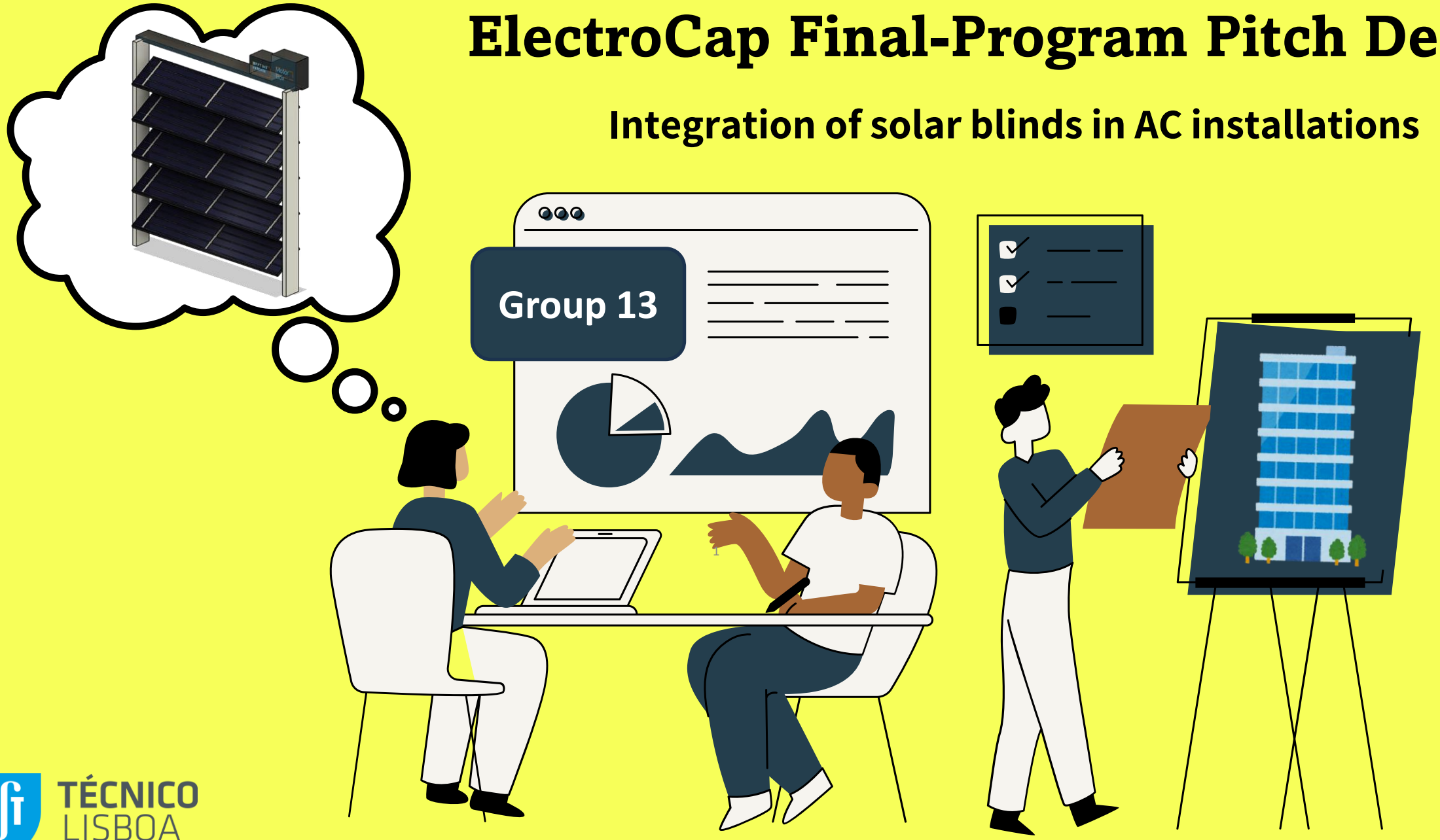
ElectroCap Final-Program Pitch Deck

Integration of solar blinds in AC installations



TÉCNICO LISBOA

Team

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Advisors and Mentor

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- **Mentor:** Ricardo Lameirinhas

Scientific Advisor

Scientific Co-Advisor

Coordinator

Mentor

Introduction

Renewable Sources

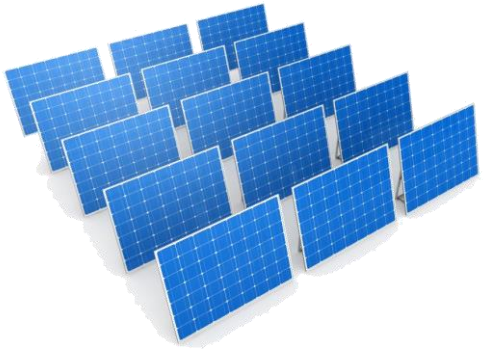
What do we want?

