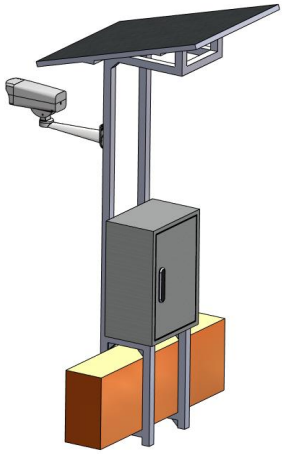
Promotion of Community Resilience Against Plastic Pollution and Climate Change in the Mekong River Basin

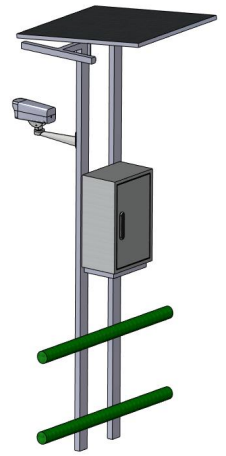
(Plastic and Climate Resilience)

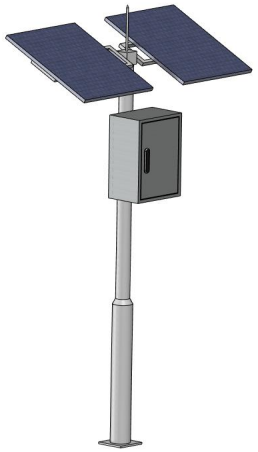
Activity 4: Implementation of the developed solutions in the selected riverine communities - Monitoring

pLitterCCTV

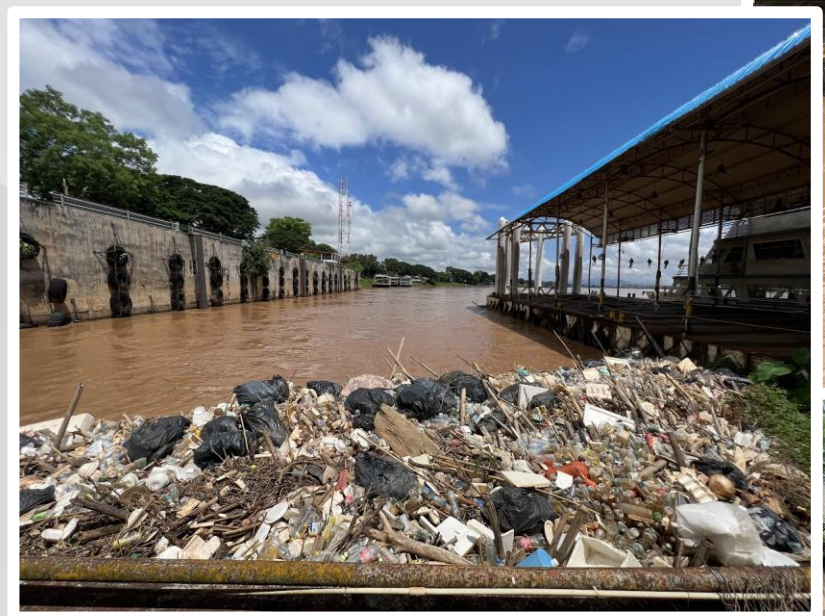
Training Material

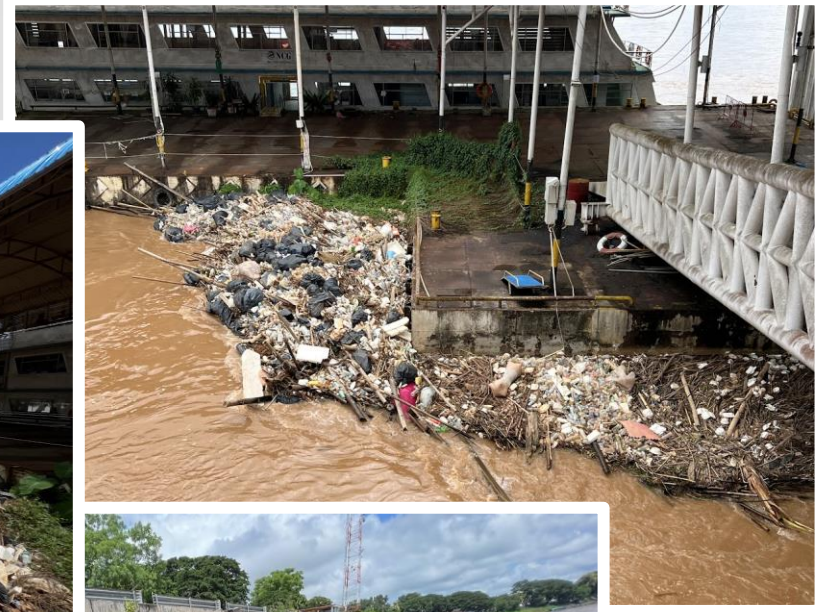






Contents



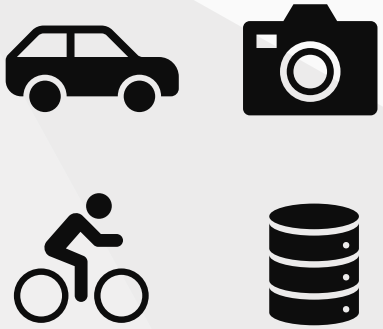


Plastic litter identification using Vision, AI and Geospatial Technologies

What is pLitter?

4M
Man|Machine|Monitoring|Mapping

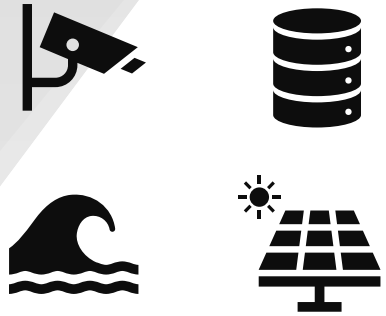
pLitter Street



Littering heatmap city-scale

Number of objects identified

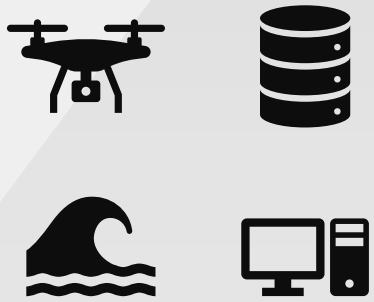
pLitter CCTV



Analytics of floating objects

PLASTIC LITTER

pLitter Aerial



Plastic litter snapshot along canals

pLitter Mobile

Analytics of collected data with geolocation by Citizen Scientists

pLitter CCTV

Why?

