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ZMICRO, Inc.  
San Diego, CA  
USA

13-15 May 2019  
Stockholmsmässan  
Sweden

## Computers, Displays, Digital Video

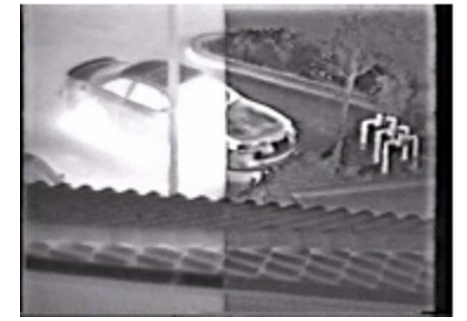


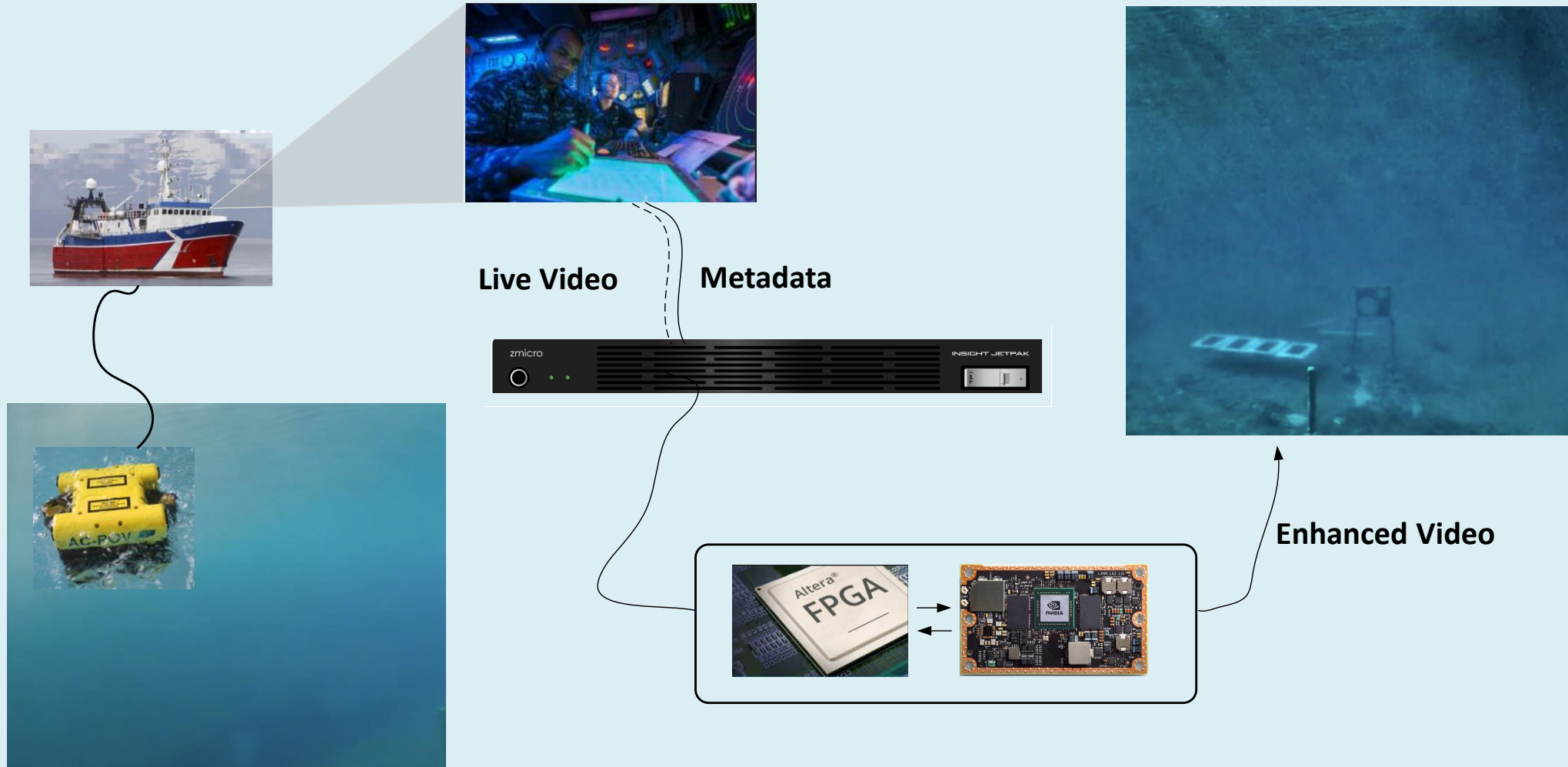
## Today's Focus

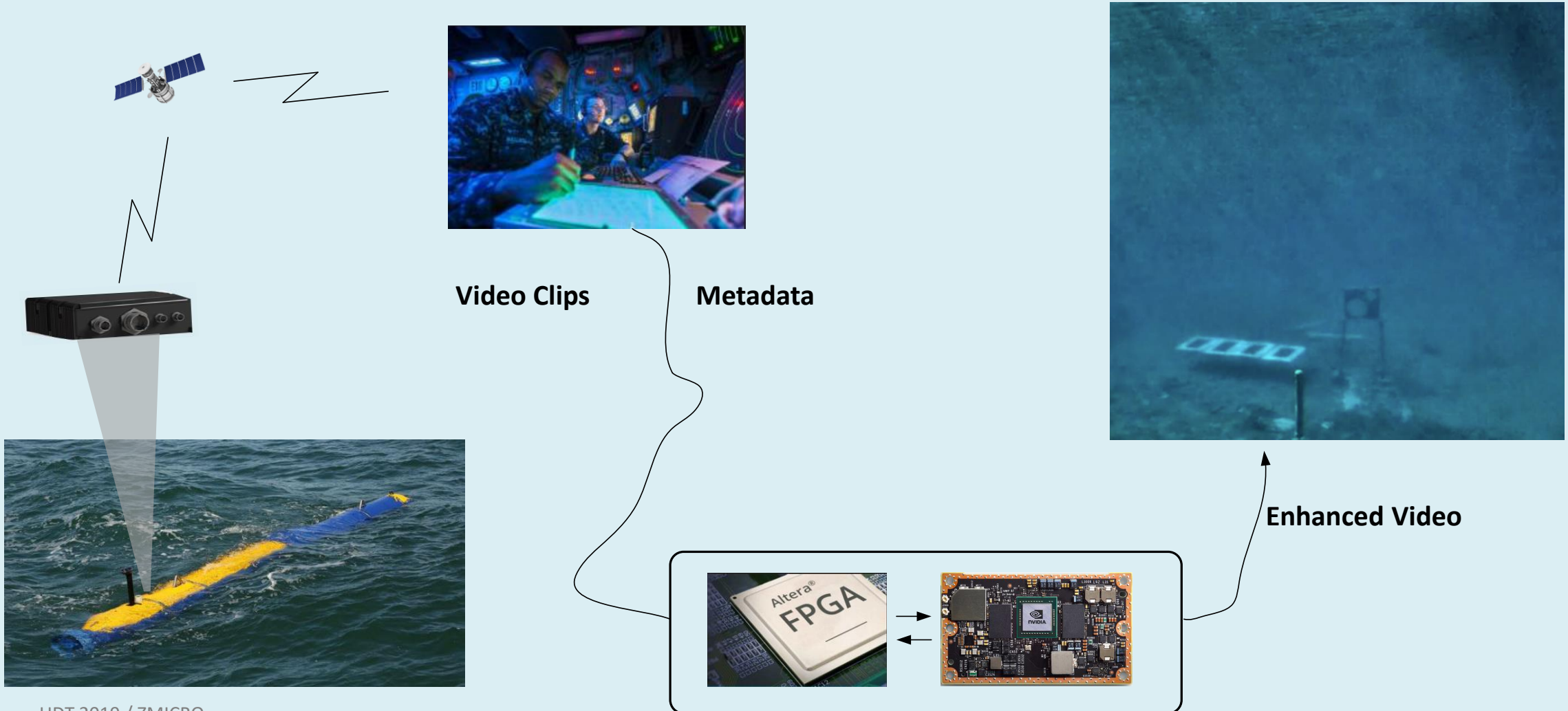