To address climate change and transition to sustainable energy sources with innovative solutions

Practical solution

Seamless integration

Helps



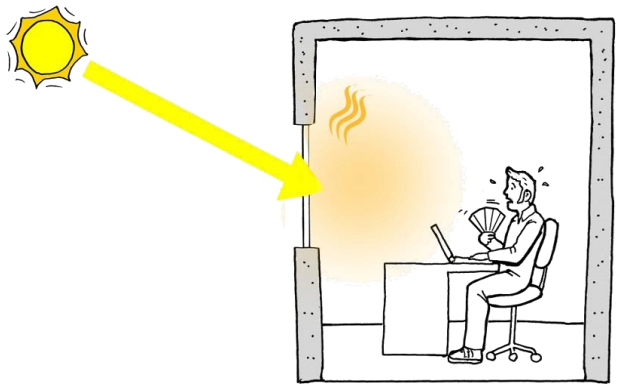
Require a vast area to install panels

Problem

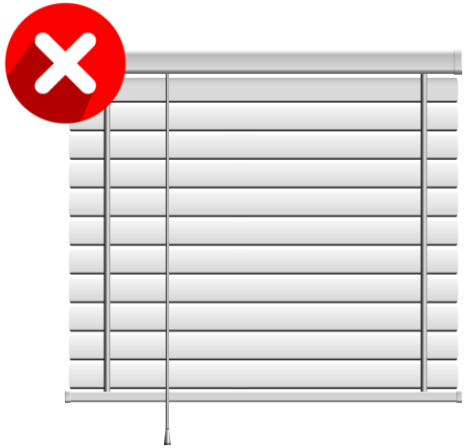
There is significant energy inefficiency in conventional electrical installations. Regular blinds represent major energy loss and heat gain.

Solution

Replacing old fashioned blinds with solar blinds, the amount of energy used from electrical providers will be reduced by the amount of electricity generated by the blinds.



Energy loss and heat gain



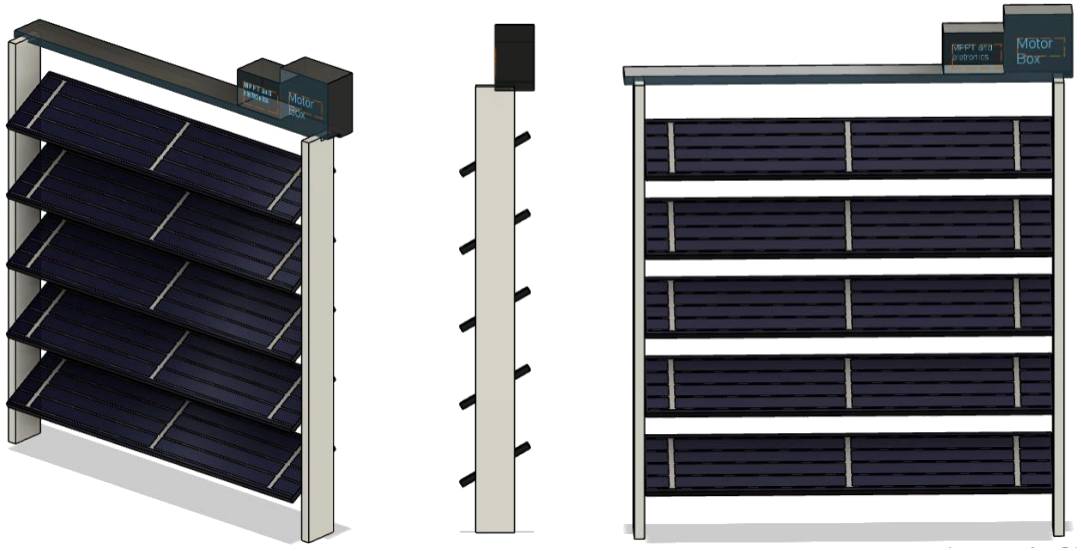
Conventional Blinds

Replace

Solar Blinds

Solution

Solar Blinds



Technology Used

1. Microcontroller
2. Electrical Motor
3. Photovoltaic Cells
4. Inverter (DC-AC) and MPPT
5. Structure that supports the cells

How does it work?

1. Solar blinds produce energy from the sun
2. Energy conversion and grid injection

- Save costs on electricity bills up to **30%**
- Up to 600 kWh per 1 sq.m (annually)

Product

Benefits

- Energy efficiency;
- Costs savings in electricity;
- Environmental impact;
- Seamless integration;
- Grid independence and reliability;
- User-friendly.

Solar Blinds

1. Temperature Control
2. Brightness Control
3. Renewable Energy Production

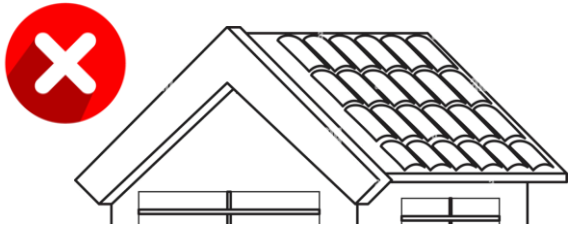
Operational Modes

Mode A – Automatically changes its inclination in order to maximize the energy produced.