Continuous Monitoring of Floating Plastics

Capture and Visualize the Accumulations using Analytics

Monitor the Dumping and Cleaning Activities

Goal and Execution

Integrating Machine Learning & AI technologies while moving towards renewable energy

Strong and stable

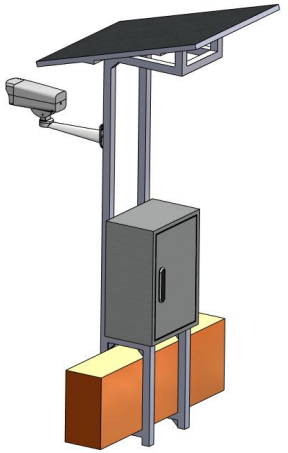
Weather resistance

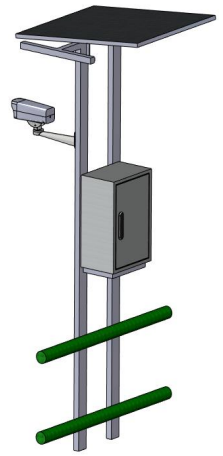
Power harvesting

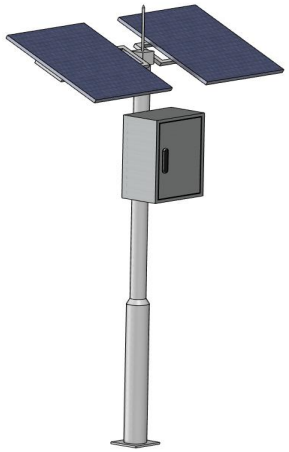
Power storage

Our Product

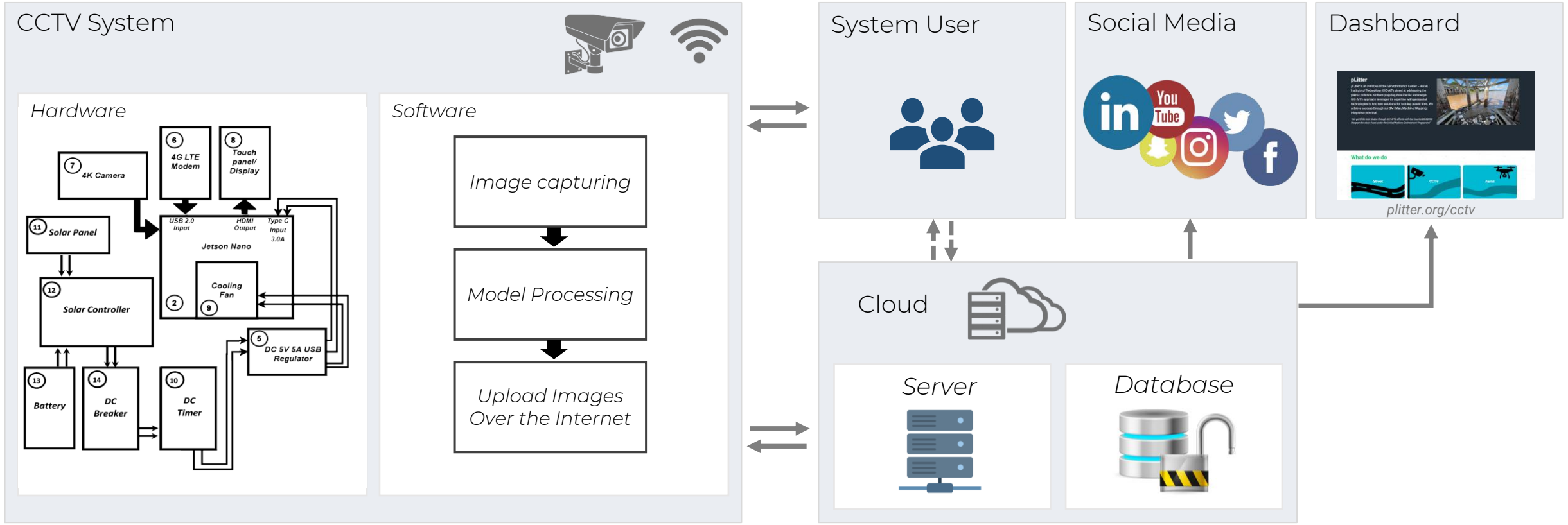
- REAL-TIME PREDICTION
- REAL-TIME DATA TRANSMISSION
- LOW-COST CCTV MODULE
- TIME-LAPSE CAPTURING & CLOUD TRANSMISSION
- TECHNICAL KNOW-HOW IS OPEN



