



Sea Star

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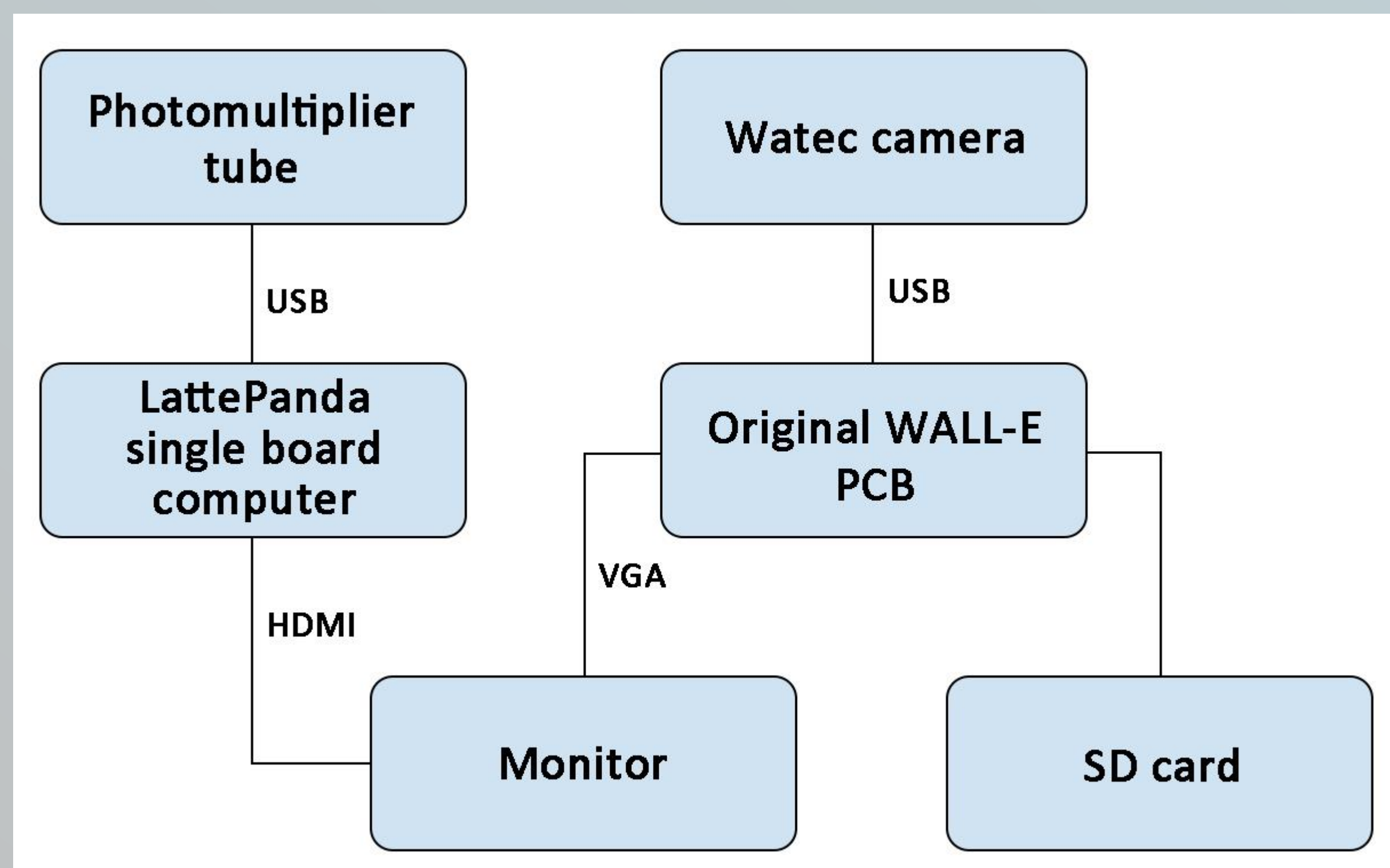
Background

To study the biodiversity of the ocean, Sea Star was developed to analyze cypridinid ostracods by using a dual-camera setup to record 3D videos of the bioluminescence, as well as automatically apply the Photomultiplier Tube to record light levels with extreme precision. With the custom denoising algorithm and stereo rectification, Sea Star is capable of saving effort and time to post-process the videos.

