



Lightener

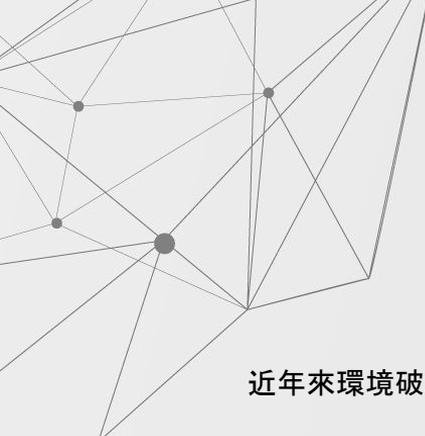
The streetlights that make your life easy and safe

Sustainable cities and communities

01

Motivation





Motivation

近年來環境破壞日益嚴重、氣候異常，許多人開始提出永續的想法，希望能為環境多付出一份心力。

從日常生活中觀察，在馬路密布的都市裡，路燈是不可或缺的元素。路燈為夜晚的交通提供光源，照亮街巷的死角，為現代生活帶來安全和方便。

然而，我們覺得既然路燈是如此頻繁出現的事物，假設能使他更節能之外，還能提供許多額外資訊以供參考，如此將大大提升我們的生活便利性。例如監測交通事故、火災、壞掉自動報修，量測空氣品質、噪音音量、氣象狀況，或是更實際的嵌入網路等服務。

藉此，能省下不少預算經費，以及日後維護上的不便，達到永續經營。



Primary Features

精準照明

平時在“待命”狀態中，當人車通過附近的路燈才全亮

情境假設

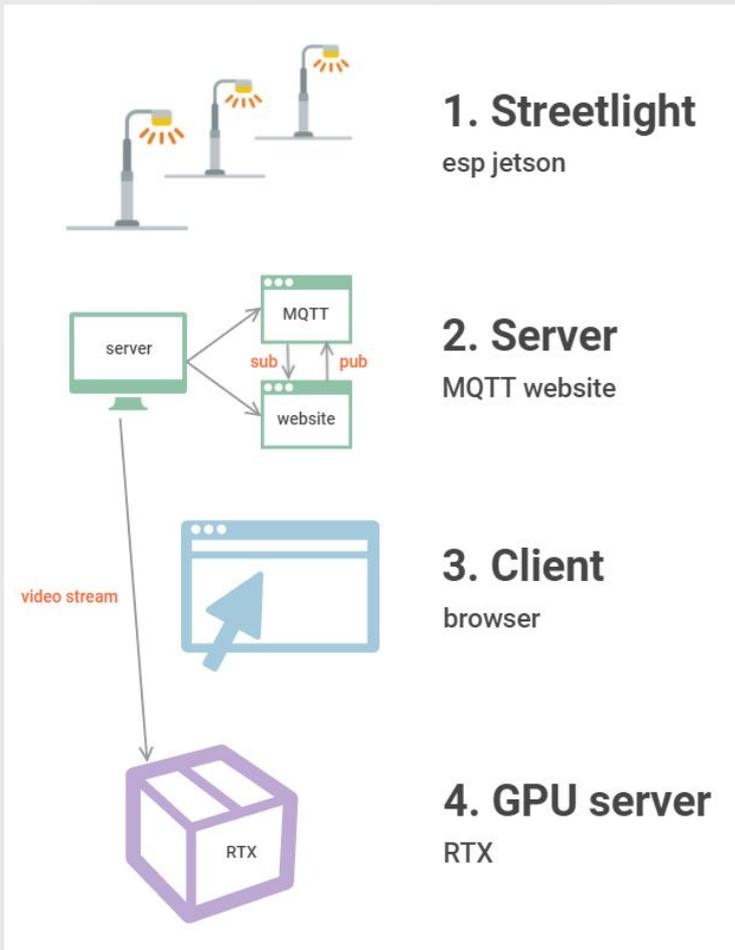
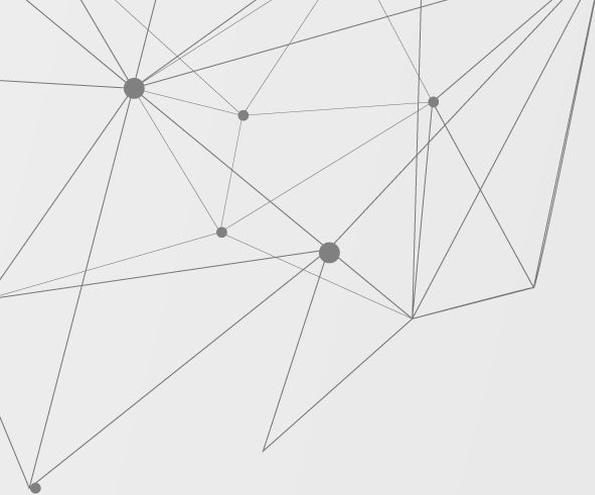
設想自己身處郊外的黑夜之中...
你獨自走在馬路上