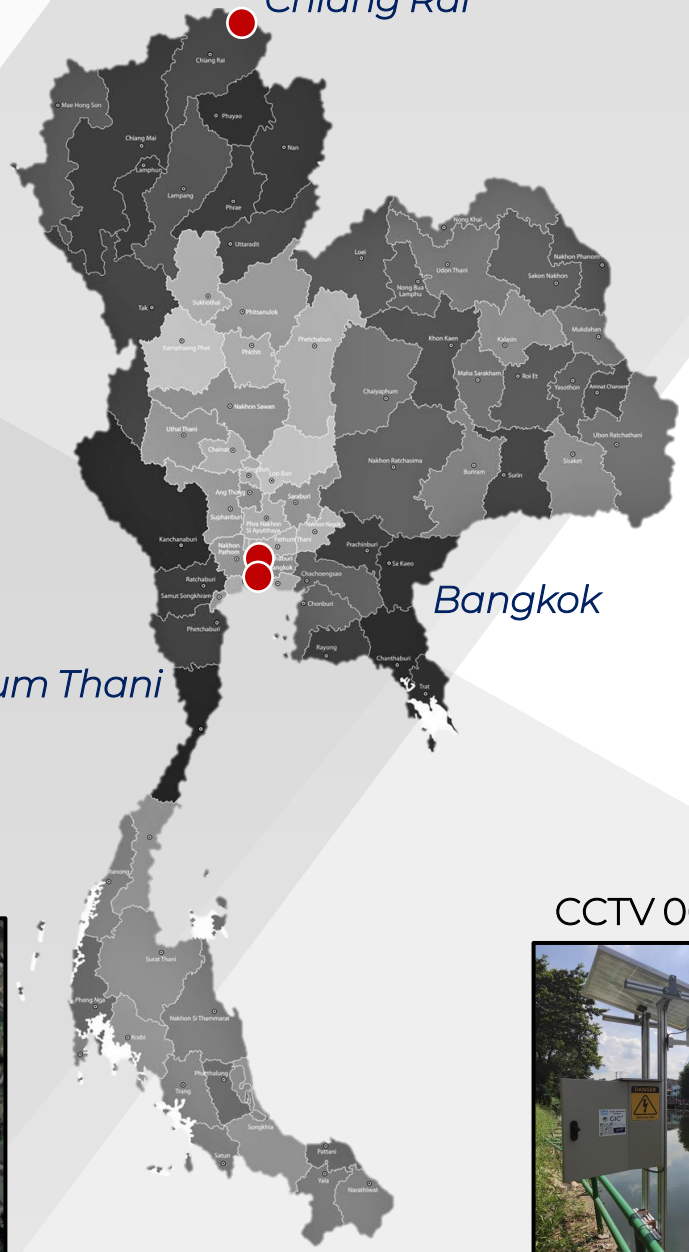




Architecture Diagram

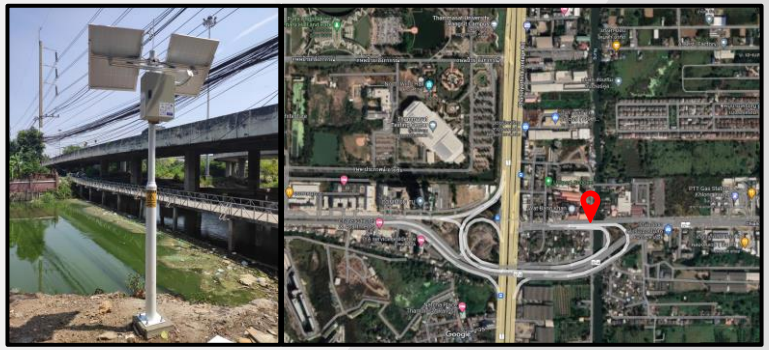


CCTV 04 Chiang Saen/Ruak River, Chiang Rai



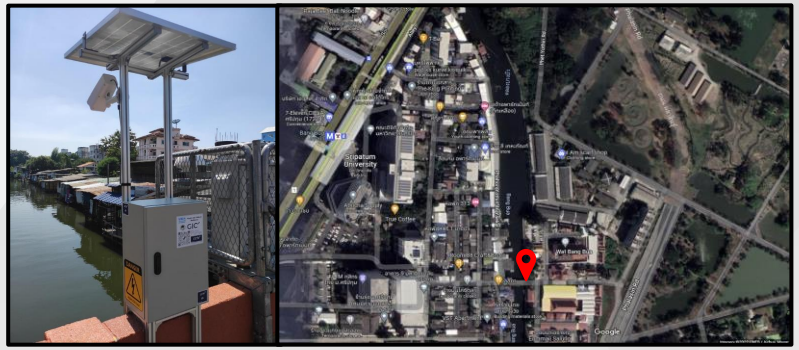
CCTV 01 Chiang Saen, Chiang Rai

CCTV 03 Ban Kang, Pathum Thani



CCTV 02 Chiang Saen, Chiang Rai

CCTV 05 Bang Khen, Bangkok

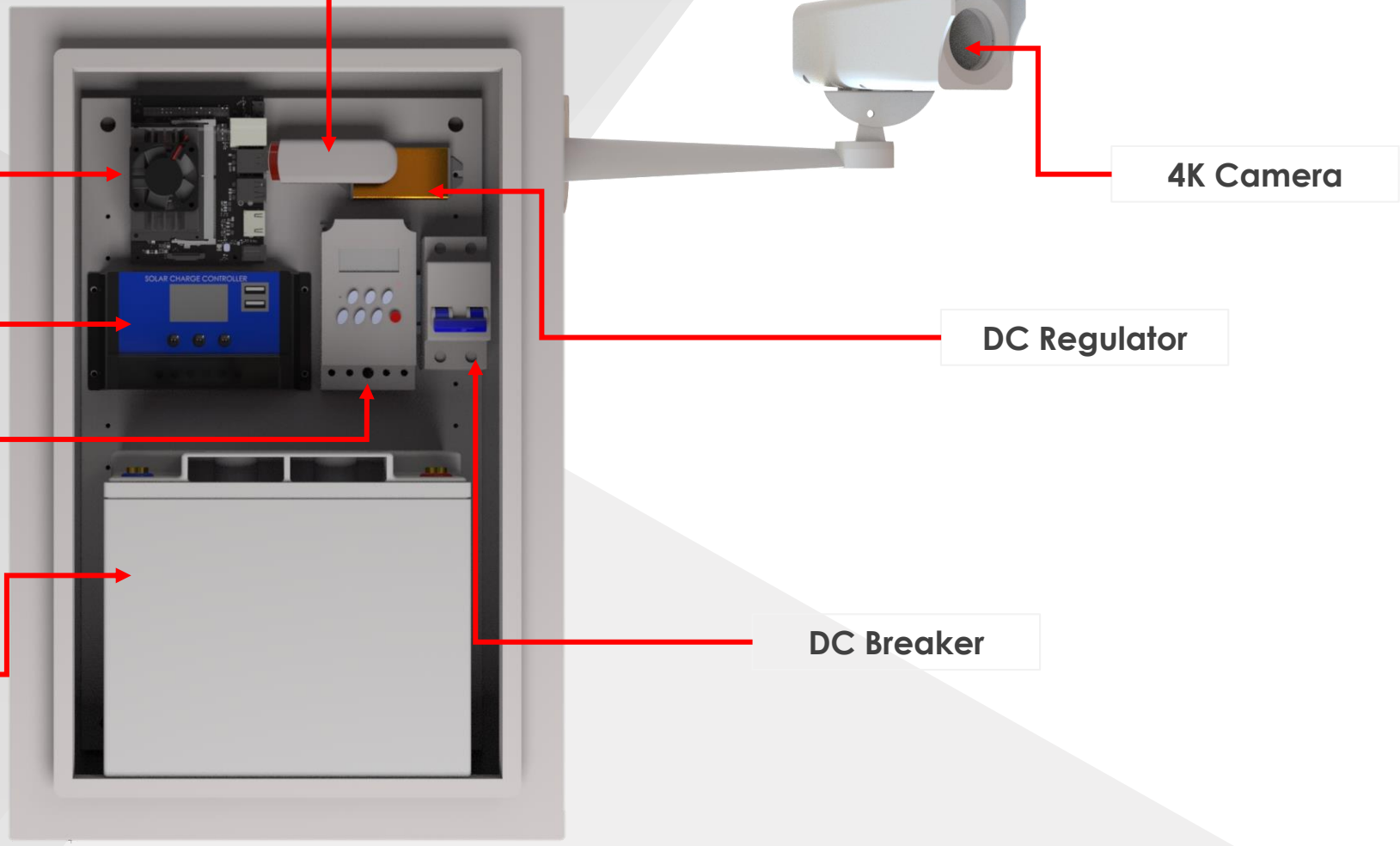


CCTV 06 Bang Khen, Bangkok

Hardware Preparation

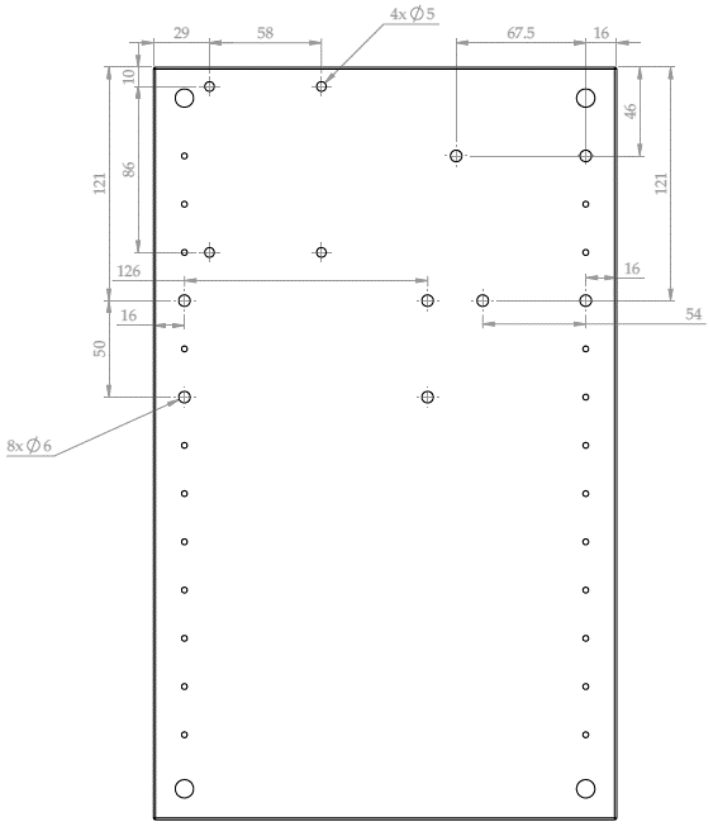
CAD Model of the CCTV setup

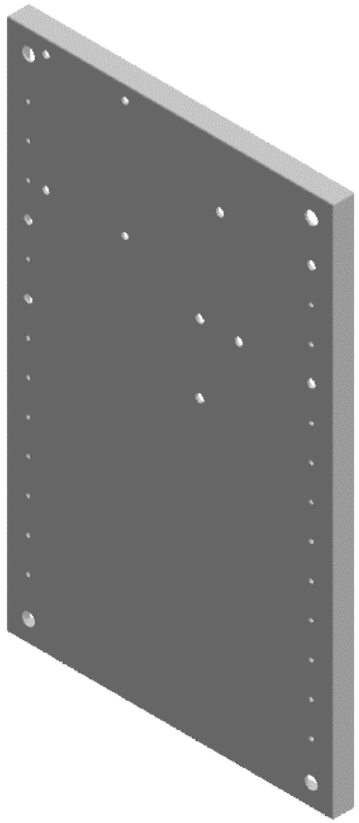
Hardware Preparation



Hardware Preparation

Controller Box



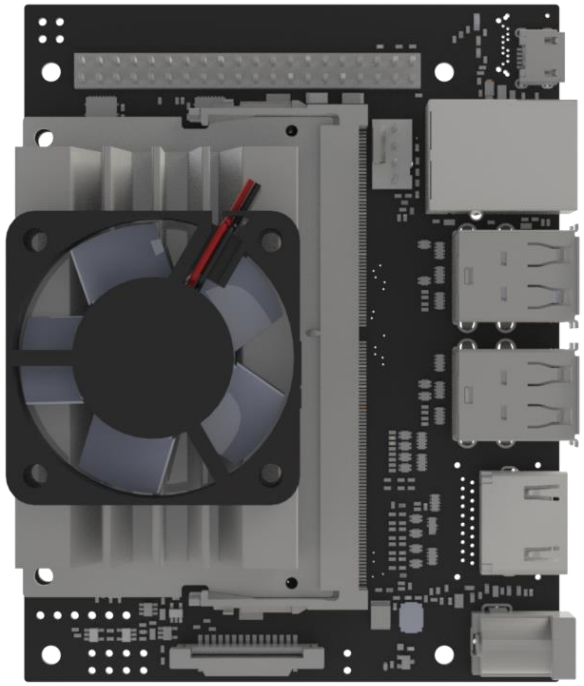


DESIGN GIC	DATE 12/6/2022	1ST ANGLE	SCALE 1:2	Drawing Name Panel Board
CHECKED	GIC	PROJECT NAME pLitter CCTV		DRAWING No.
APPROVED				

FM-DS-01-03 Rev.00

Hardware Preparation

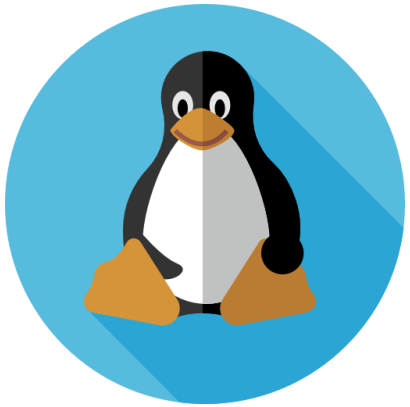
Nvidia Jetson Nano 4GB



NVIDIA

