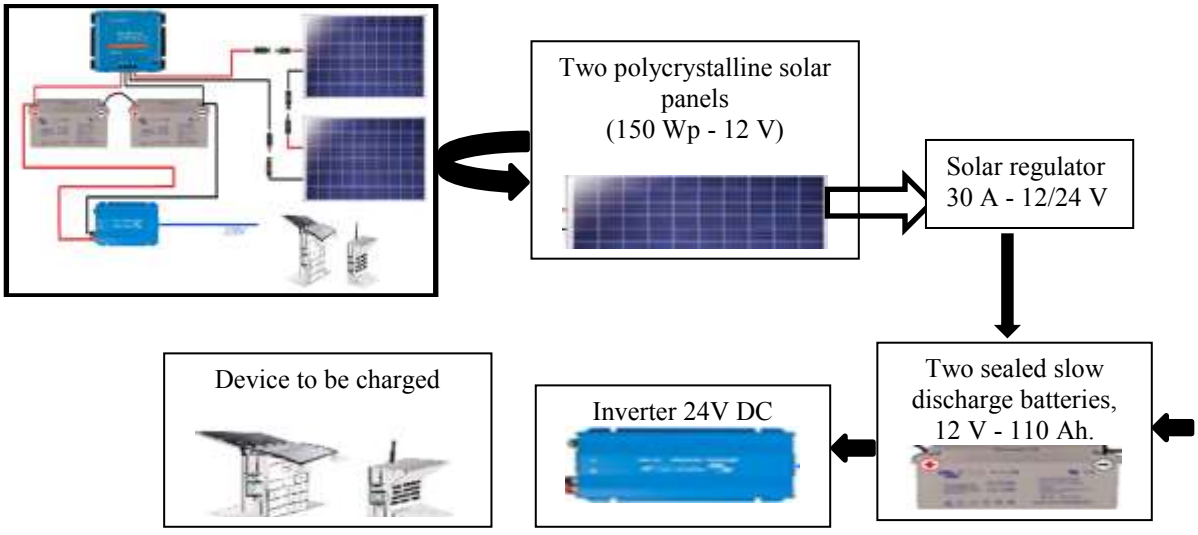


Figure 2-a : System block diagram

Figure 2-b: wifi station & solar charger.

### 2.1. Content of the solar kit

For the design, the solar charging station [8, 9-10] is compounded of the following subsystems:

- Two polycrystalline solar panels of 150 Wp - 12 V
- Specific solar cable between the panel and the regulator.
- Solar regulator (30 A - 12/24 V).
- Two sealed slow discharge batteries, 12 V - 110 Ah.
- Inverter that converts the 24 V DC (direct current) from the battery into 220 V AC (alternating current) identical to the network – 600 VA (600 W).
- Protection box that can accommodate up to 4 circuit breakers, 2 16 A circuit breakers and a 10 A are integrated in the kit to protect the panel, the battery and the 24 V output. A circuit breaker can be added for an inverter.

### 2.2. Energy needs assessment

Generally, in wifi & smart phone charger stations [8, 11- 12], we are interested in mobile phones and portable microphones. From this material, we calculated the energy consumed during each use. These results are reported in Table 1.

| Device | Energies (Wh) |
|---|---|
| 10 Smart phones (10W for each phone) | 100 w x 8 hours |
| 4 Micro portables (40 W for each micro) | 160 w x 4 hours |

Table 1: Electrical equipment used in the station

### 2.3. Schematic plan (CH-926/Arduino) and source code

A coins lot is a device used in vending machines responsible for checking whether a coin conforms to a given value. More recent models usually accept a whole series of coins and sort each according to its value. The schematic plan is as shown in figure 3.

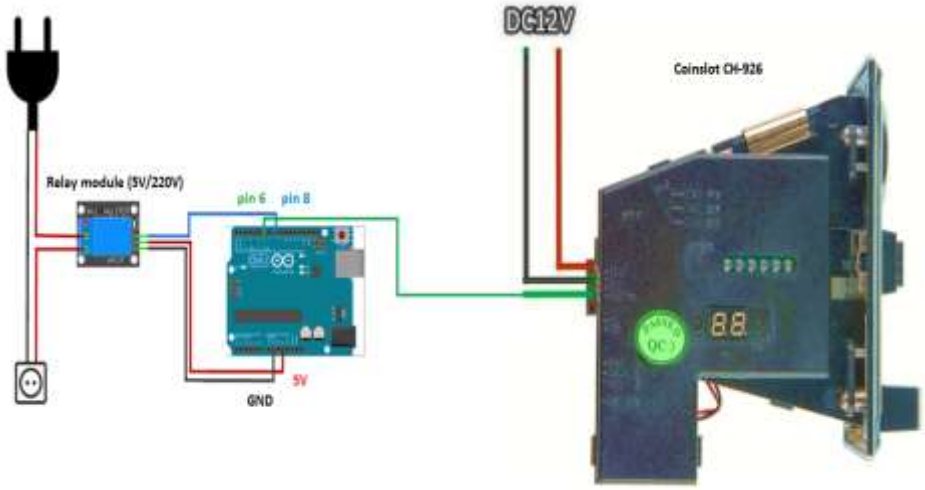


Figure 3 : Schematic plan of CH-926 / Arduino

In this example we want to program 1 coin type: 50 DA coin1 impuls.
Here is the procedure how to program the acceptor to recognize a set of 1 coin.