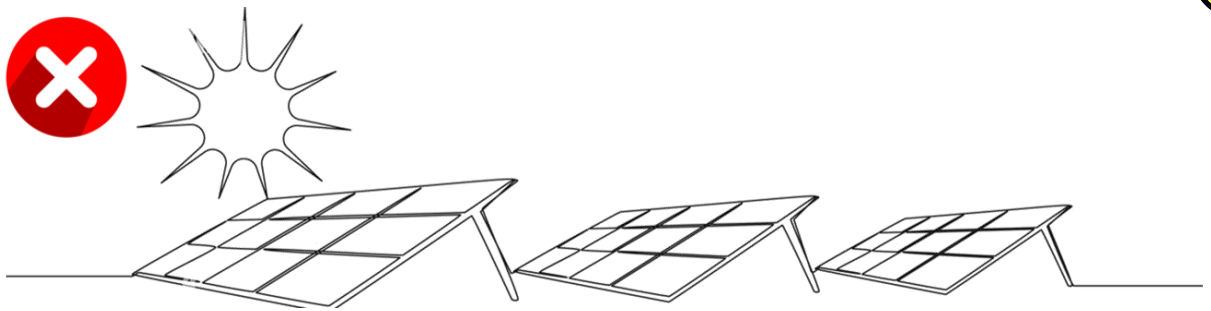
Mode B – The user can mannually operate to adjust the blinds.

Beneficiaries

Buildings without accessible roofs or with limited surface area to install photovoltaic panels.