Edge computing is a distributed computing paradigm that brings computation and data storage closer to the sources of data. This is expected to improve response times and save bandwidth

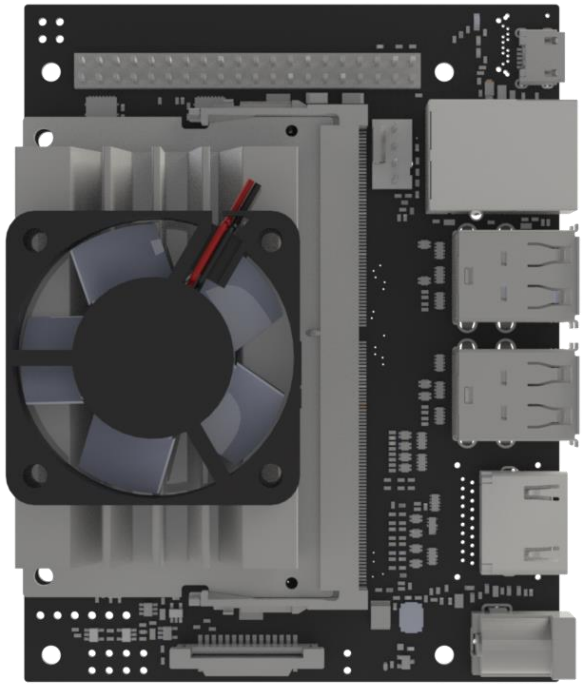
Artificial intelligence is the simulation of human intelligence processes by machines, especially computer systems



Linux is a family of open-source Unix-like operating systems based on the Linux kernel

Hardware Preparation

Nvidia Jetson Nano 4GB



Specification	
Model	Jetson Nano Dev Kit with 16GB EMMC
GPU	128-core Maxwell
CPU	Quad-core ARM A57 @ 1.43 GHz
Memory	4 GB 64-bit LPDDR4 25.6 GB/s
Storage	16GB eMMC
Video Encode	250 MP/s 1x 4K @ 30 [HEVC] 2x 1080p @ 60 [HEVC] 4x 1080p @ 30 [HEVC]
Video Decode	500 MP/s 1x 4K @ 60 [HEVC] 2x 4K @ 30 [HEVC] 4x 1080p @ 60 [HEVC] 8x 1080p @ 30 [HEVC]
Camera	2 x MIPI CSI-2 DPHY lanes
Display	HDMI and DP
USB	4x USB 3.0, USB 2.0 Micro-B
Dimensions	100 × 80 × 29mm

