Vision-xG

Video Intelligent Sensor Integration Over advanced Networks

ECS COLLABORATION TOOL

Challenges and objectives

The high speed and low latency wireless networks enabled by 5G have enabled a multitude of novel services, and Internet of Things. For the moment, most of these IoT sensors transmit small amounts of data at infrequent intervals mainly due low bandwidth nature of IoT networks such as LoraWAN. However emerging applications such as Intelligent traffic management, preventive maintenance of infrastructure, Precision agriculture, Augmented reality, ADAS, all of them demand video or image data sensors [1],[2],[3],[4],[5].

The major bottlenecks blocking the wide adoption of these technologies are

***Autonomy of Wireless Imaging Systems**:Massive deployment of Wireless Applications using different types of cameras (Thermal, Visual, Multispectral, Lidar) requires very low power sensors and systems. Embedded harvesting systems is a solution in order to extend the autonomy using small batteries and maintaining a small footprint.*

***Video Bandwidth Requirements:** According to Cisco VNI [21] video traffic already accounts for 82% of total internet traffic with a CAGR of 27.4. The M2M traffic grows at a rate of 19% [21] Addition of video traffic generated by millions of image sensors trying to connect to the cloud for real-time decision making is going to explode the demand for video bandwidth.*

***Network Infrastructure:** IoT network protocols such as LoraWAN, Sigfox, Zigbee, BLE are designed for low bandwidth communication over long distance. A part of our project will facilitate (compression, edge computing) will enable the transmission image frames only when necessary and in a highly compressed fashion.*

***Security & Privacy :** Given the critical nature of the applications, and use of personal video footage, security and privacy is of utmost concern*

Technical goals

1. Solutions for autonomous intelligent image sensors through energy fusion (Ambient Light, RF) and Edge Computing.

2. Solutions for video bandwidth reduction through Learned Image Compression and Video Coding for Machines.

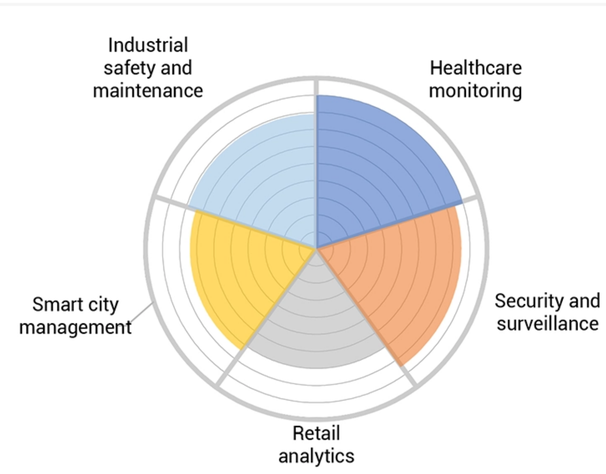
3. Integration of above solutions to demonstrate a edge-to-cloud single sensor use case, and collect performance metrics.

Expected impact

Due to advances in AI the global Video-as-a-Sensor market is growing at a rate of 7.9%, and poised to grow to USD 101 Billion by 2029 [22]. Various growth sectors are shown in the accompanying diagram.

Various video use cases are documented in 5G MEC/oneM2M document [6]. Namely :Smart Transportation with Edge Computing High-precision Road Map Service using Edge Computing Smart Factories using Edge Computing,Vulnerable Road User Discovery Use Case for Edge Computing

AI IMPACT ON THE VIDEO AS A SENSOR MARKET



HEALTHCARE MONITORING
- Patient Monitoring
- Guest Flow Monitoring

SECURITY AND SURVEILLANCE
- Real-time Threat Detection
- Facial Recognition

RETAIL ANALYTICS
- Customer Behavior Analysis
- Traffic Pattern Analysis

SMART CITY MANAGEMENT
- Public Safety
- Urban Planning

INDUSTRIAL SAFETY AND MAINTENANCE
- Equipment Maintenance
- Workplace Safety

Known partners:

- Institut Mines Télécom
- University of Turin
- CEA(LETI)
- University of Paris , Saclay
- Universidade Federal de Pelotas, Brazil

Needed profiles:

- Industrial Use Case Pilots
- Semiconductor Design House :
  - NVM, Chiplet Integration
- Universities:
  - Computer Vision Research
  - Video Coding Research Groups

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Aeneas

EPoSS. European Association on Smart Systems Integration

Inside Industry Association