Accessible roofs



Large surface area

1. Schools and Universities

2. Offices and Shopping Centers

3. Other professional and commercial buildings

and many others …

Competitors and Previous Work

Competitors

Solar Gaps

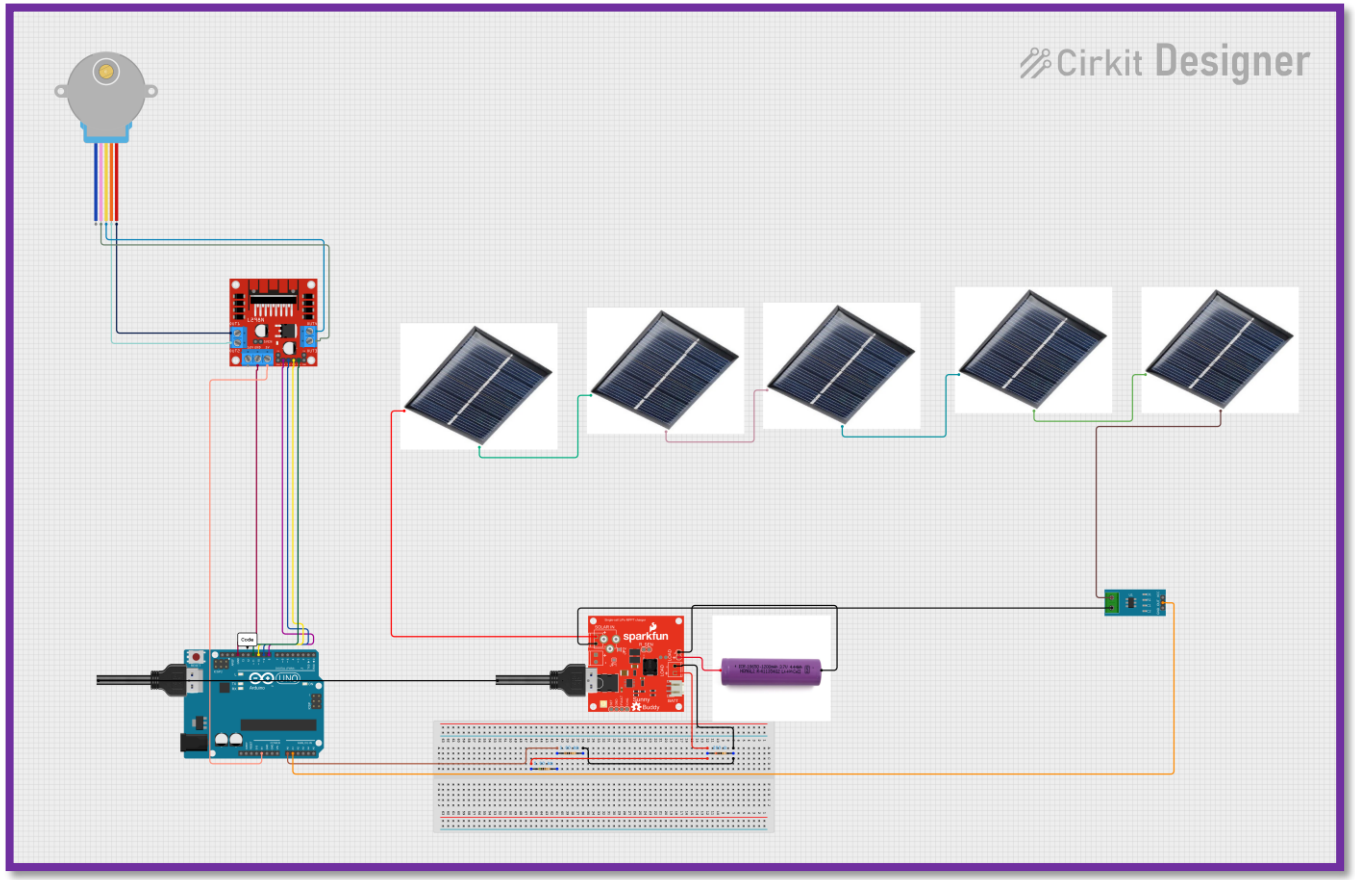
SolarGaps

Previous work

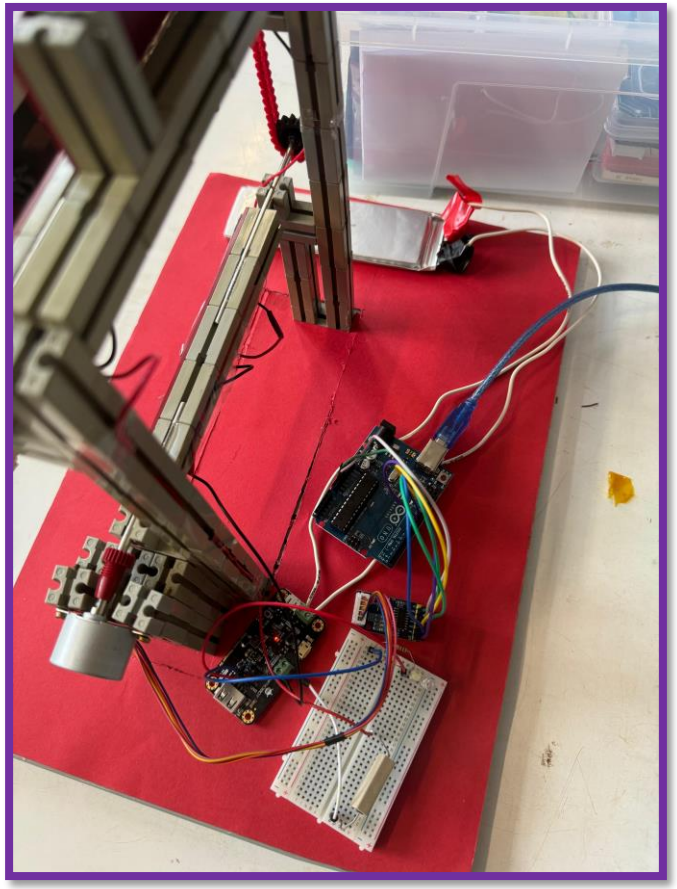
Research related to the project called : “Solar Powered Window Blinds” done by University Central of California.

Research related to the project called : “A New Dynamic and Vertical Photovoltaic Integrated Building Envelope for High-Rise Glaze-Facade Buildings” published by Elsevier Ltd. on behalf of Chinese Academy of Engineering