Hardware Preparation

Solar Panel

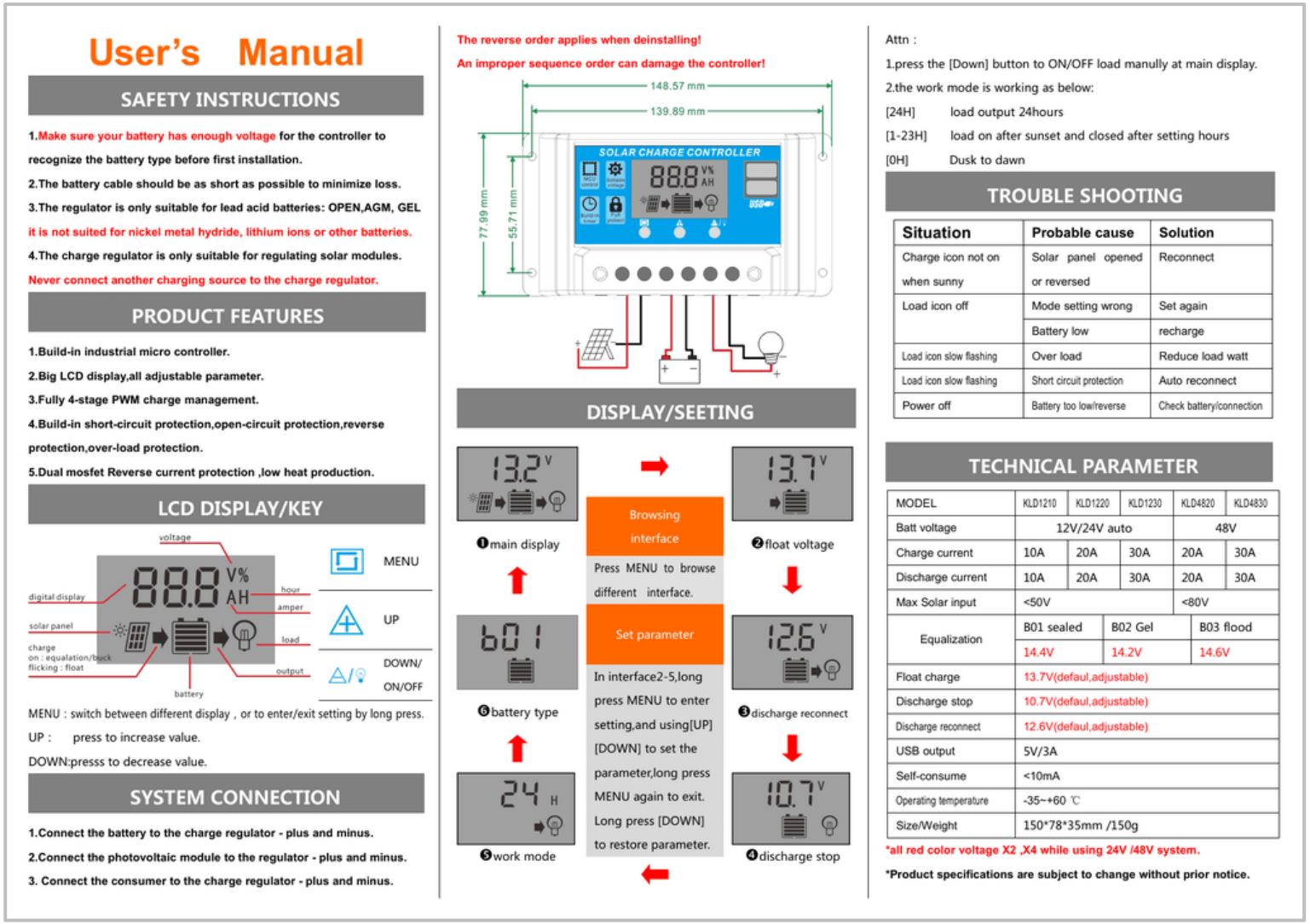
A panel designed to absorb the sun's rays as a source of energy for generating electricity or heating.

Specification	
Model	SZ-Solar-Module-18V-50W
Type	Polycrystalline
Maximum Power Output(Pm)	50W
Maximum Operating Voltage (Vmp)	18V
Maximum Power Current(Imp)	2.77A
Open Circuit Voltage (Voc)	21.24V
Short Circuit Current (Isc)	3.11A
Max System Voltage	1000V
Dimension	670mm x 530mm

Hardware Preparation

Solar Charge Controller

A solar charge controller is used to keep the battery from overcharging by regulating the voltage and current coming from the solar panel to the battery



User's Manual

SAFETY INSTRUCTIONS

1.Make sure your battery has enough voltage for the controller to recognize the battery type before first installation.
2.The battery cable should be as short as possible to minimize loss.
3.The regulator is only suitable for lead acid batteries: OPEN,AGM, GEL it is not suited for nickel metal hydride, lithium ions or other batteries.
4.The charge regulator is only suitable for regulating solar modules. Never connect another charging source to the charge regulator.

PRODUCT FEATURES

1.Build-in industrial micro controller.
2.Big LCD display,all adjustable parameter.
3.Fully 4-stage PWM charge management.
4.Build-in short-circuit protection,open-circuit protection,reverse protection,over-load protection.
5.Dual mosfet Reverse current protection ,low heat production.

LCD DISPLAY/KEY

voltage, digital display, solar panel, charge on : equalation/buck flicking : float, battery, hour, amper, load, output, MENU, UP, DOWN/ ON/OFF

MENU : switch between different display , or to enter/exit setting by long press.
UP : press to increase value.
DOWN:presss to decrease value.

SYSTEM CONNECTION

1.Connect the battery to the charge regulator - plus and minus.
2.Connect the photovoltaic module to the regulator - plus and minus.
3. Connect the consumer to the charge regulator - plus and minus.

The reverse order applies when deinstalling!
An improper sequence order can damage the controller!

148.57 mm, 139.89 mm, 77.99 mm, 55.71 mm, SOLAR CHARGE CONTROLLER

DISPLAY/SEETING

❶main display
❷float voltage
❸discharge reconnect
❹discharge stop
❺work mode
❻battery type

Browsing interface
Press MENU to browse different interface.

Set parameter
In interface2-5,long press MENU to enter setting,and using[UP] [DOWN] to set the parameter,long press MENU again to exit. Long press [DOWN] to restore parameter.

Attn :
1.press the [Down] button to ON/OFF load manully at main display.
2.the work mode is working as below:
[24H] load output 24hours
[1-23H] load on after sunset and closed after setting hours
[0H] Dusk to dawn

TROUBLE SHOOTING

Situation	Probable cause	Solution
Charge icon not on when sunny	Solar panel opened or reversed	Reconnect
Load icon off	Mode setting wrong	Set again
	Battery low	recharge
Load icon slow flashing	Over load	Reduce load watt
Load icon slow flashing	Short circuit protection	Auto reconnect
Power off	Battery too low/reverse	Check battery/connection

TECHNICAL PARAMETER

MODEL	KLD1210	KLD1220	KLD1230	KLD4820	KLD4830
Batt voltage	12V/24V auto			48V	
Charge current	10A	20A	30A	20A	30A
Discharge current	10A	20A	30A	20A	30A
Max Solar input	<50V			<80V	
Equalization	B01 sealed		B02 Gel		B03 flood
	14.4V		14.2V		14.6V
Float charge	13.7V(defaul,adjustable)				
Discharge stop	10.7V(defaul,adjustable)				
Discharge reconnect	12.6V(defaul,adjustable)				
USB output	5V/3A				
Self-consume	<10mA				
Operating temperature	-35~+60 ℃				
Size/Weight	150*78*35mm /150g				

*all red color voltage X2 ,X4 while using 24V /48V system.
*Product specifications are subject to change without prior notice.