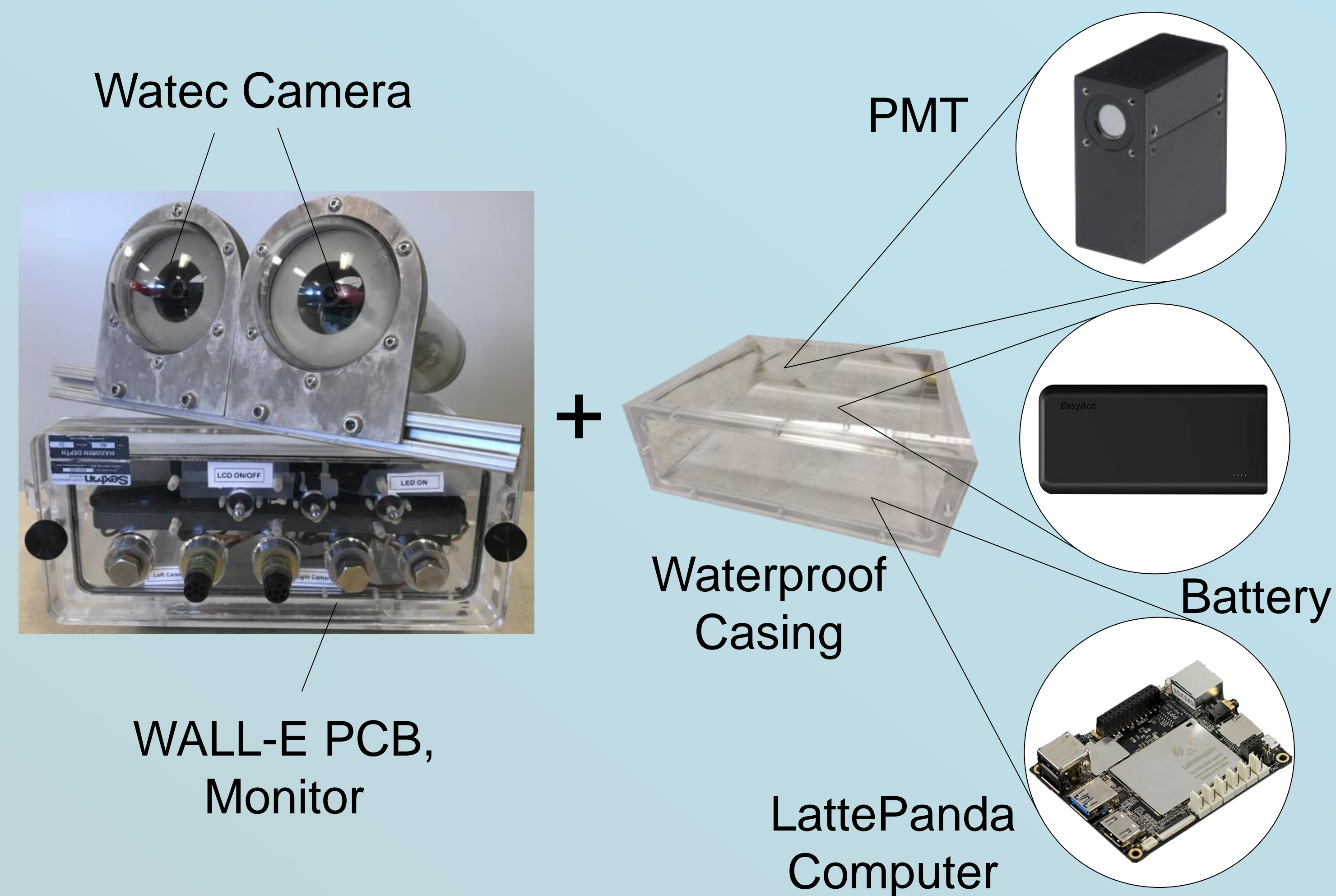
Design Specification

- Use Photomultiplier Tube (PMT) to automatically record overall light levels after pre-defined configurations
- Collect data from Watec Cameras
- Post-processing the recorded videos
 - Denoising
 - RGB Conversion
 - Stereo-rectification
 - 3D coordinate extraction
 - Temporal signal identification