Electrical diagram



Real

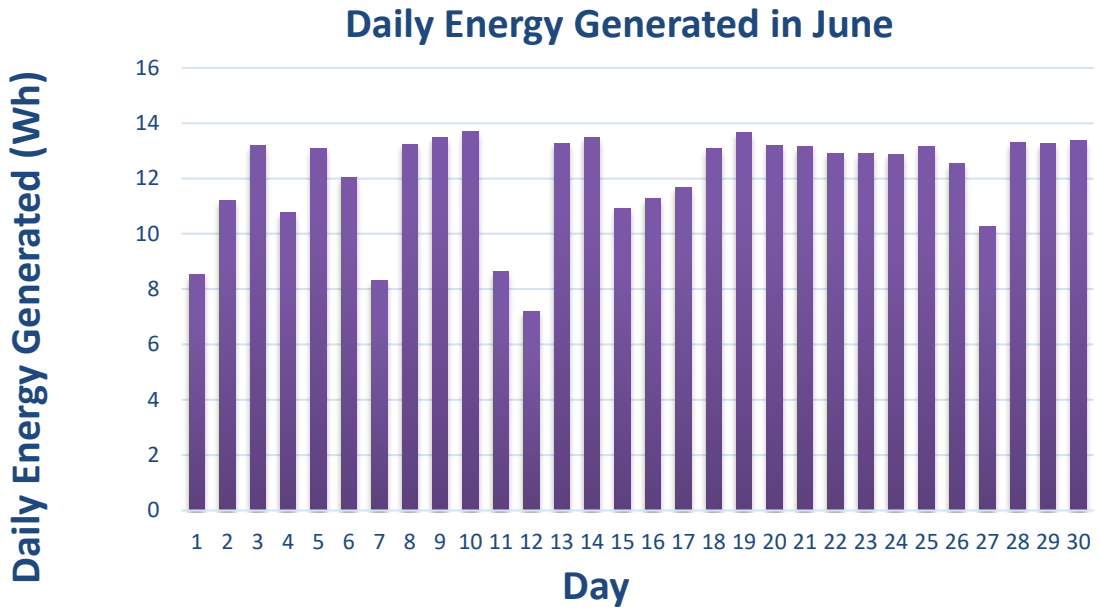


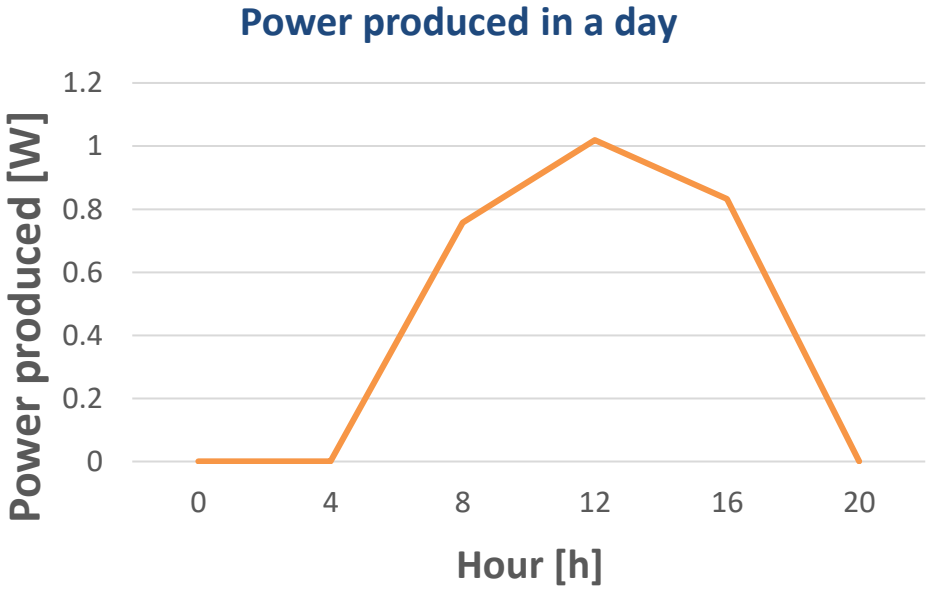
Schematic

Prototype

Analytical Model

Check our Report





12 Wh are aproximately produced every day in June

At peak hour **1 W** is generated