Hardware Preparation

Deep Cycle Battery

A deep cycle battery is a lead battery designed to provide sustained power over a long period and run reliably until it is 80% discharged or more, at which point it needs to be recharged

Ring Lug

Hardware Preparation

DC Timer

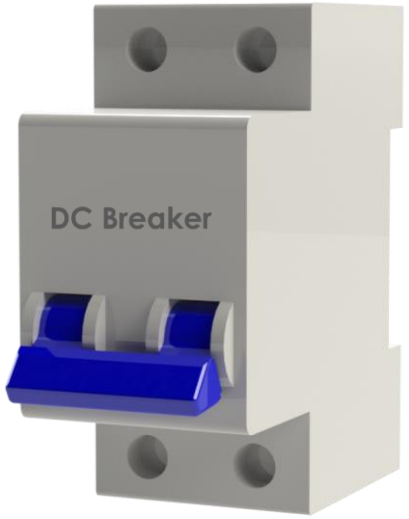
This timer is used with DC 12 V, can withstand 25 A of current.
Can be programmed to turn on-off each day, 17 programs (on and off 1 time, 1 program, within 1 day can be set to turn on and off 17 times

CCTV Operating Timings

- Start : 0600 Hr.
- Reset 01 : 0900 Hr. off / 0901 Hr. on
- Reset 02 : 1200 Hr. off/ 1201 Hr. on
- Reset 03 : 1500 Hr. off/ 1501 Hr. on
- Stop : 1800 Hr.

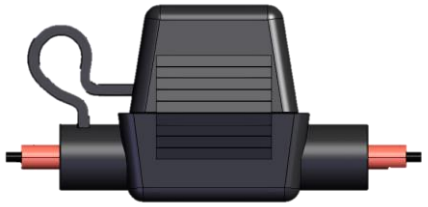
Hardware Preparation

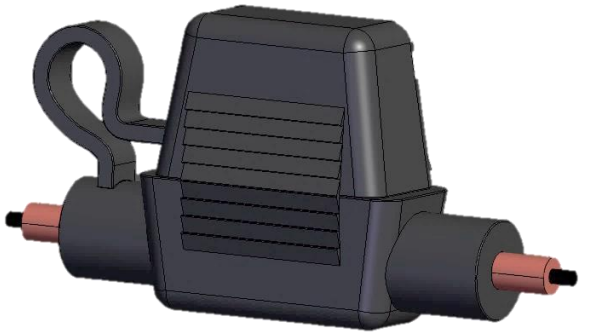
DC Breaker



DC circuit breaker is a safety switch that protects your equipment from damage by turning off the power when an overload is detected. It also protects your safety since overloaded circuits can result in a fire

Fuse

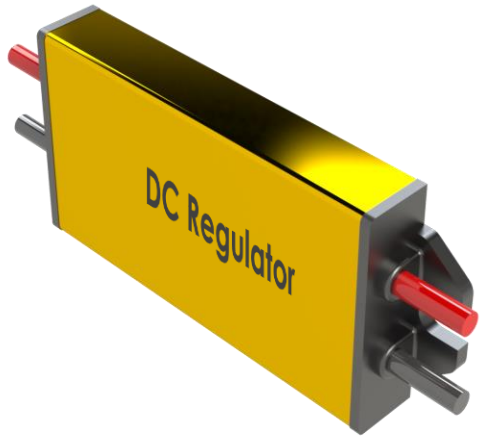




A fuse is an electrical safety device that operates to provide overcurrent protection of an electrical circuit. Its essential component is a metal wire or strip that melts when too much current flows through it, thereby stopping or interrupting the current

Hardware Preparation

DC Regulator



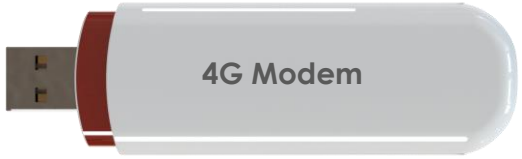
Regulate DC-DC 9V -36V to 5V-5A 4 output. This module can be used for DIY modified electronic assembly to get 5V 5A output. Here it is used to power up the Nvidia Jetson development kit including cooling fan

DC Male Jack

A DC power jack is responsible for receiving power and is usually attached to a power adapter. Here is it used to supply power from the regulator to the Nvidia board

Hardware Preparation

4G LTE Modem



LTE modems have a connection interface, allowing it to be connected to any device. LTE modems also have a built-in wireless adapter, so it can distribute the Internet via a Wi-Fi network. This device is allowing the Nvidia Jetson to connect to the network.

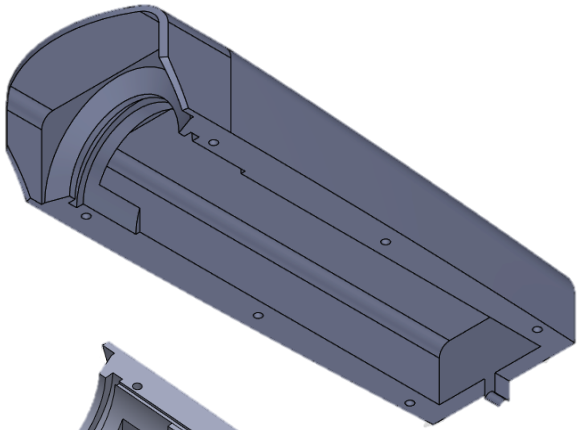
Hardware Preparation

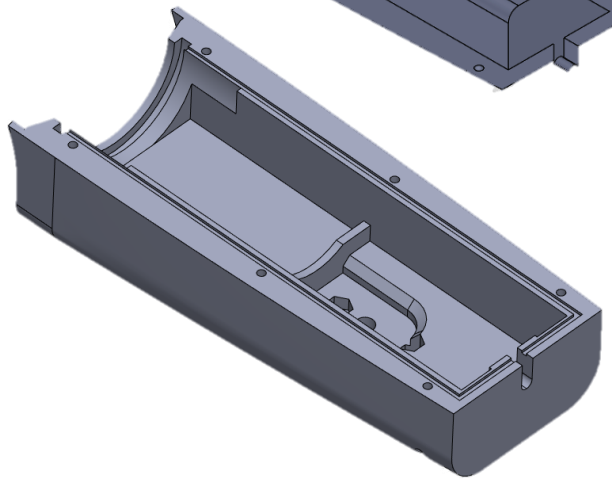
4K Camera

3840*2160 resolution manual focus adjustment, clear and stable picture, and high color reproduction.