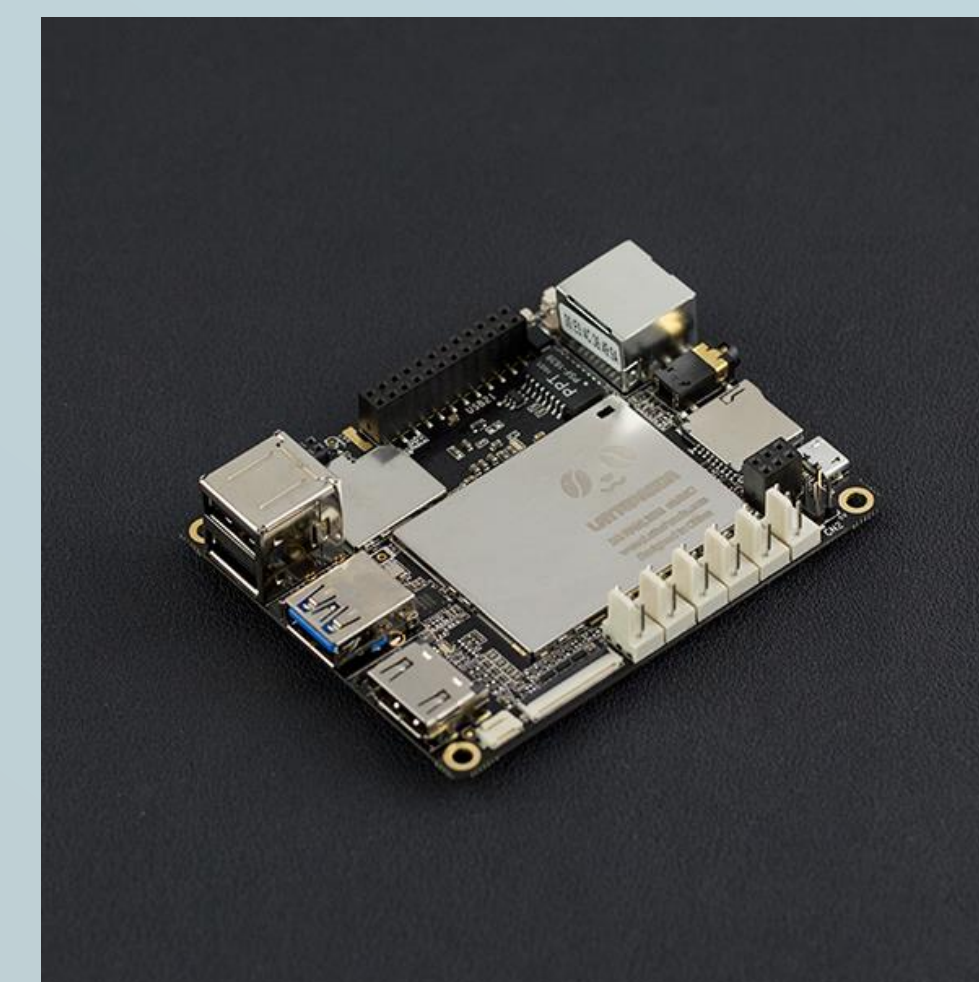
Block Diagram



Final Design



Key Components



LattePanda single board computer
 Processor: Intel Cherry Trail Z8359
 Quad Core Processor
 Operating System: Windows 10
 RAM: 2GB
 Storage Capacity: 32GB
 Power Supply: 5V@2A