Just in June aproximately **360Wh** can be generated with our prototype of 6 photovoltaic cells

Aplication

Check our Report

Description

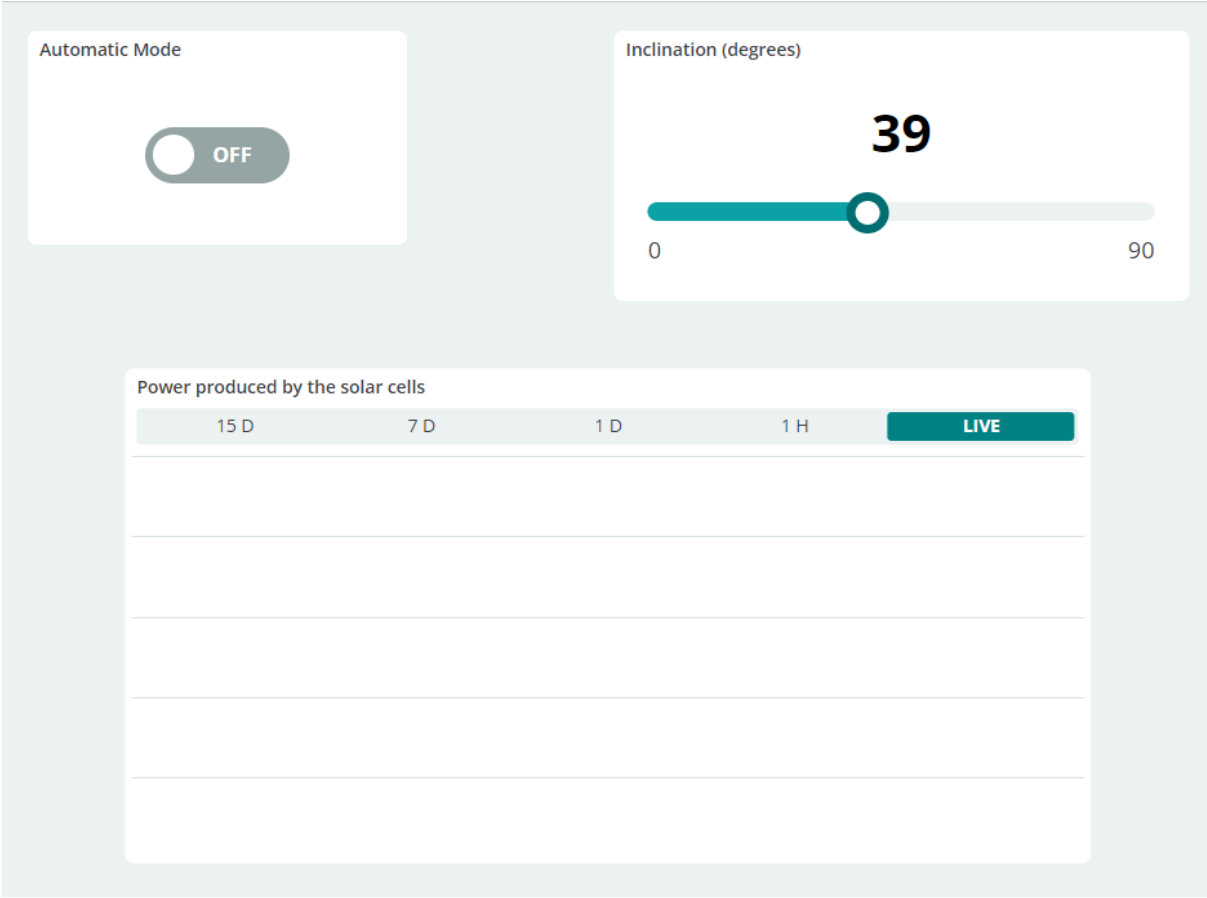
Based on the latitude and longitude of the solar panels, the solar altitude is calculated.