### Insight



### Insight Vantage







**SEE — Enhanced Visual Acuity**

**FIND — Locate, Classify, Identify**

**REPORT — Publish, Share**

## ZMicro Enhancement Algorithms *60 fps with no added latency*

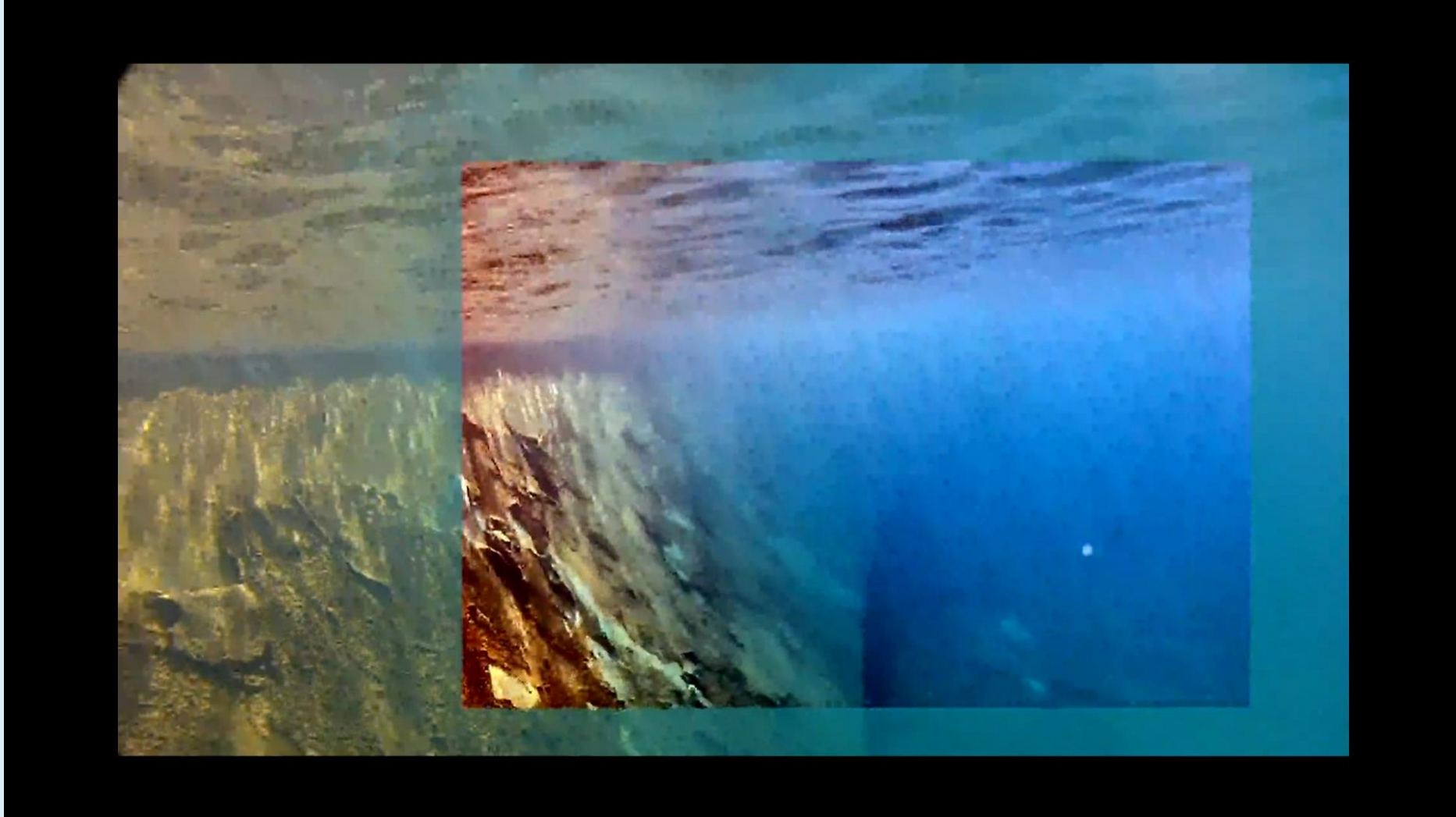
Video In