跌倒偵測

隨時監看路面
當察覺有人躺在路邊
立即通報，並可在網頁中觀看即時畫面

IoT

路燈能回報自身狀態和 sensor 讀值、彙整到網頁上



1. Streetlight

esp jetson

2. Server

MQTT website

3. Client

browser

4. GPU server

RTX

02

Hardware

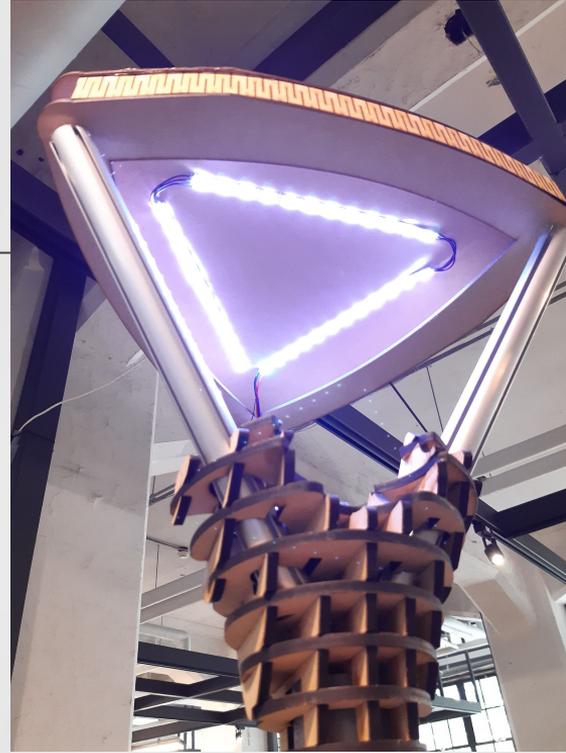
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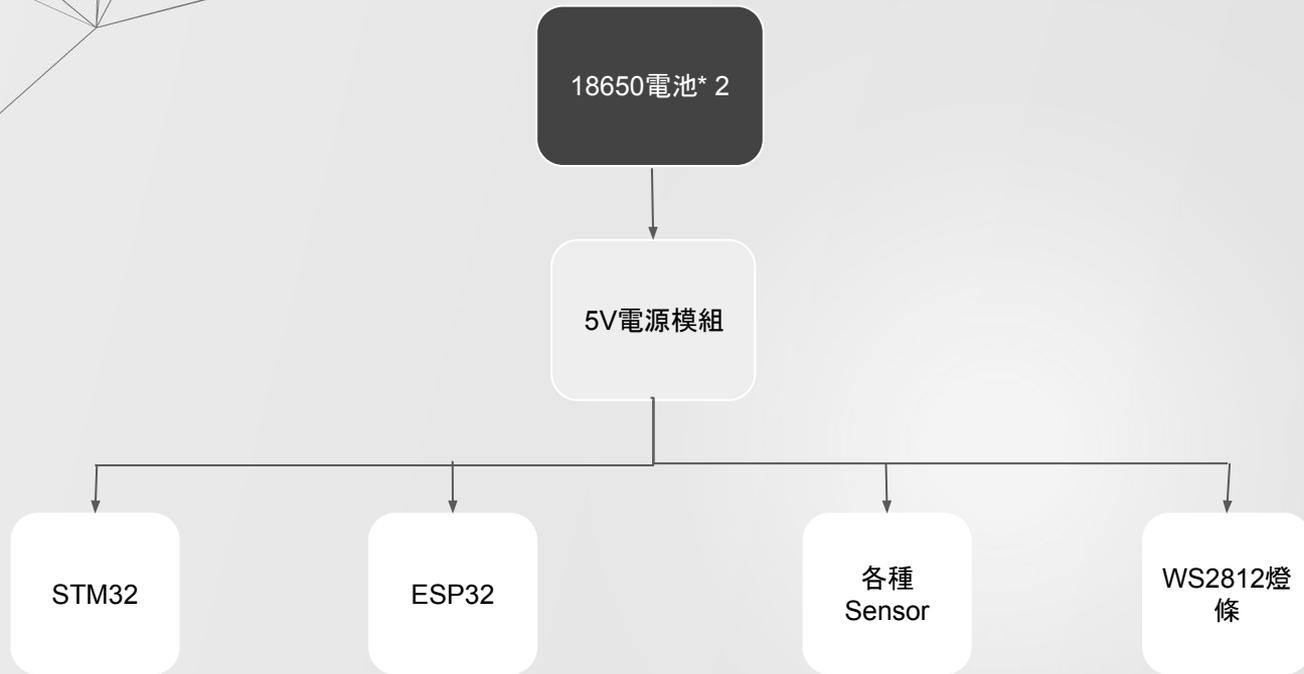
Structural design

Laser cut plywood to build 3D support

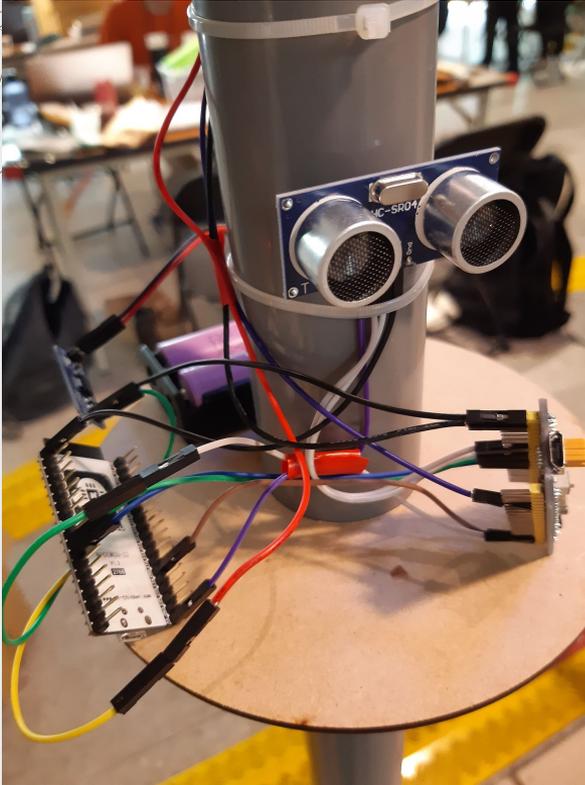
Laser cut is faster and waste less
material than 3D printing



電力架構



Hardware design



Sensor and development board

Jetson Nano (video transmitter)

Collect webcam stream and relay to GPU server

STM32 blue pill (main control of sensors)

STM32F746G-DISCO

ESP32(support wifi transmission)

Light sensor

Detect light

Ultrasonic sensor

To detect when something is on the road

WS2812

Firmware

Our firmware of STM32 is built on **STM32Cube**



LED Control

Our WS2812 LED strip can be driven by square waves in different period, so we adopt pwm and dma to send our control signal

For each sensor, we use different ways to collect data, such as using i2c, uart, timer...