Solar blinds rotate **automatically** according to the solar altitude.

If it is indicated by the user, it is possible to rotate them **manually** at a desired angle.

The power produced by the solar panel is presented in a **graph**.

Dashboard

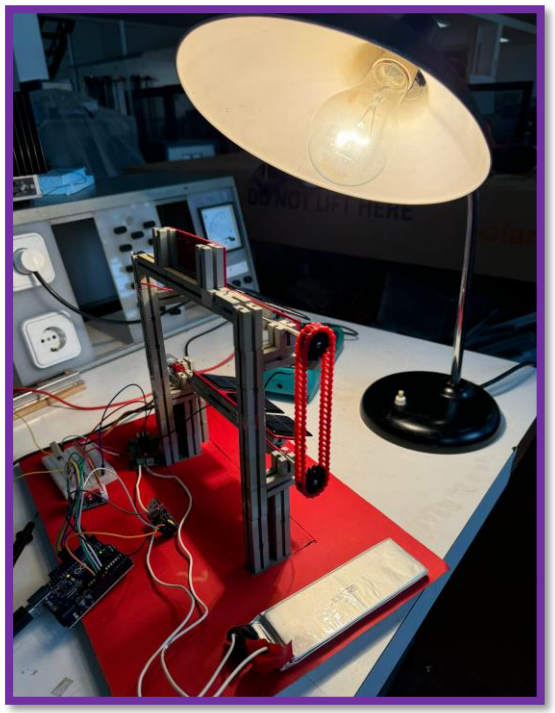


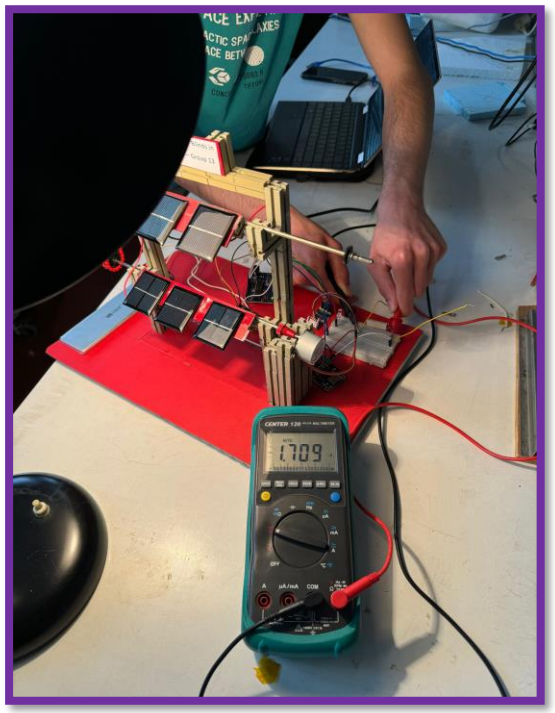
Testing Prototype

It wasn't a sunny day

Solution

1 Incandescent light bulb



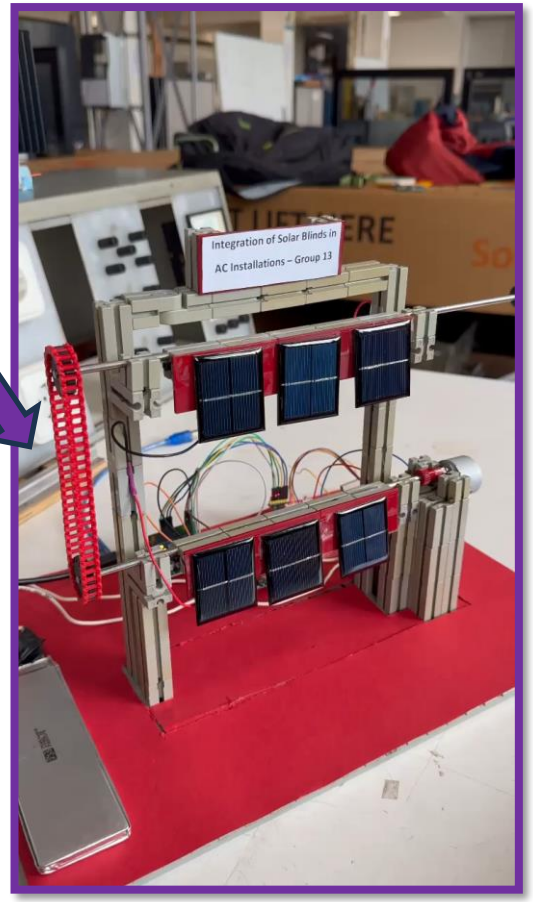


Both operational modes were successful

Obtained 0.26 W

Testing Prototype

Dashboard



Time-Lapse (Automatic Mode)

The user can **manually** operate to adjust the blinds

Costs

Check our Report

Project Example nº1

1

Type of building:	**Public Institute**
Location:	**Lisbon**
Window area:	**136.2 sq.m**
Facing:	**South-Southeast (19º)**
Annual production:	**88 MWh**
Project cost:	***48 000€**
Anual savings:	***15 000 €**
ROI 20 years:	***450%**

Project Example nº2

2

Type of building:	**IPSS**
Location:	**Lisbon**
Window area:	**9 sq.m**
Facing:	**South (0º)**
Annual production:	**6 MWh**
Project cost:	***3 200€**
Anual savings:	***630€**
ROI 20 years:	***260%**

*Approximated estimated values including VAT

For more details check our technical and economic study report

Market prediction

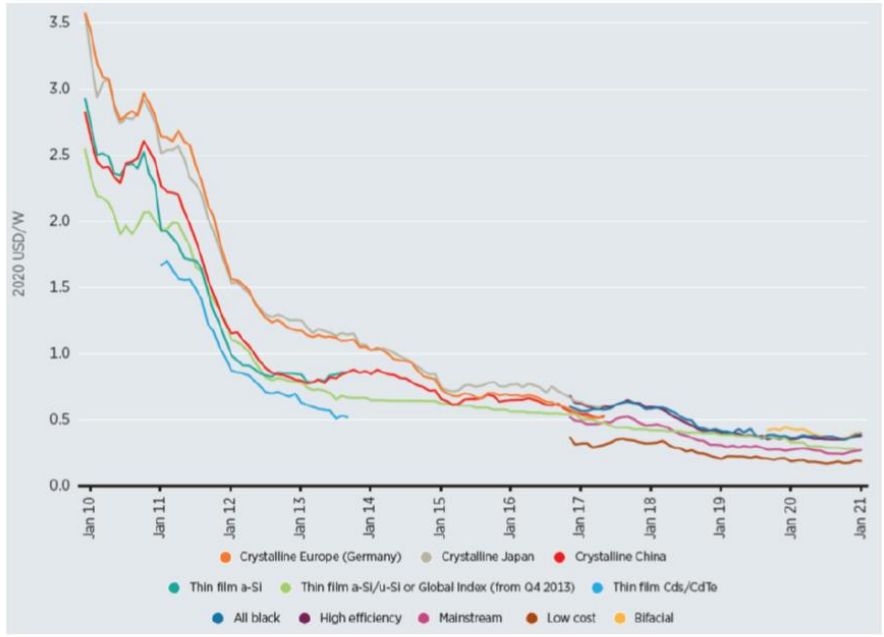
1. Annual **price reductions** for photovoltaic cells and DC-AC inverters

2. Annual **increase** in cell **efficiency**

*These results were taken from the European Commission's annual report: 'Photovoltaics in the European Union"

1

Figure 10. Module spot prices for different PV technologies for the period 2010-2021.



Source: (IRENA, 2022c)

2

Table 1. Yearly average module efficiencies for the period 2010-2021.