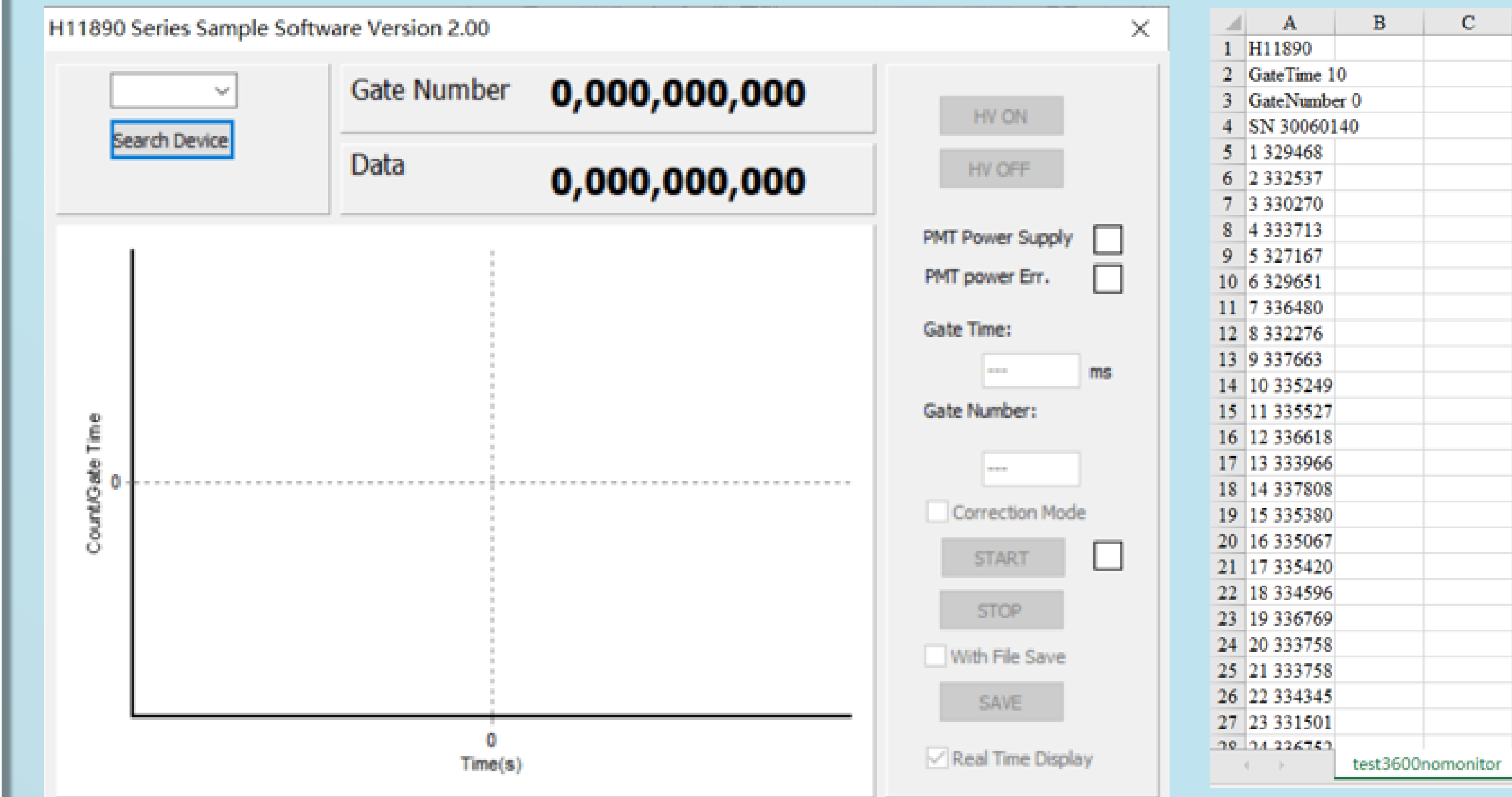
Pros: small size, Windows OS for PMT software, suitable power supply for portable battery



Photomultiplier Tube (PMT)
 Type: Hamamatsu H11890-210
 I/O interface: USB Port
 Power supply: single board computer
 Spectral response: 230 to 700 nm
 Effective area diameter: 8 mm