Data Collection



Communication

After collecting data, our STM32 send data to ESP32 in order to upload to server, and ESP32 will receiver command from server to send the control signal of LED to STM32



03

IoT system

The software architecture

Software

Website UI

This website is for streetlights management. There are controls bar for light and data visualization of all the sensors on the streetlight.



Website-Light Control

Name and IDs

Name and IDs are for identification

Brightness

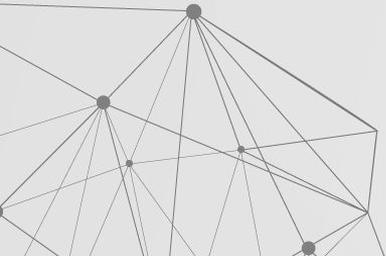
Remotely control the brightness

Description

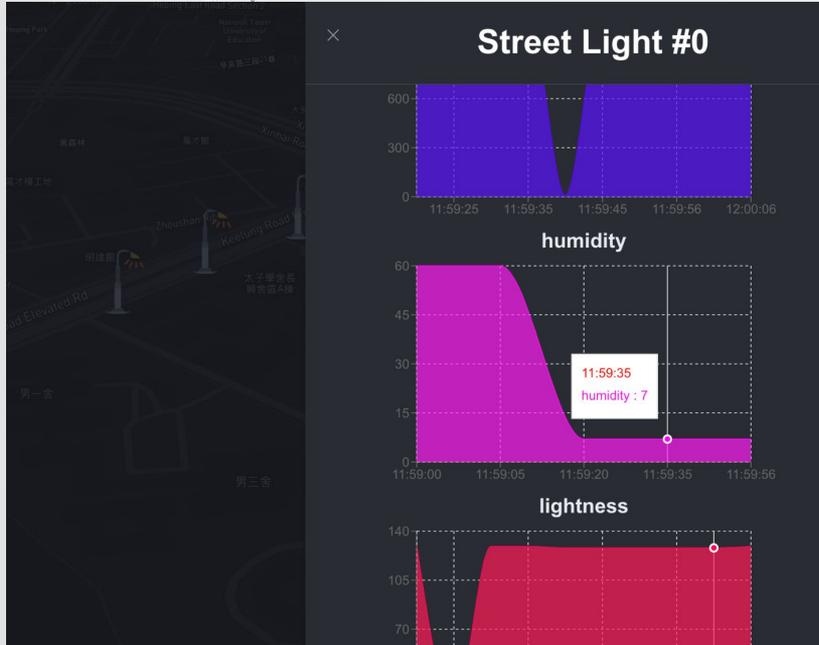
Detail description of this streetlight.

Sensors

All the sensors data are shown as real-time chart



Website



We have 4 kinds of sensors in total: Humidity, Lighting, Temperature,, and distance.

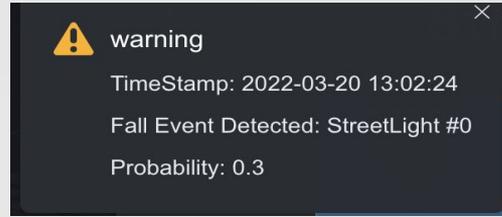
Data Visualization

After Sampling data from sensors on streetlight, we visualize these data into charts. Moreover, these chart are realtime, and updated dynamically. •

Surveillance Camera



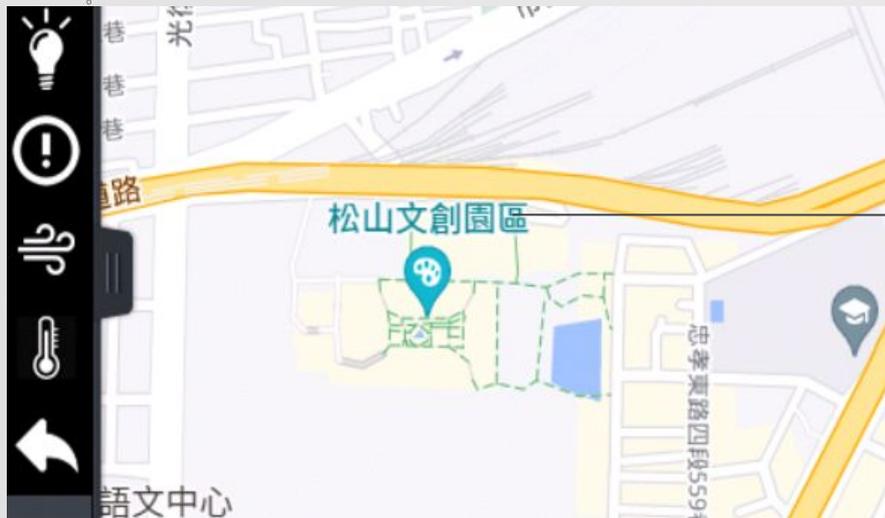
Human Fall Detection



Apply machine learning model to detect human in the camera and alert when someone falls down
And this event trigger the streetlight to be red.