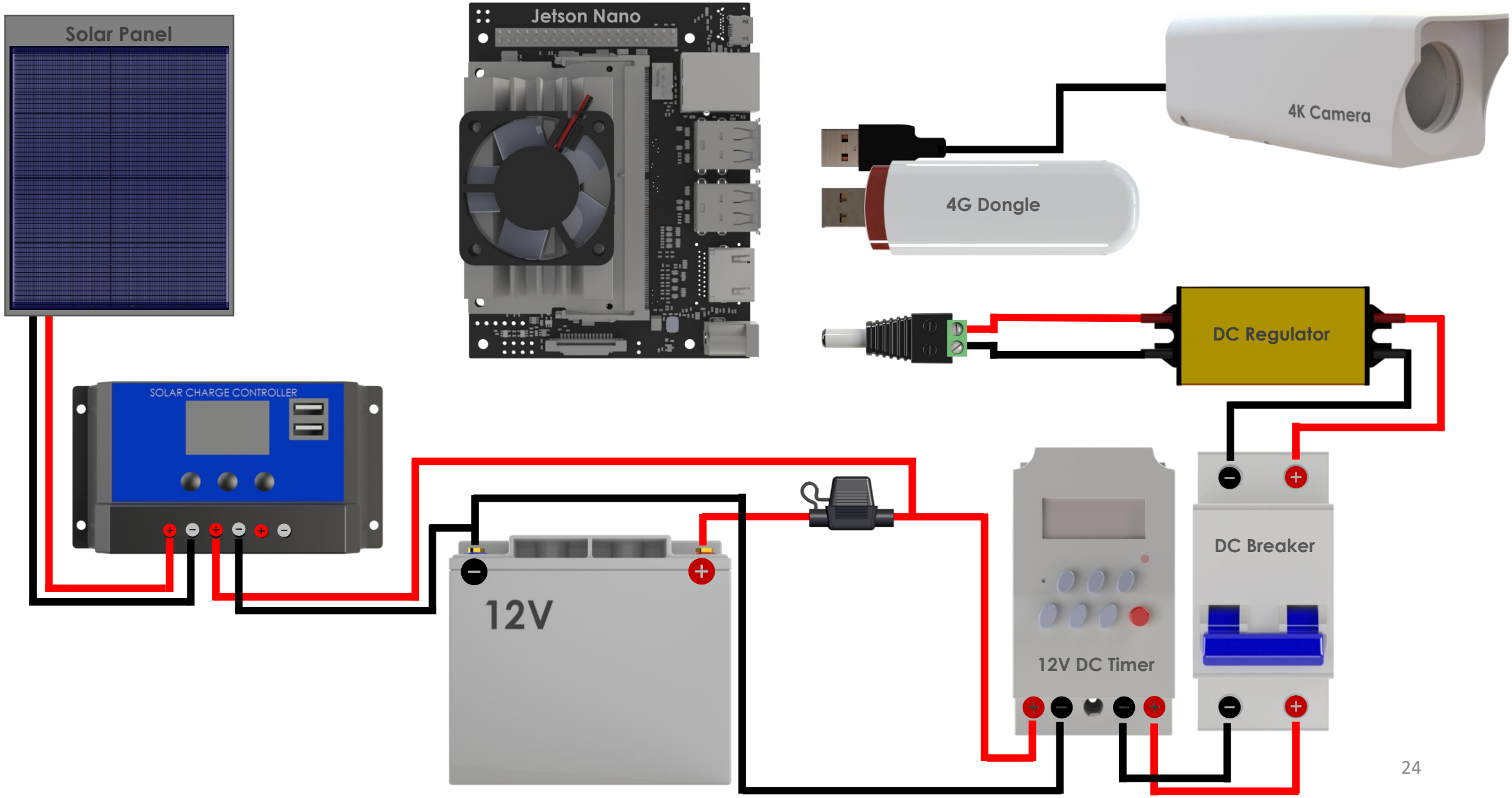
10x optical zoom for lens and 6x digital zoom for software,80-degree wide angle, very suitable for capturing close-ups at a distance, high definition without distortion