Pros: small size, high sensitivity, single USB output & charging port

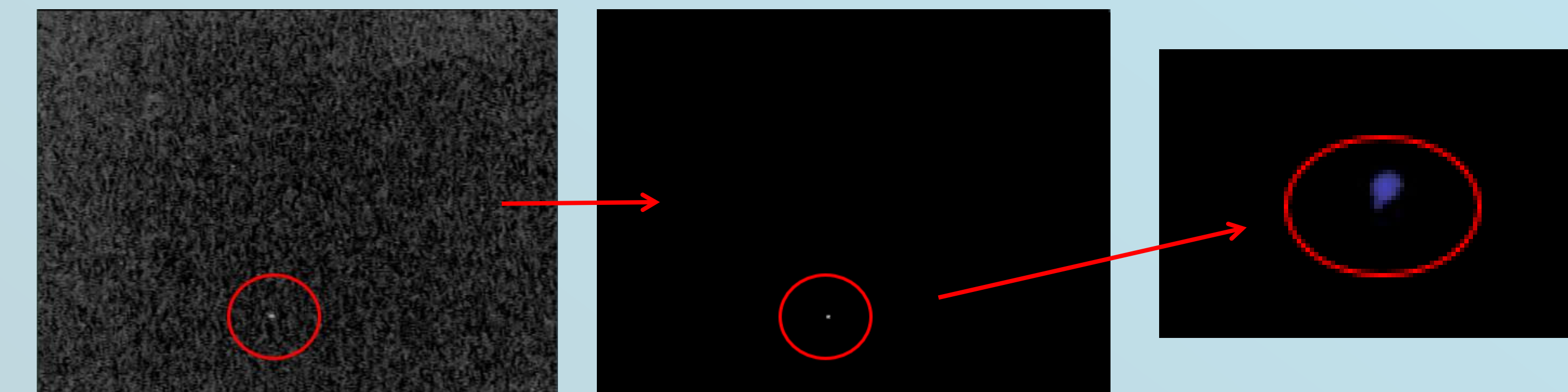
PMT Automation



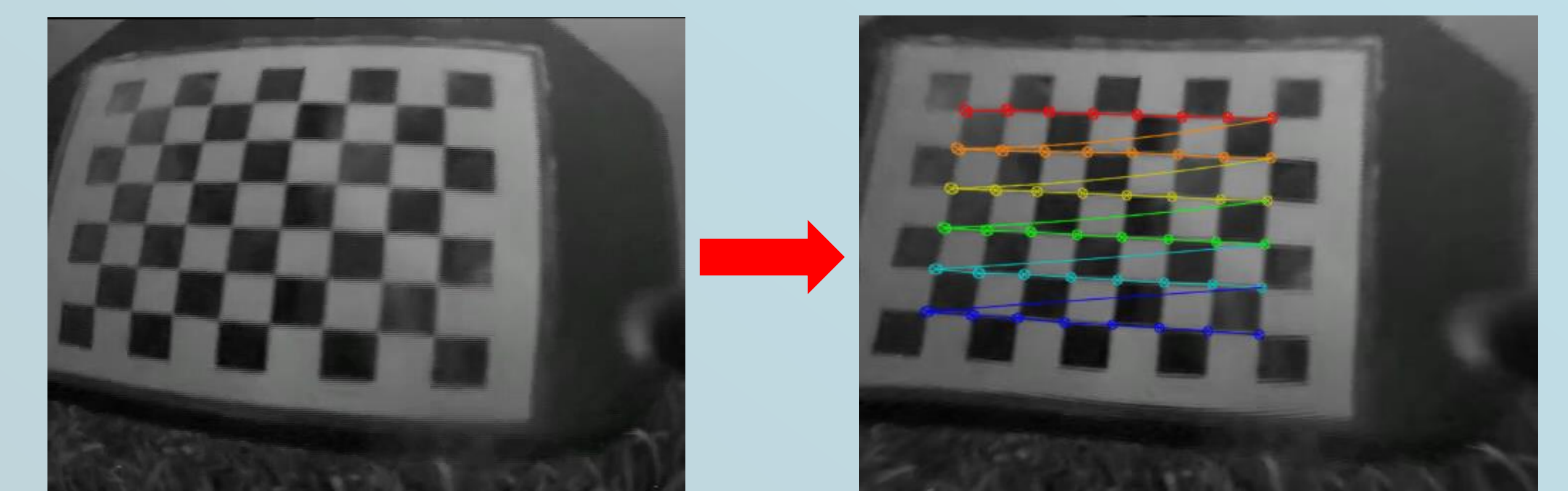
Clients can use the automation script and PMT software with predefined configurations, such as sampling rate, gate number, and time-lapse, to record how many photons pass through the tube without any manual supervision.

Video Post-Processing

Denoising & RGB Conversion



Stereo-Rectification



Sea Star makes the noisy and blurry videos taken from underwater clear and convenient to start with postprocessing by implementing the denoising algorithm, and further triggers stereo rectification to rectify the videos.

Acknowledgements:

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