GPU server

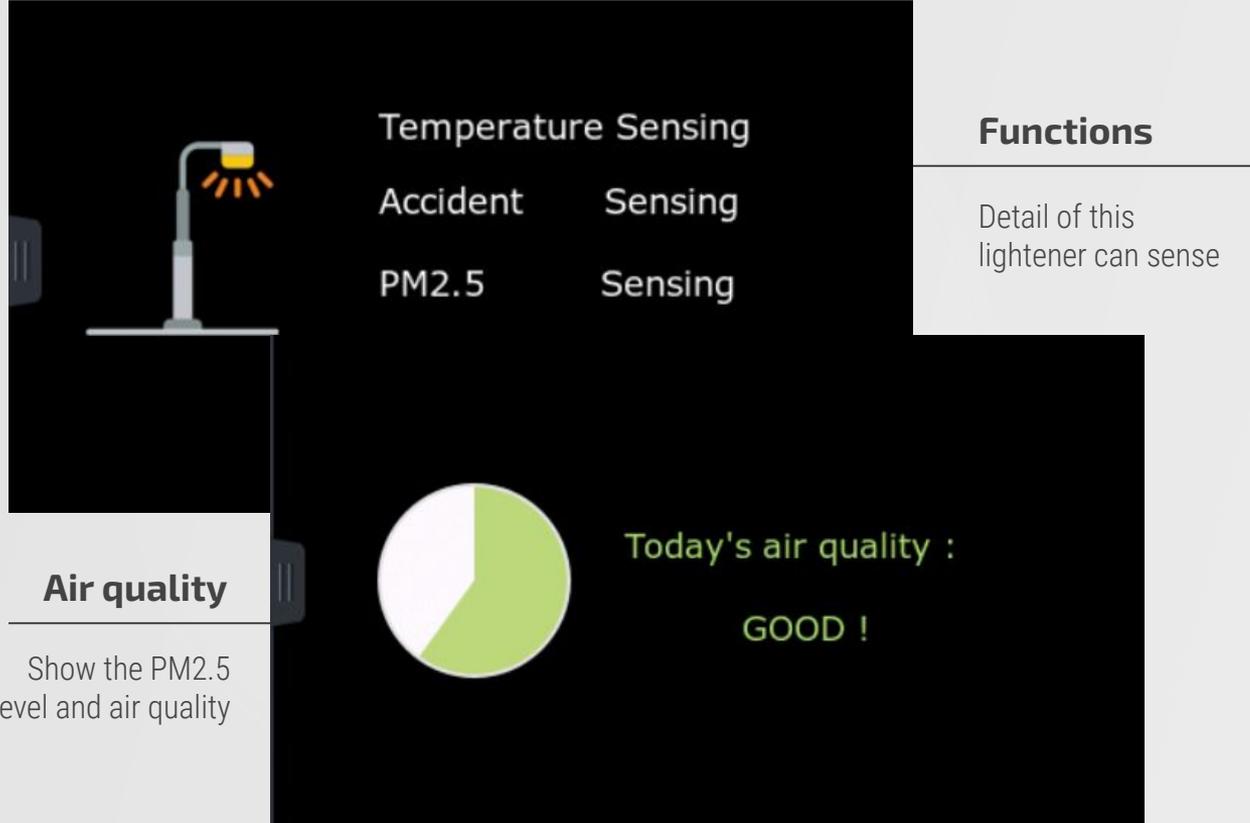
Touchboard UI



Location map

The touchboard shows the real location where the lightener is.

Touchboard UI



The image displays a Touchboard UI interface. On the left, there is a lightener icon with a yellow light. To its right, a list of functions is shown: "Temperature Sensing", "Accident Sensing", and "PM2.5 Sensing". Below this, a pie chart indicates "Today's air quality : GOOD!". The pie chart is divided into three segments: a white segment (approximately 33%), a green segment (approximately 33%), and a light green segment (approximately 33%).

Functions

Detail of this lightener can sense

Air quality

Show the PM2.5 level and air quality

Temperature Sensing
Accident Sensing
PM2.5 Sensing

Today's air quality :
GOOD !

The background features a complex network of thin, light gray lines connecting various-sized dark gray circular nodes. These nodes are scattered across the frame, with some appearing as larger hubs and others as smaller peripheral points. The overall effect is that of a digital or molecular structure. The word "THANKS" is centered in a bold, black, sans-serif font.

THANKS



03

IN BRIEF

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NEWS



NEPTUNE

Neptune is the farthest planet from the Sun



MARS

Despite being red, Mars is actually a cold place



MERCURY

Mercury is the smallest one in the whole Solar System



JUPITER

Jupiter is the fourth-brightest in our Solar System



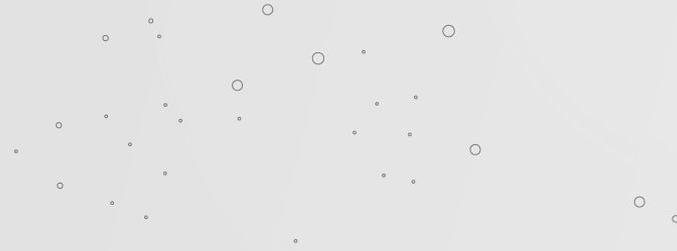
VENUS

Venus has a beautiful name and is terribly hot as well



SATURN

Yes, Saturn is the ringed planet. It's a gas giant





CUSTOMER REVIEWS

“Neptune is the farthest planet from the Sun and the fourth-largest planet in our Solar System!”