1. We start by pressing + and - buttons together until A is displayed.
2. After pressing Setup button E should be displayed.
3. With + - buttons we select number of types of coins. 1 in our case.
4. After pressing Setup again H1 is displayed. Here with + - we select number of sample coins we would use to program this first type of coin.
5. After pressing Setup again P1 is displayed. Here we select number of impulses that would represent the first coin. In our case it will be 1 impulse for first coin.
6. After accepting it with setup button is displayed. Here we set sensitivity (Recommended value = 6).
7. When done LED display again shows A. After pressing Setup it changes to E. At this stage we can power off coin acceptor.
8. When pressed again we get A1 and we are ready to sample first coin. Slot the coins one by one.
9. When done indicator LEDs blink. The coin acceptor is ready to be programmed with the Arduino and used with the relay module in our station.

## 3. Conclusion

The main goal of this project is to design a mobile phone charging station that runs on solar electricity.
Running out of battery life pisses up smartphone addicts more than anything else. In isolated and open tourist regions, it can help young people find work by building a prominent solar station. In the case that it does not, the installation will carry on operating autonomously at any location where it will be beneficial to all parties (for example, phone charging stations used during the 2022 Mediterranean Games in Oran or other events). These stations are found in public areas such as retail malls, airports, hotels, and campuses.

*References*

[1] G. Ch. Ioannidis, C. S. Psomopoulos, S. D. Kaminaris, P. Pachos, H. Villiotis, S. Tsiolis, P. Malatestas, G. A. Vokas, S. N. Manias, (2021), AC-DC & DC-DC Converters for DC Motor Drives, WSEAS Transactions on Electronics, vol. 12, pp. 155-162.
[2] George J. Tsekouras, Panagiota M. Deligianni, George A. Vokas, Antonios X. Moronis, Constantinos D. Tsirekis, Anastasios D. Salis, Christos N. Bolakis, (2021), An Optimal Design of a Small Photovoltaic Plant with Cost Minimization based on a Real Database of PV Panels and Inverters", WSEAS Transactions on Circuits and Systems, vol. 20, pp. 227-243.
[3] H. Dehra, Developments in Wireless Power Transfer Using Solar Energy, intechopen, 2021.

[4] A. N. Maroma, Solar Powered Cell Phone Charging Station, Station. Open Access Library Journal, vol. 01, N°. 9, pp. 1-7, 2014.
[5] Constâncio António Pinto, José Torres Farinha, Sarbjeet Singh, (2021), Contributions of Petri Nets to the Reliability and Availability of an Electrical Power System in a Big European Hospital - A Case Study", WSEAS Transactions on Systems and Control, vol. 16, pp. 21-42.
[6] R. Acas., E. Barquissau., Y-M. Boulvert., E. Dosquet., F. Dosquet., J. Pirotte., Objets connectés, la nouvelle révolution numérique, ENI, 2016.
[7] G. Pravin., A.K. Rastogi., (2018), Low cost microstrip patch antenna for wireless communications, Journal of Emerging Technologies and Innovative Research, 5(3), pp. 540-543.
[8] Younis Badran, Ishaq Sider, (2021), Solar Cooling Technologies in Jordan: A Technical Study, WSEAS Transactions on Power Systems, vol. 16, pp. 220-230.
[9] A. Pramono., Smart Mobile Phone Charging Stations for Public Service as Smart Cities Component, International Conference on Information Management and Technology (ICIMTech), IEEE Xplore 11-12 August 2022, pp. 257-261.
[10] A.S. Alkhunaizan., The Implication of Mobile Phone Charging Stations: A Perspective of Consumer Experience, IJCSNS Int. J. Comput. Sci. Netw. Secur., vol. 20, N°.1, pp. 132-138, 2020.
[11] A.S. Alkhunaizan., (2019). Empirical Analysis of Charging Time Derived from Mobile Charging Stations, International Conference on Computer and Information Sciences (ICCIS), pp. 1-5.
[12] A.S. Alkhunaizan., (2020), Users Experiences on Mobile Phone Charging Solutions, IJCSNS, International Journal of Computer Science and Network Security, vol.20 N° 5, pp. 6-10, May 2020.

**Contribution of Individual Authors to the Creation of a Scientific Article (Ghostwriting Policy)**

Abdelhadi Slami, making the arduino card.
Mama Bouchaour and Laarej Merad carried out the simulation and the optimization.

**Sources of Funding for Research Presented in a Scientific Article or Scientific Article Itself**
No funding was received for conducting this study.

**Conflict of Interest**
The authors have no conflicts of interest to declare that are relevant to the content of this article.