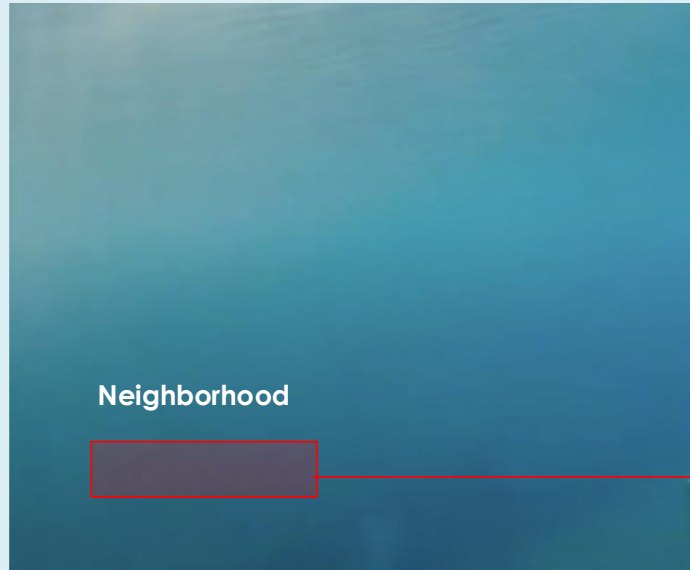


Video Out

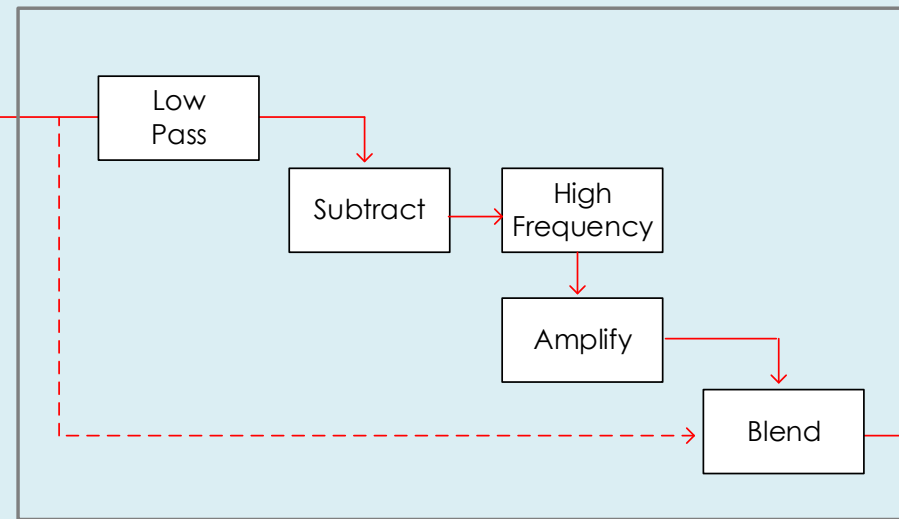


Snapshots/Clips





## Pixel by Pixel Convolution





**TRUE COLOR**

Globally adaptive dehazing algorithm removes the effects of haze, fog, smoke, mist, and dust in degraded video.

**CLARIFIER**

Locally adaptive, ultra-large convolution kernel for improved contrast and overall visibility.

**EXPANDED SHARPNER**

Sharpening with an adjusted 11x11 kernel size to bring out image details and reduce noise.

**CASCADING ALGORITHMS**

Used together the algorithms provide visual acuity and enhanced clarity.