**RICHARD
ROE**

“Despite being red, Mars is a cold place. It’s full of iron oxide dust, which gives the planet its reddish cast”

**HELENA
PATTERSON**



THIS IS A TABLE

	ISSUE 1	ISSUE 2	ISSUE 3	ISSUE 4
VENUS	12	32	23	45
MERCURY	67	23	45	65
MARS	67	49	78	34

04

WELCOME!

You can enter here the subtitle if you need it



WELCOME!



MARY RUIZ

Neptune is the farthest planet from the Sun and the fourth-largest



JOHN SMITH

Despite being red, Mars is a cold place, not hot. It's full of iron oxide dust



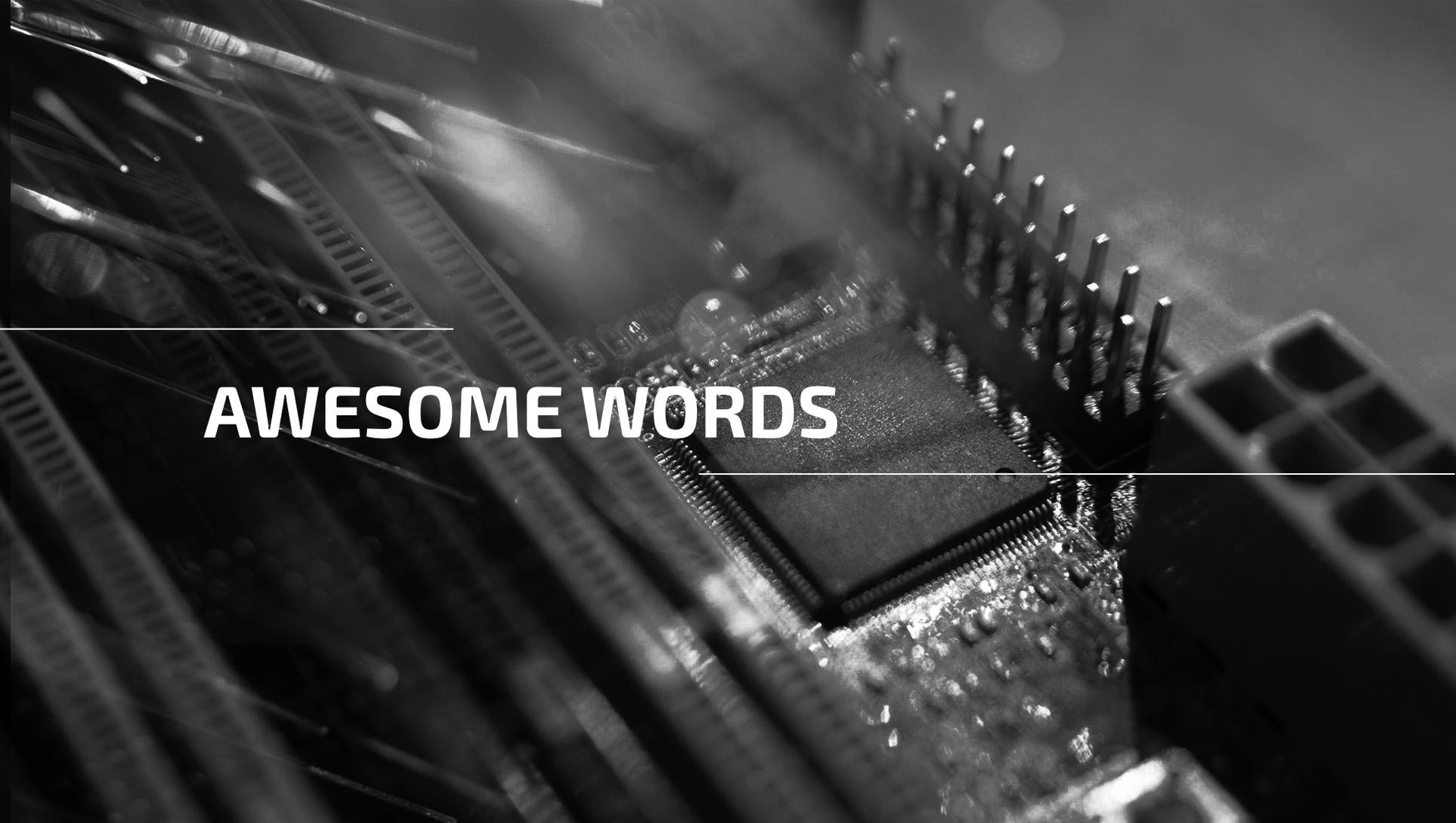
JONATHAN DOE

Mercury is the closest planet to the Sun and the smallest one



MINA HAWKINS