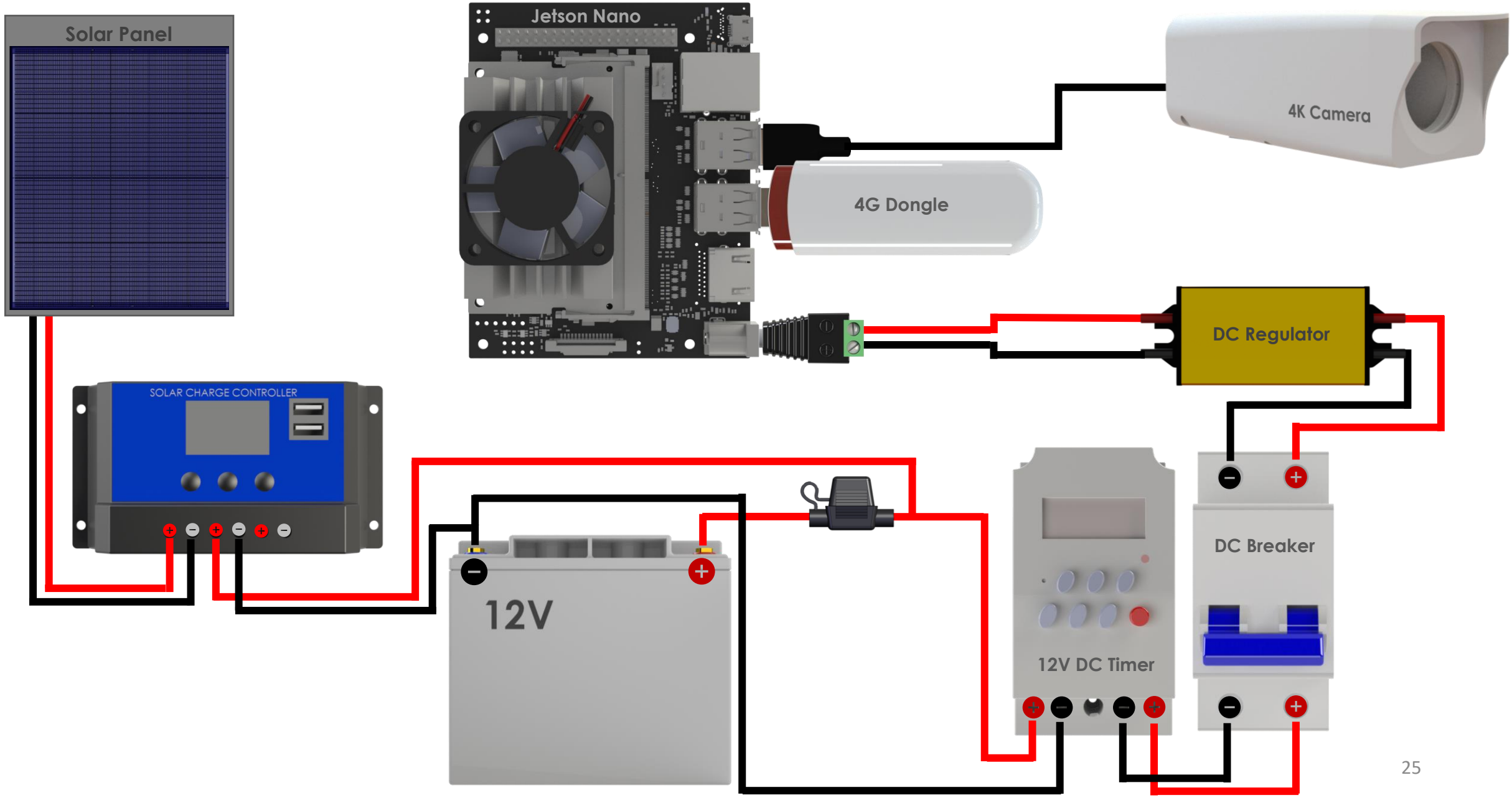
3D Printed Camera



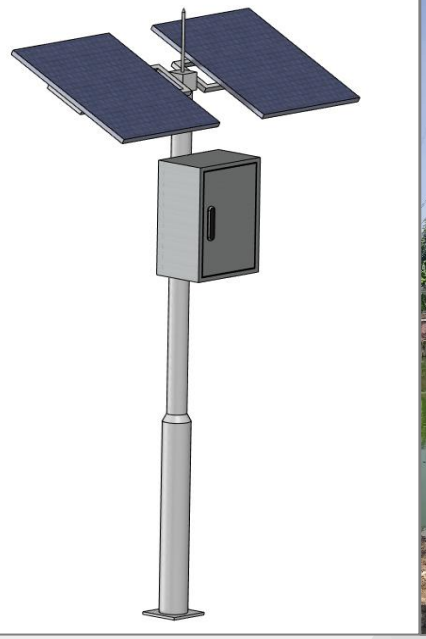


CAD Designed cover for 4K camera is custom made to reduce weight which approximately 400g in total. STL, prt. files are available for printing


Solar Panel
Jetson Nano
4K Camera
4G Dongle
DC Regulator
SOLAR CHARGE CONTROLLER
12V
12V DC Timer
DC Breaker

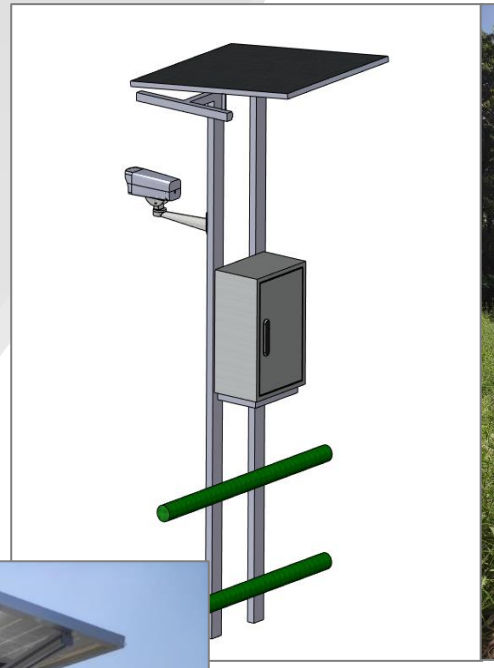

Solar Panel
Jetson Nano
4K Camera
4G Dongle
DC Regulator
SOLAR CHARGE CONTROLLER
12V
12V DC Timer
DC Breaker

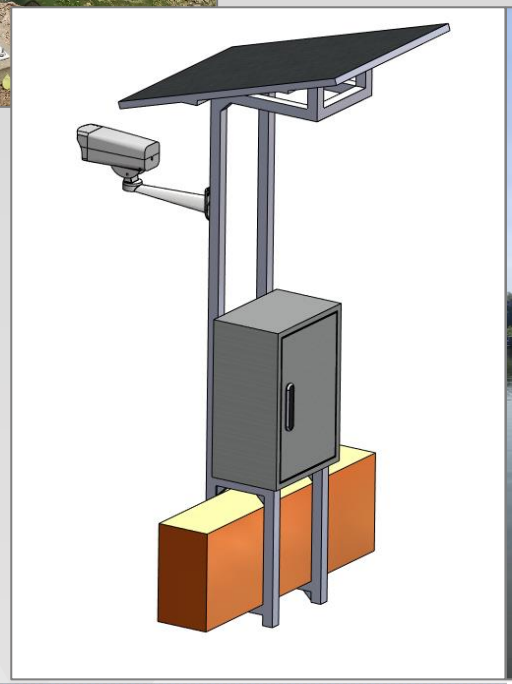
CCTV Installations



Bang Khan riverbank Installation

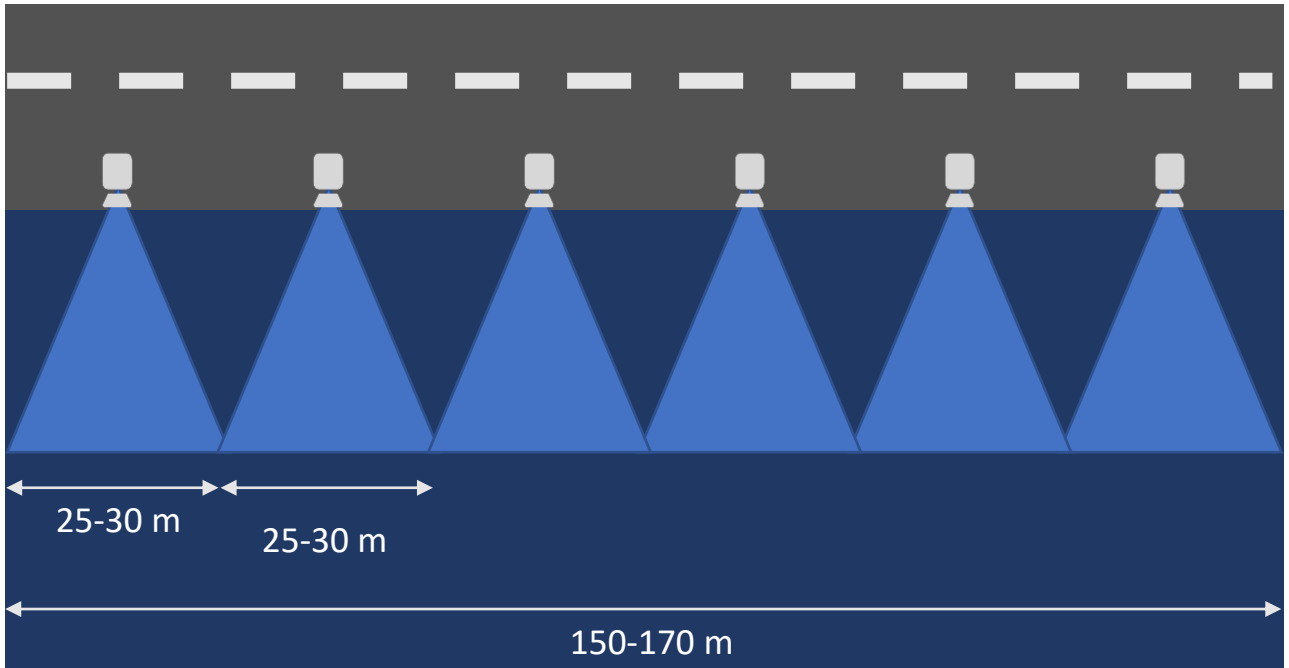
Bang Bua, riverbank Installation





Bang Bua, bridge Installation

Camera Requirements



Approx. length in meters = 160
Approx. length cover by a camera in meters = 30
Therefore, minimum camera requirement = 160/30
= 5.33 ≈ 6

For the two locations, it will be required at least 12 camera to cover the whole river