A Small, Cheap and Easy to Build Solar Energy System

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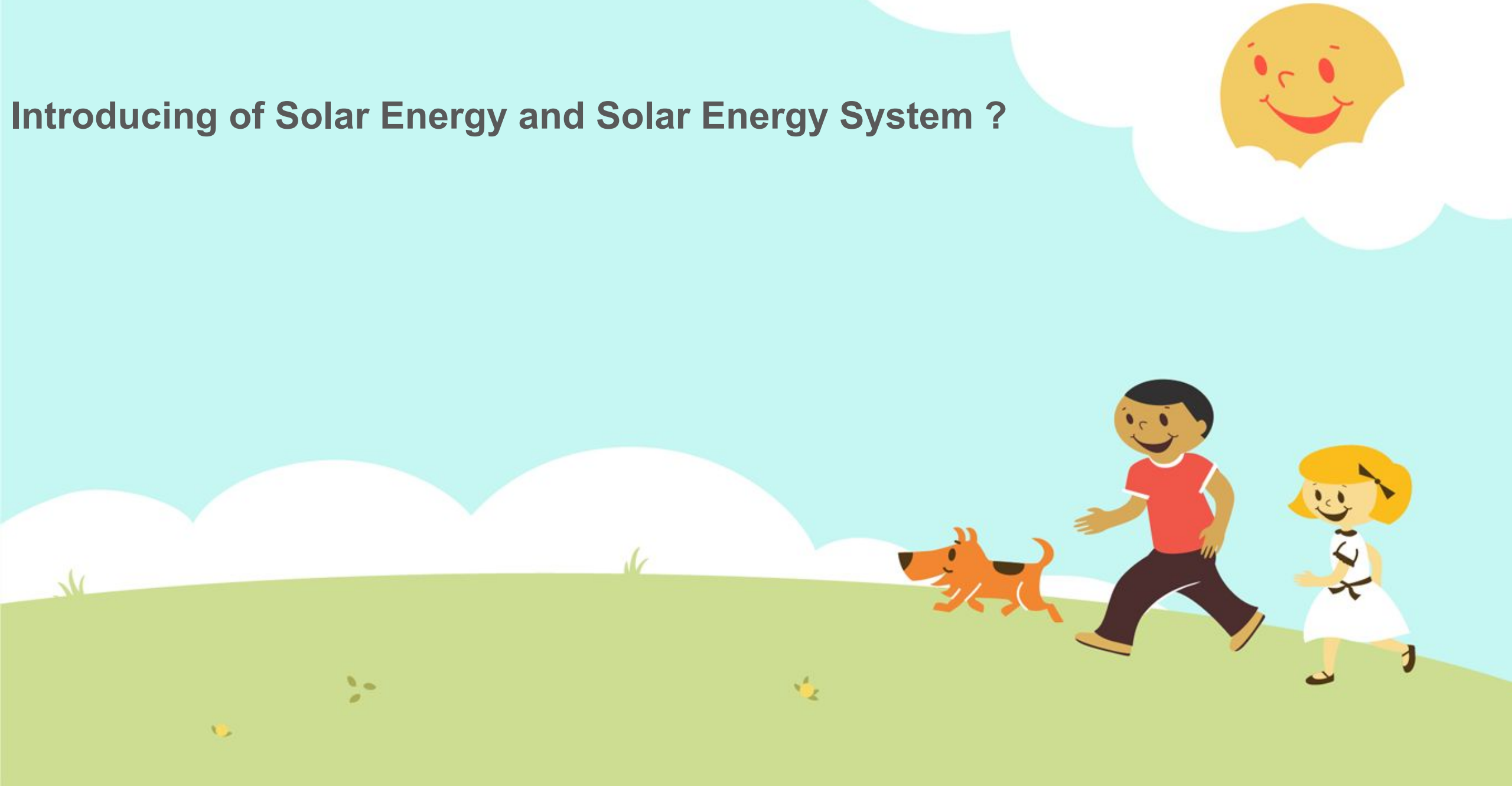
Amateur