Venus has a beautiful name and is the second planet from the Sun



AWESOME WORDS

05

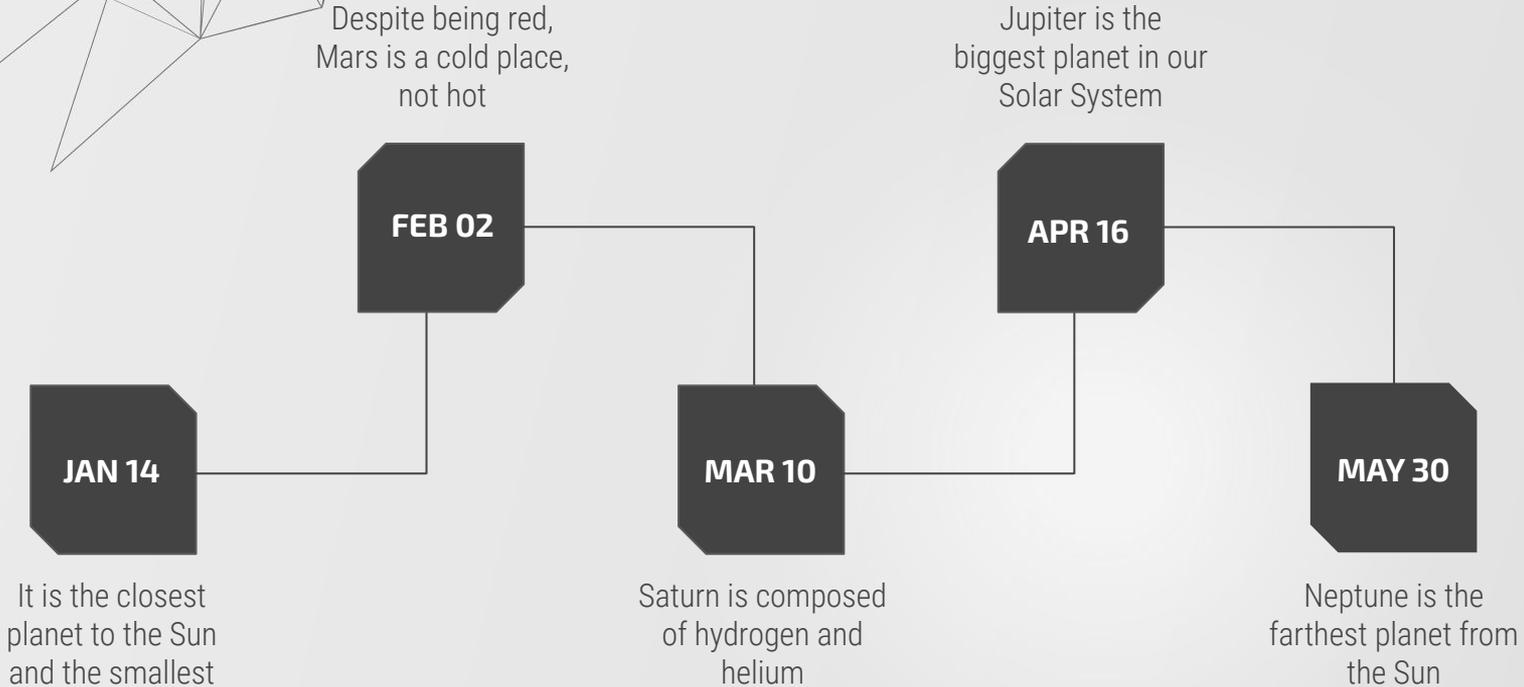
EVENTS

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REVIEW OF PAST EVENTS



UPCOMING EVENTS

SEP 08



Mercury is the closest planet to the Sun

OCT 16



Despite being red, Mars is a cold place



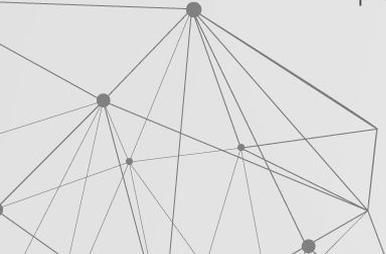
NOV 29

Saturn is composed of hydrogen



DEC 10

Jupiter is the biggest planet in our Solar System



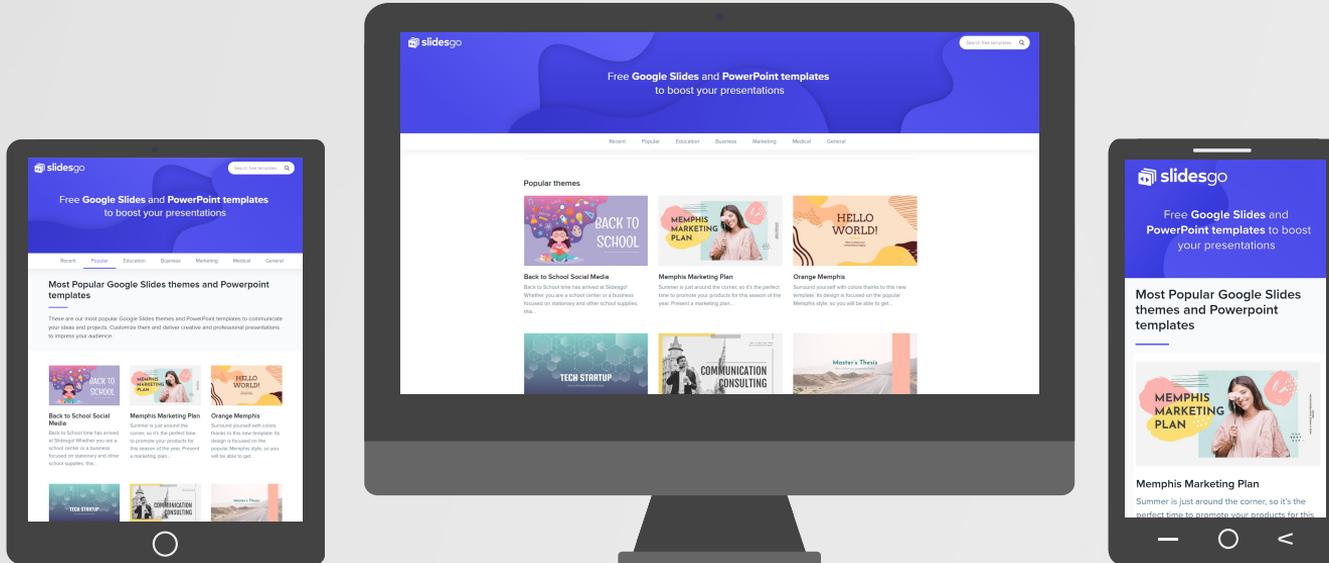


06

SNEAK PEEK

You can enter here the subtitle if you need it

SNEAK PEEK



Neptune is the farthest planet from the Sun and the fourth-largest in our Solar System