## Globally Adaptive vs Locally Adaptive 400 x 400 Convolution Kernel

Global



Local



## Insight



### Stream of Pixels

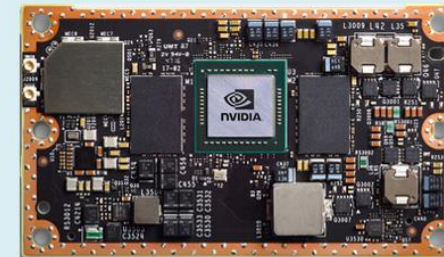


RTEV Algorithms

## Insight Vantage



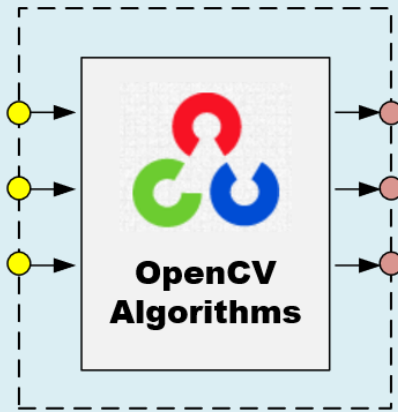
### Frames of Video



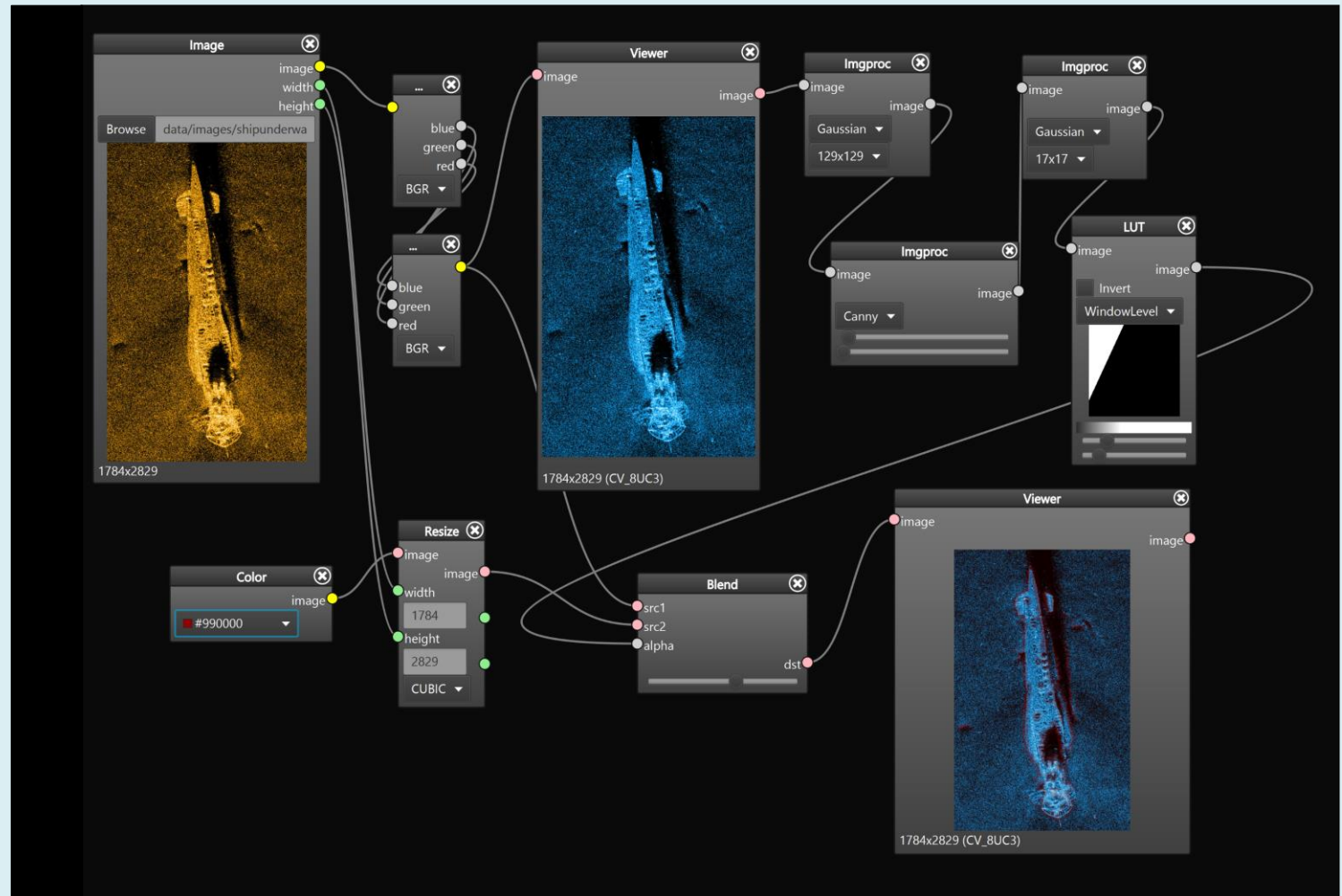
Feature Based Algorithms  
AI Neural Networks