General Infomations of this project

The solar energy system project has 3 main points, described as the diagram

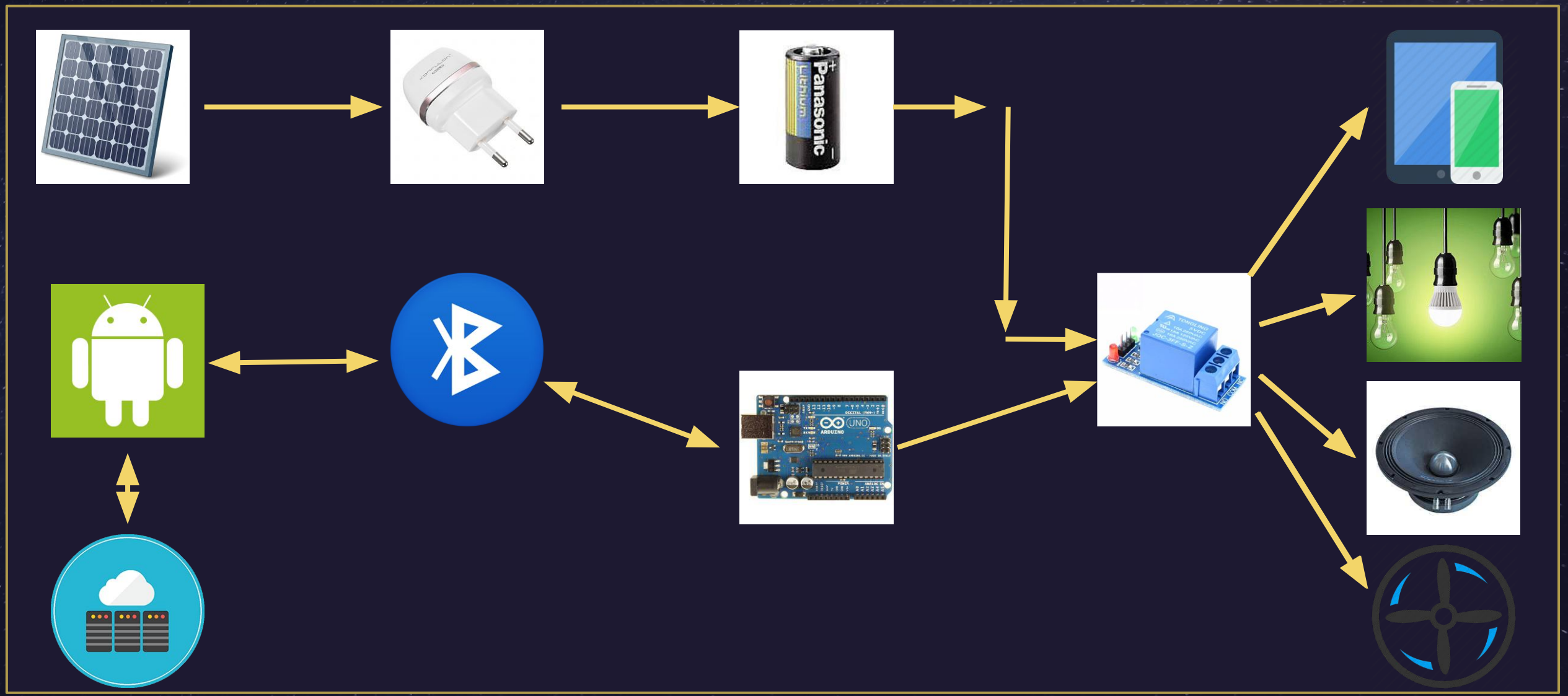
Introducing of Solar Energy and Solar Energy System ?



Which functions provided by this solar energy system ?

- Providing energy for charging battery packs
- Using batteries charged for powering low-energy consuming devices like LED bulbs, Fans, charging mobiles/tablet, small speakers, or things else use low-voltage from 5-12V
- Allowing monitor and control process of charging battery packs from solar panels via Android App and Web Server or Bluetooth Communication
- Allowing on/off devices linked to system by relays
- Allowing expand storage capacity by adding more battery packs later

System’s General Operation Diagram



Needed parts for building this project are

NAME	PRICE	NUMBER	NOTES
Small, cheap 0.35W - 5.5V -65mA Solar Panels	~1$ per one	4	
18650 Batteries 1100mAh	~1.5$ per one	2	just 2 for using in this demo
Bluetooth Module HC06	~5$ per one	1	
Uno Arduino Board	~9$ per one	1	Any Arduino Board else is available for this project
Some Relays	~0.4$ per one	4	just 4 for using in this demo
Charger Board/Module allows charge 18650 batteries	~0.8$ per one	1	just 1 for using in this demo
Some 3W-4V LEDs	~0.8$ per one	2	just 2 for using in this demo
12V – Speaker Module	~4$ per one	1	