THANKS

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- Woman using smartphone with hologram
- Happy businesswoman looking at camera with holding pencil and diary
- Portrait of smiling man holding digital tablet looking at camera
- Smiling bearded man holding disposable coffee cup while opening door
- Portrait of pretty woman holding laptop looking at camera
- Motherboard with optical fiber
- Futuristic technology screen interface
- Front view of businessman holding high tech tablet
- Businessman holding the newspaper and smiling
- Multiracial group of cheerful coworkers

- Happy young couple exchanging love messages
- Smiling business people team sitting around the table in the meeting

VECTORS

- Technology background with gradient colors
- Blue 5g concept background
- Abstract landing pages with technology devices

PREMIUM ICONS

- Big Data Icon pack

PREMIUM PHOTOS

- Short haired business woman laughing



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A dark gray rounded square with a thin white border, containing the text "#434343".

#434343

A light gray rounded square with a thin white border, containing the text "#e6e6e6".

#e6e6e6

A white rounded square with a thin white border, containing the text "#ffffff".

#ffffff

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Pana



Amico



Bro

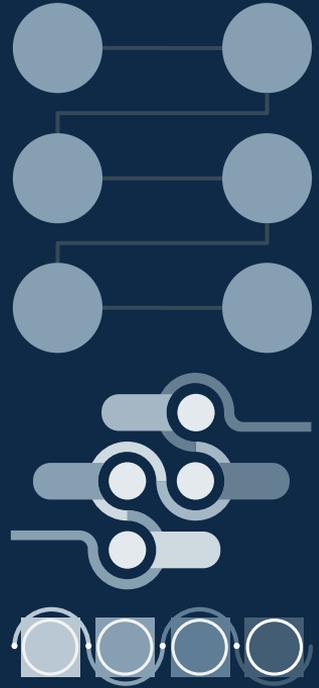
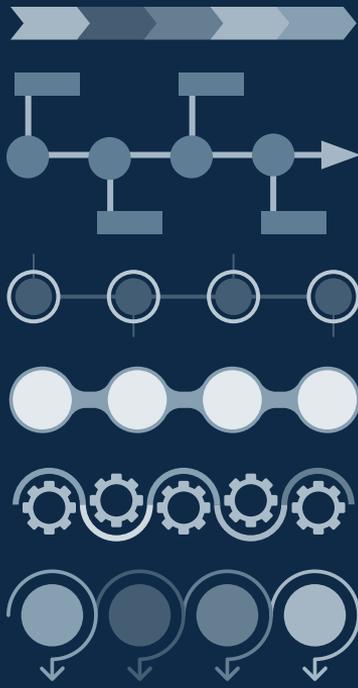
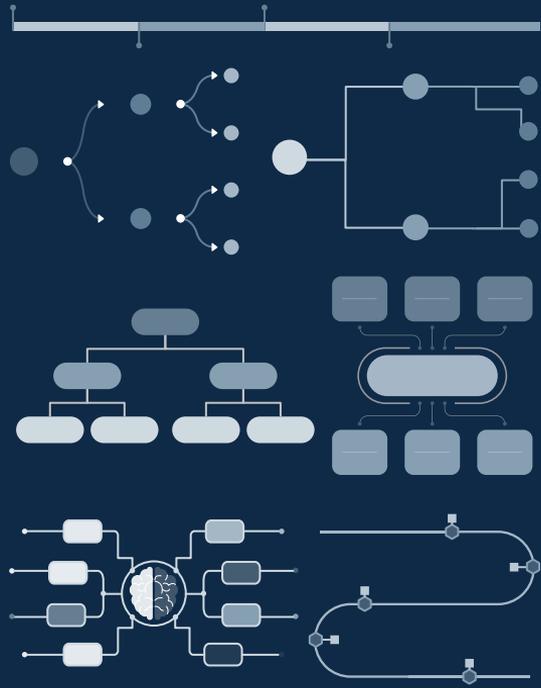