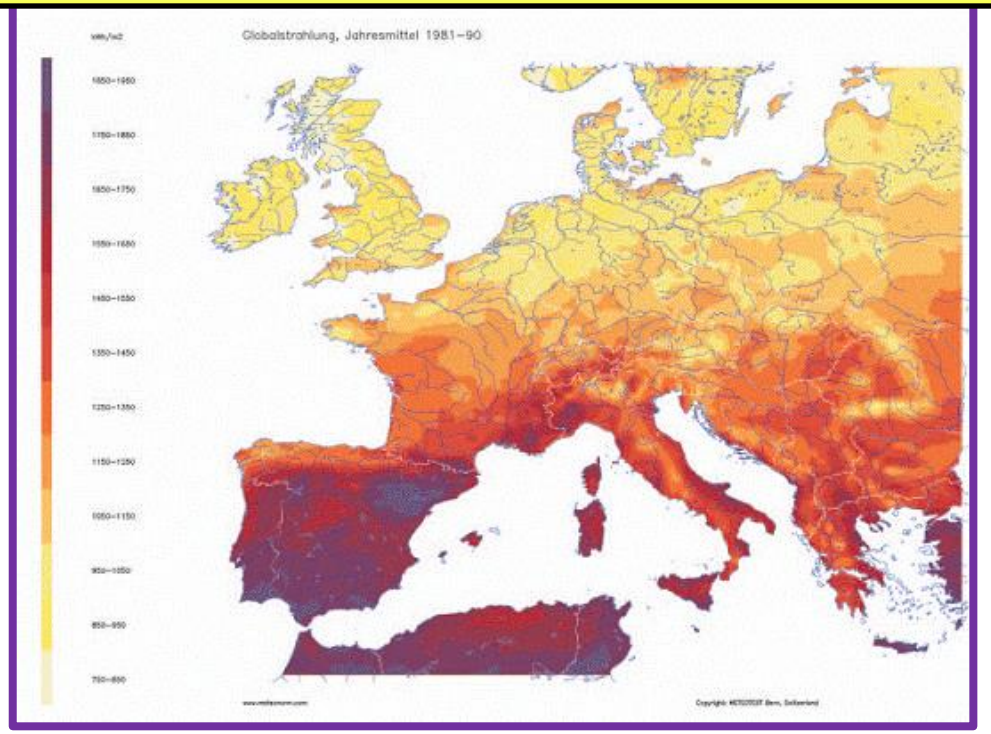
Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Aver. module efficiency [%]	14.7	15.2	15.4	16.0	16.3	17.0	17.5	17.7	18.4	19.2	20.0	20.9

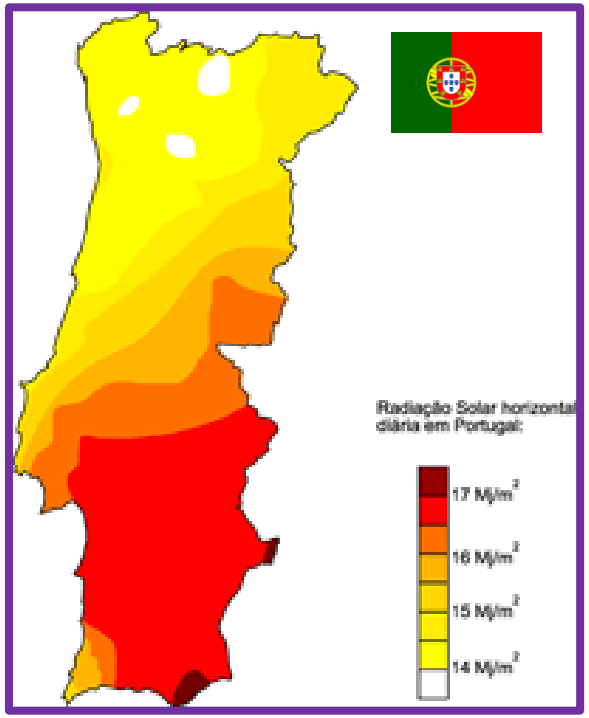
Source: (VDMA, 2022)

Availability of solar radiation

Portugal is one of the countries in Europe with the **greatest availability of solar radiation**

This is a good indicator of investment in this area





Distribution of solar radiation in **Portugal**

Team member's contribution

Neelam Visueshcumar	Lucas Santos	João Ribeiro
Analytical model	**Analytical model**	**Software Development**
Poster and Video Editing	Software Development	Prototype Development
Prototype Development and Structure Modelling	Prototype Development	Prototype Testing
Electrical circuit diagram	Prototype Testing and Time-Lapse	Poster
Energy Production analysis for prototype		

Team member’s contribution

Miguel Roça	Miguel Gonçalves	Jorge Assis
Project Development	**Technical and Economic Study**	**Technical and Economic Study**
Prototype Development and Structure Modelling	Landing Page & Communication	Poster and Video editing
Product Render and modelling	Video editing	Market Knowledge
Solar Cells Soldering	Electrical circuit diagram	Prototype Development and Structure Modelling
	Prototype Testing	

Demo Video

Check our Video

Renewable energy production

Integration of solar blinds in AC installations

Website

Blog