Count:	**~30-35$ (included wires, buzzer, solder materials,etc ….**

Choosing Solar Panels

This is solar panels used for this demo

Another one provides higher capacity but still be cheap and small solar panel (0.6W – 6V – 100mA. The price per one is ~1.7$

Connecting Solar Panels Together

2 Basic Ways of Connecting

In Series

The way uses combined both

Output: 11V – 65mA

Output: 5.5V – 130mA

Output: 11V – 130mA

Better Output: 12V – 200mA if 6V Panels Used

In Parallel

Choosing Battery

The battery cell used in this demo are Panasonic 18650 batteries which have capacity ~1100mAh/one

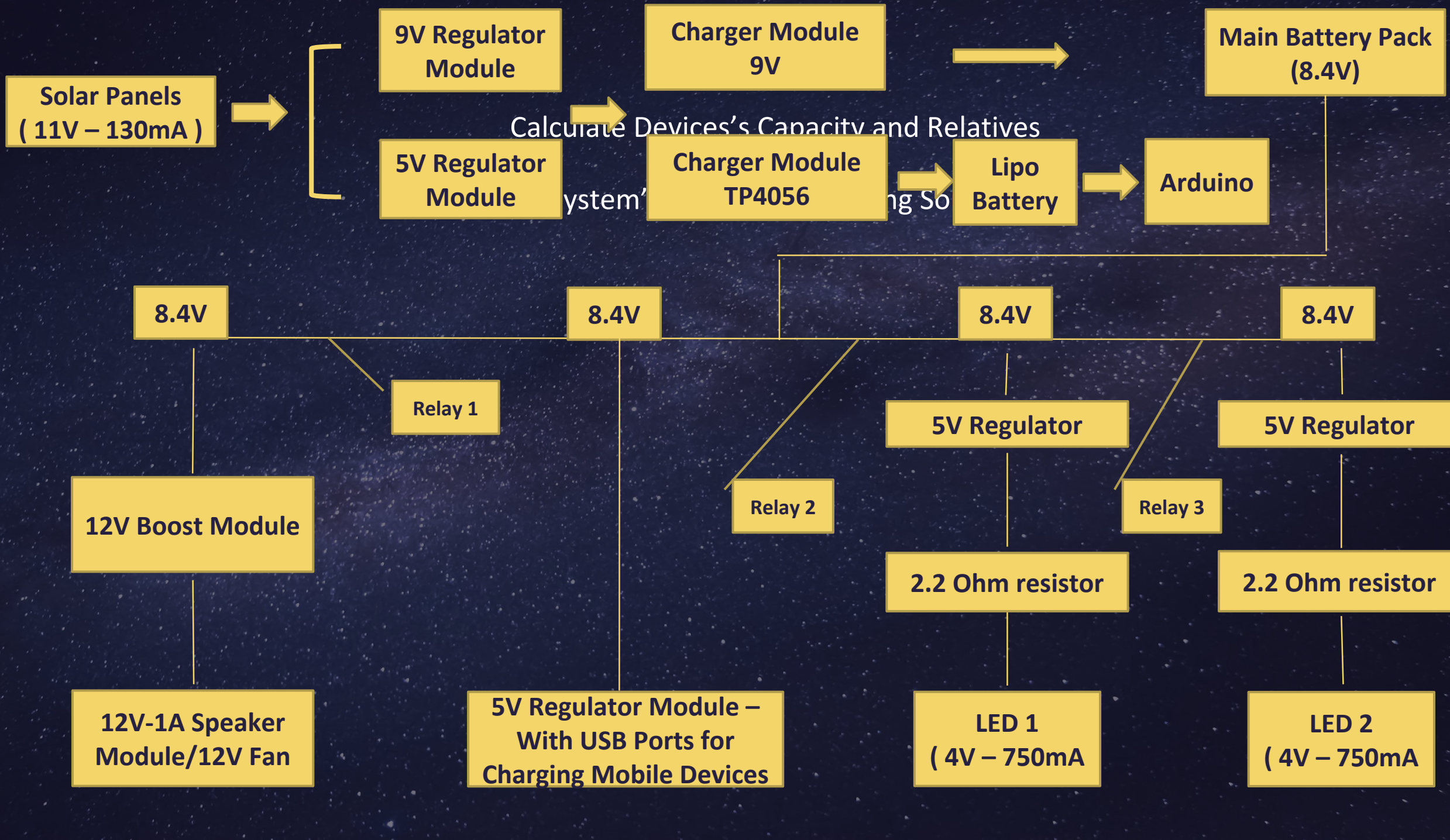
About reading and understand details printed on battery:

- Example: 1100mAh 2A 3.7V

+ Available Capacity: 1100mAh means this battery can provide constantly a current at 1100mA/1.1A for an hour, this depends on how much current of device connecting to battery uses. So if we have an device need 550mA to operate, this battery can last for 2 hrs

+ Max Current Available: 2A is the max current battery can provide in a short time

+ Voltage: 3.7V is the stable voltage of battery when it works and 4.2V is the voltage when it fully charged


Solar Panels
(11V – 130mA)
9V Regulator Module
5V Regulator Module
Charger Module 9V
Charger Module TP4056
Main Battery Pack (8.4V)
Lipo Battery
Arduino
Calculate Devices's Capacity and Relatives
ystem'
ng So
8.4V
8.4V
8.4V
8.4V
Relay 1
Relay 2
Relay 3
5V Regulator
5V Regulator
12V Boost Module
2.2 Ohm resistor
2.2 Ohm resistor
12V-1A Speaker Module/12V Fan
5V Regulator Module – With USB Ports for Charging Mobile Devices
LED 1
(4V – 750mA
LED 2
(4V – 750mA

Wiring Components to Arduino

5V

GND

TX

RX

5V

GND

Pin 9

Pin 8

Pin 2

GND

Pin 10

Pin 11

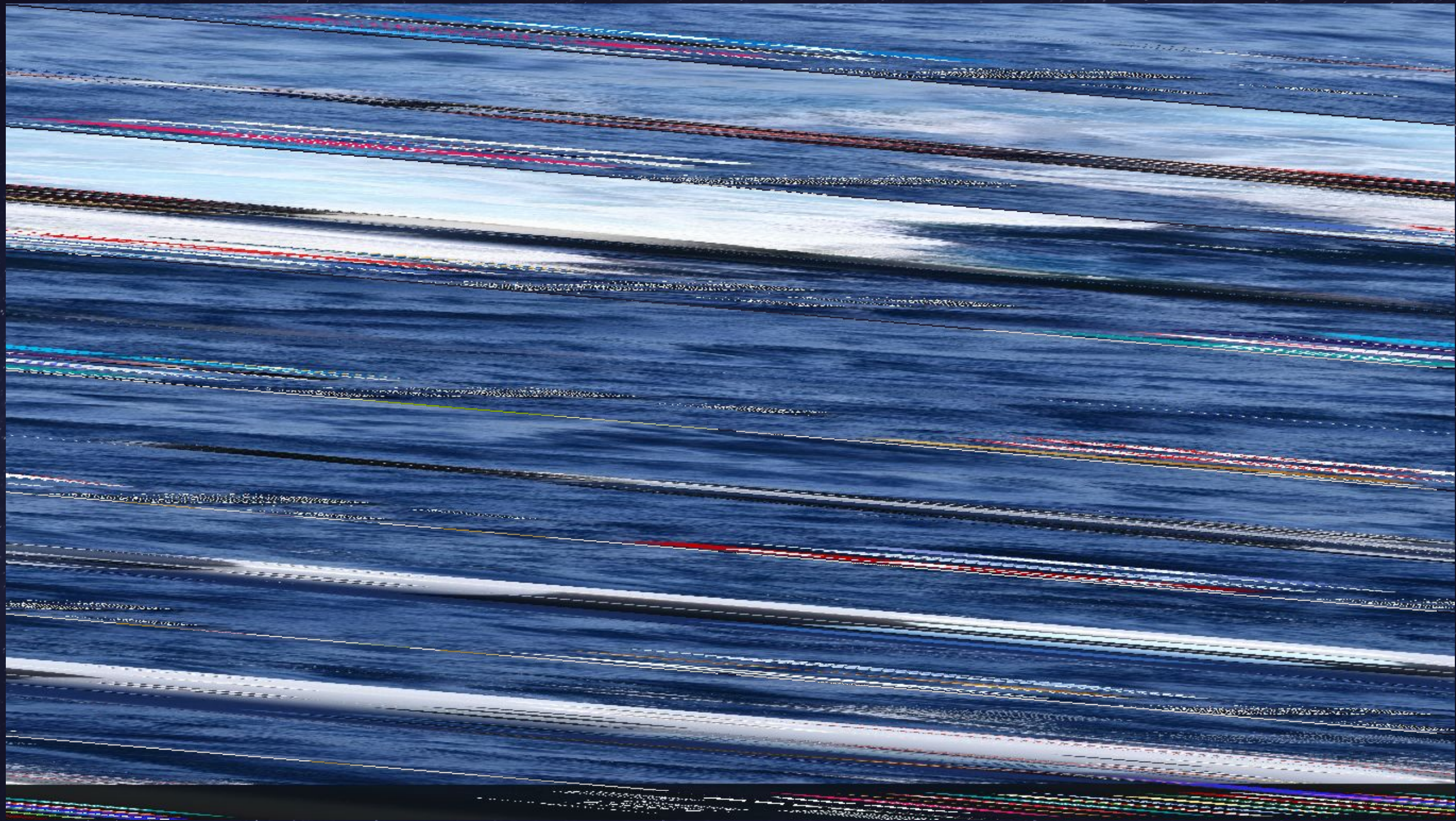
Pin 12

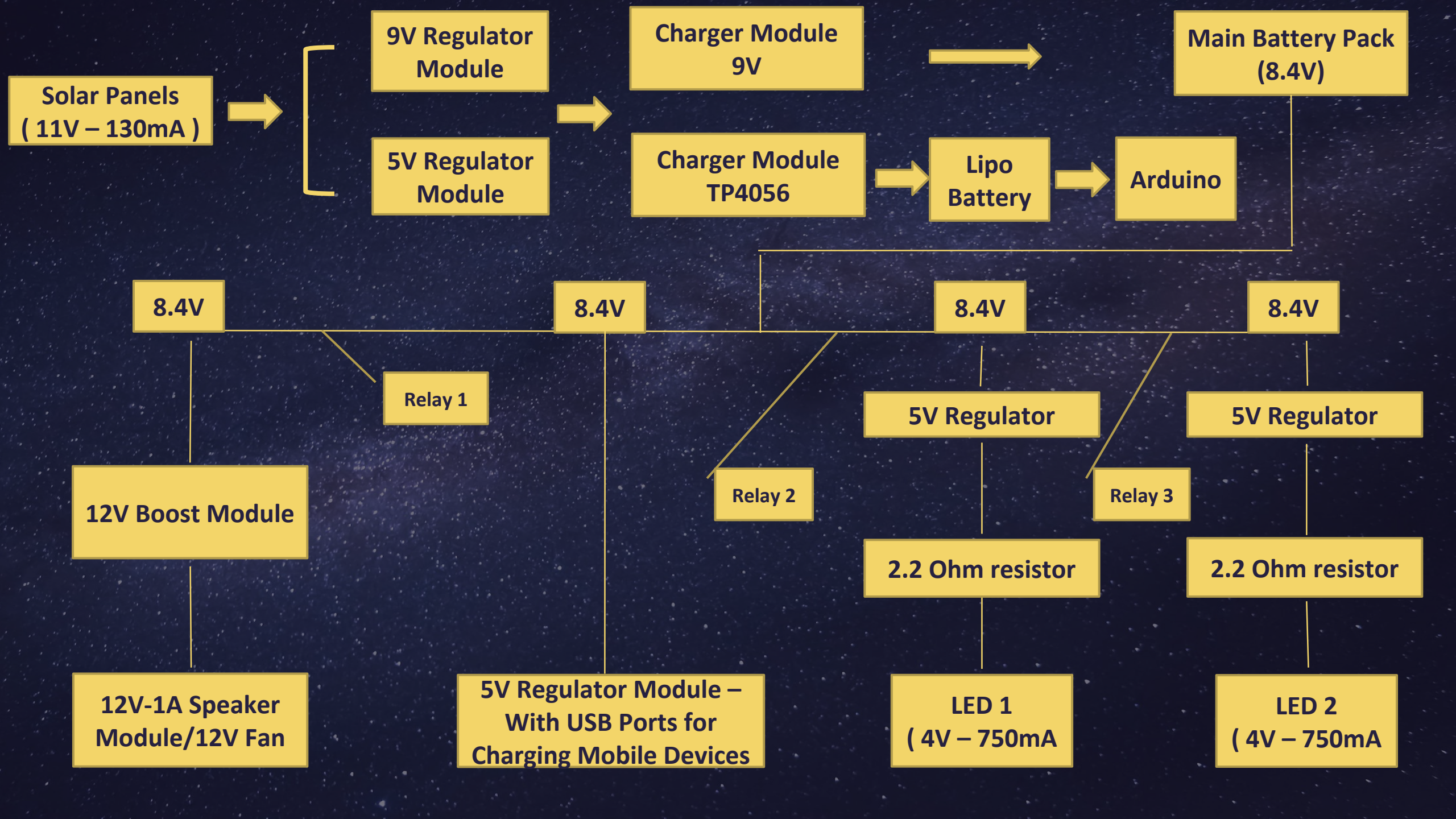
Relay 1

Relay 2

Relay 3

Buzzer

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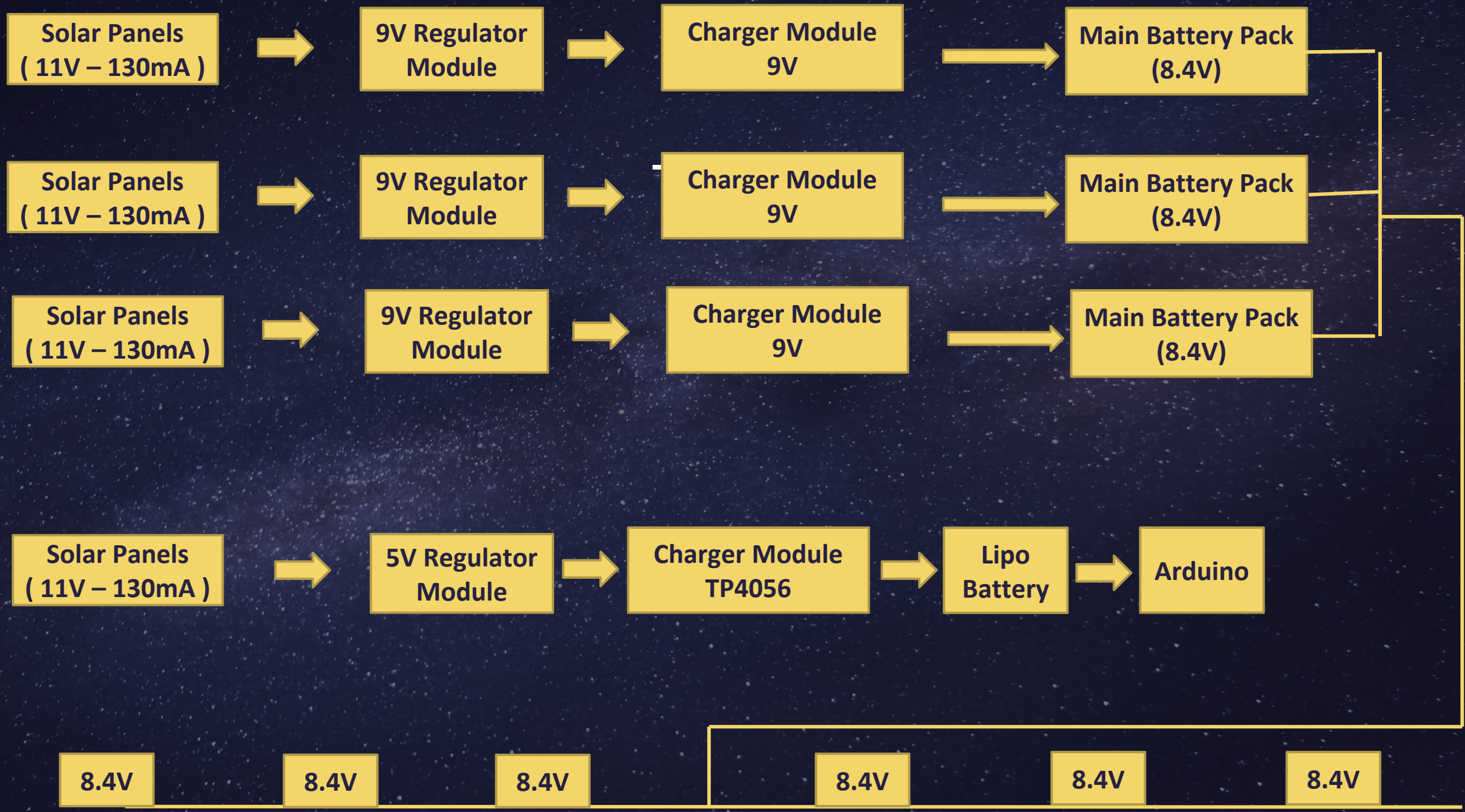
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