Create new algorithms by connecting OpenCV functions

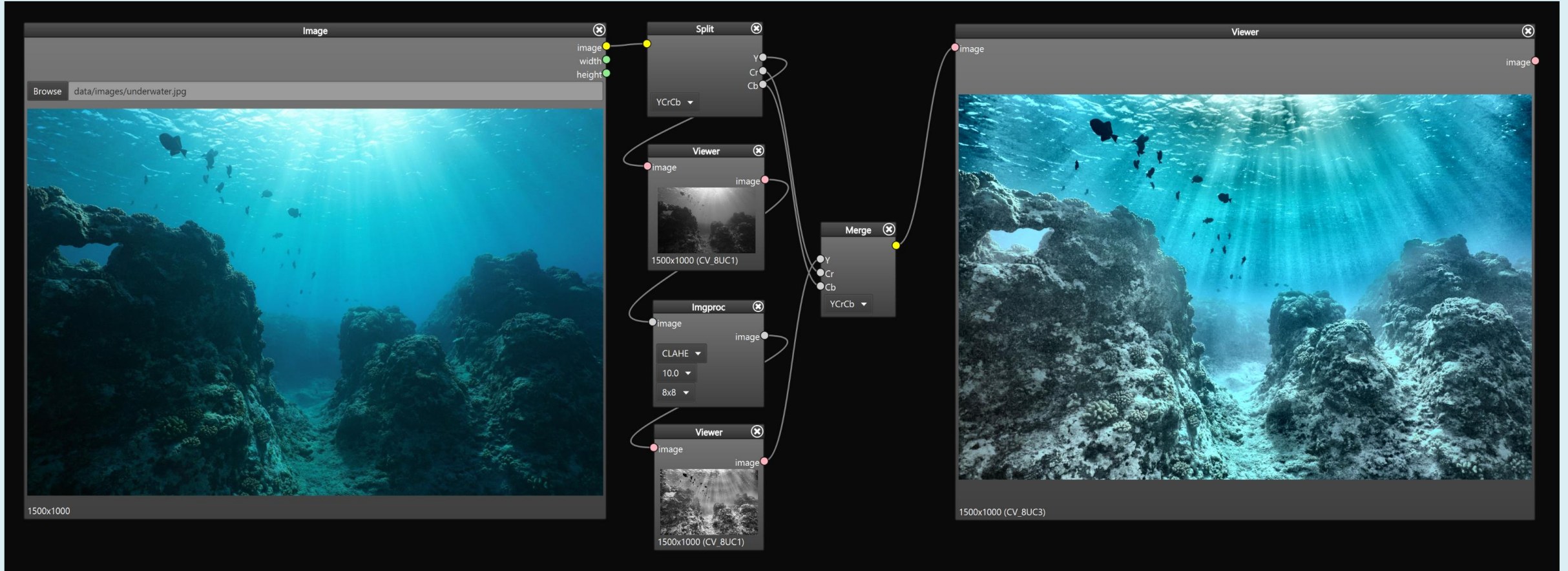
ZMicro adds  
I/O Wrappers



~2,500 Algorithms  
47K Users  
14M Downloads



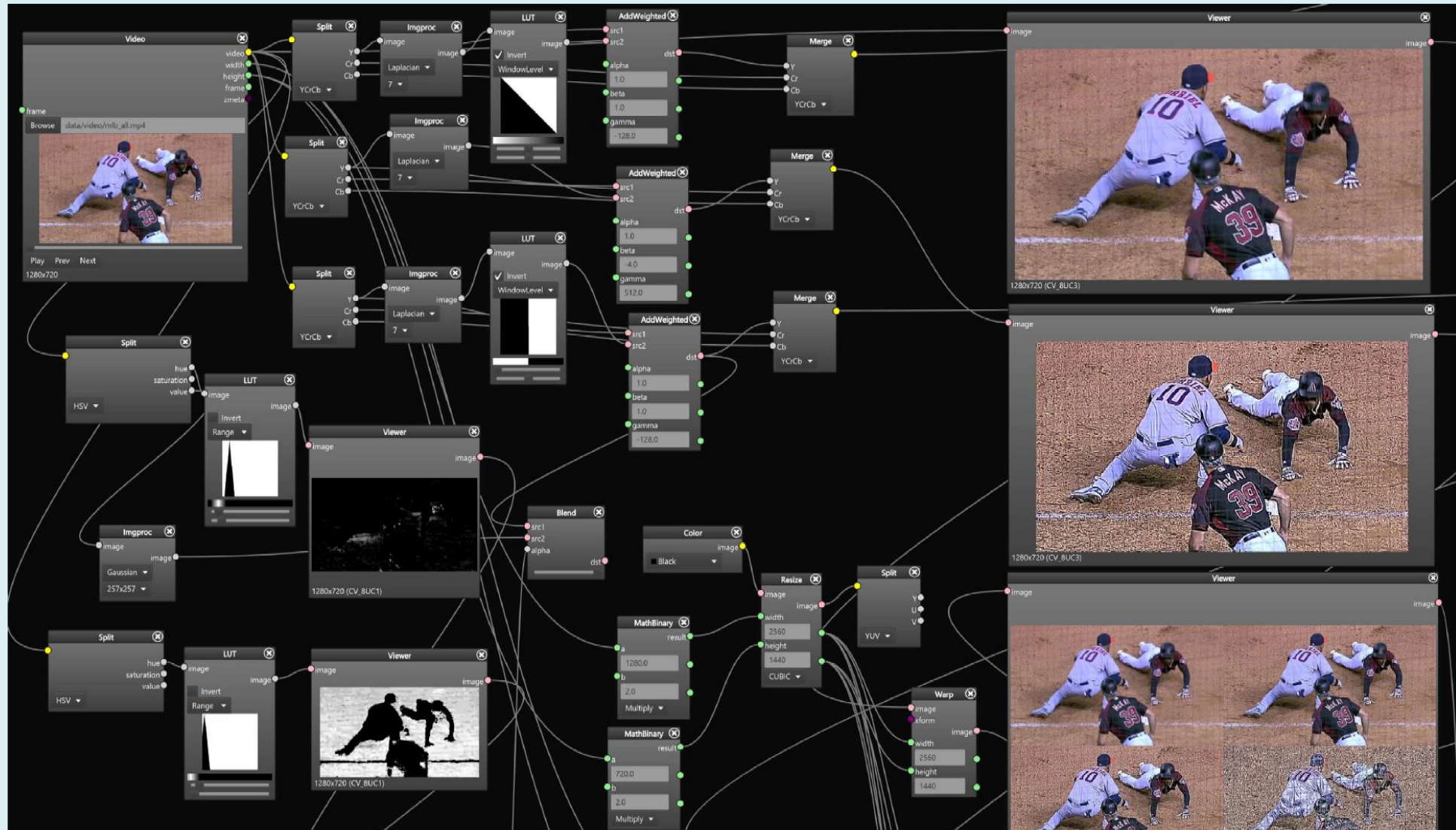
## Simple Contrast Enhancement



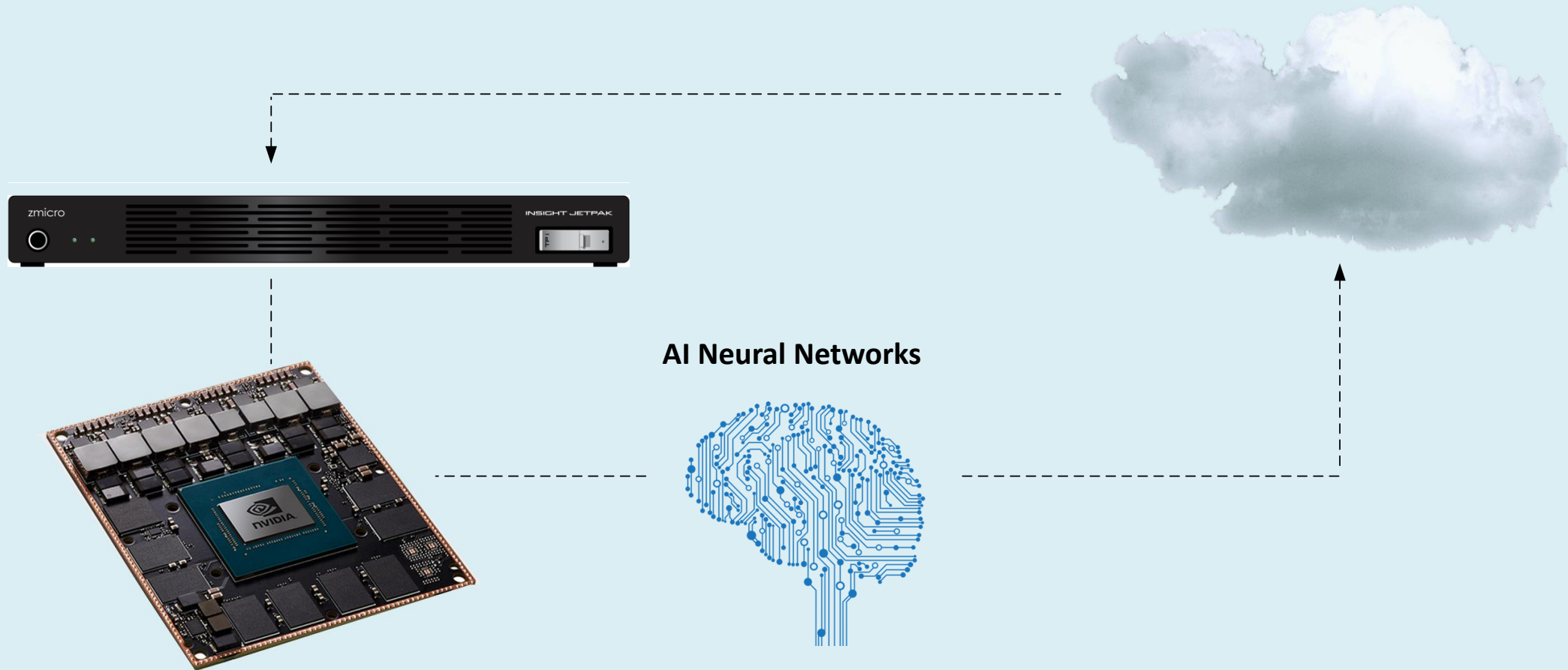
Still Images or Video

# GRAPH TOOL

# Rapid Prototyping of Complex Algorithms



*Potential exists to share mine identification algorithms and neural nets for continuous improvement*





Voice overs

Key Word Selector

- Ripples
- Ship Wreck
- Vegetation
- Possible Mine
- ...

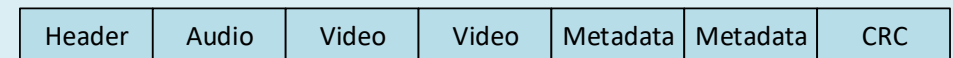
Mission data can be re-encoded as H.26x video streams with metadata inserts, recorded on removable media, and transmitted as an IP stream to remote users in real time.

User Annotative Metadata



H.26x

MISB / STANAG Compliant Encoded IP Stream



Live Video & Metadata



## Q & A

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