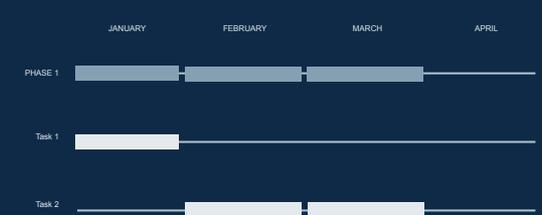
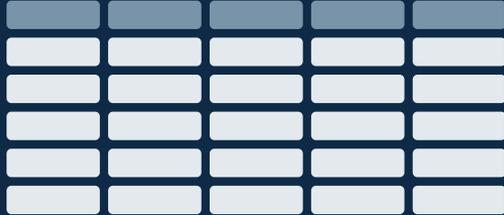
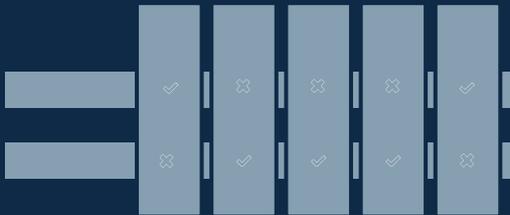
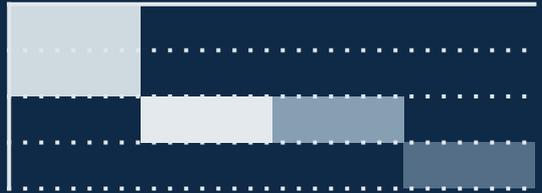
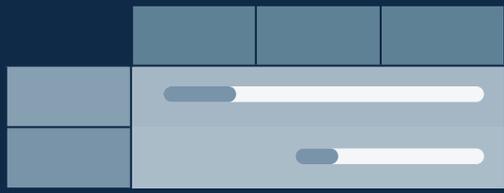
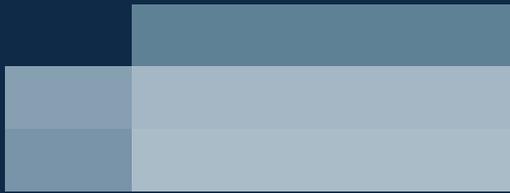
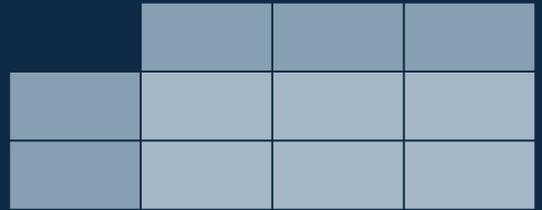
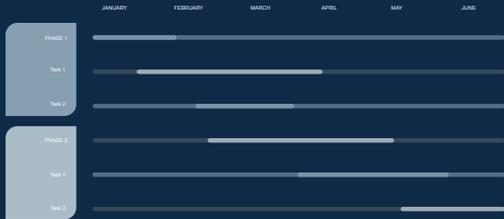
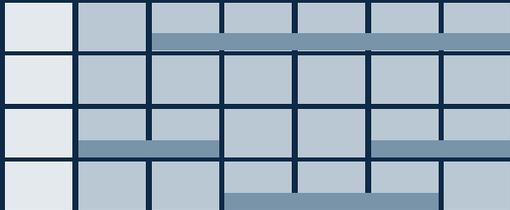
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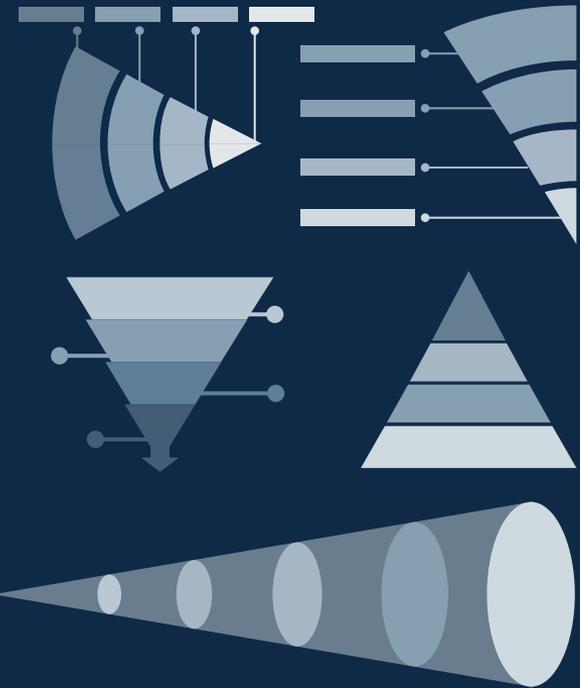
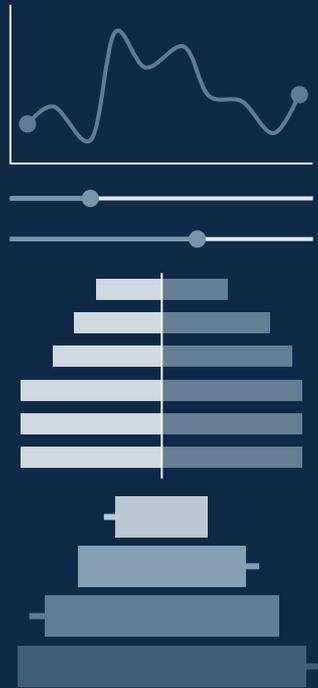
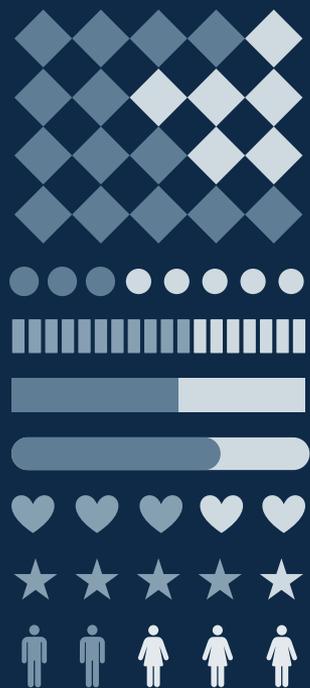
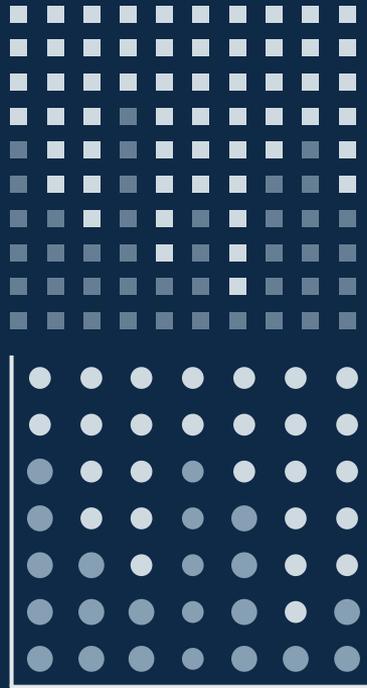
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