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Lightning Talk

Hyperspectral image pipelines in Gstreamer

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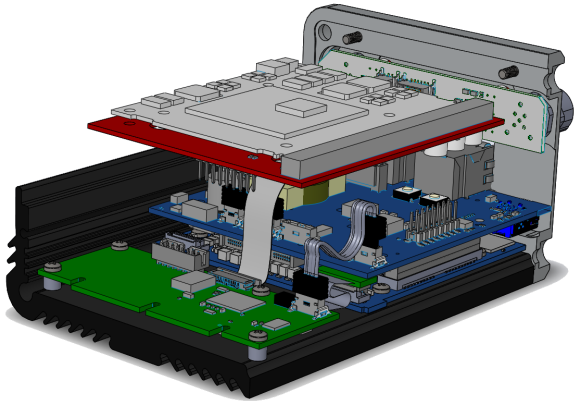
Introduction

- **Modular** industrial cameras running Linux
- One of the camera heads we provide is a hyperspectral camera
- Provide hyperspectral solutions using GStreamer



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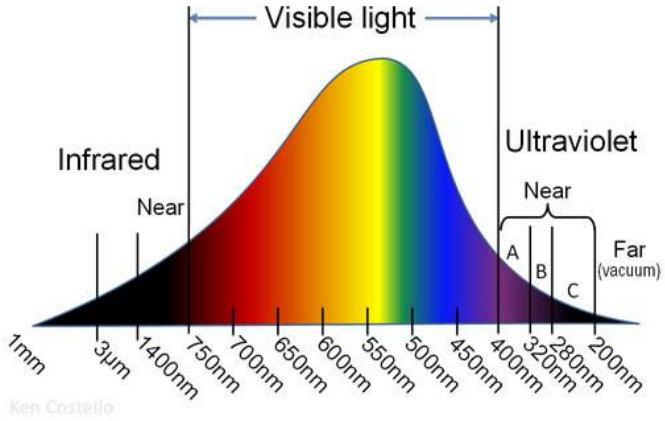
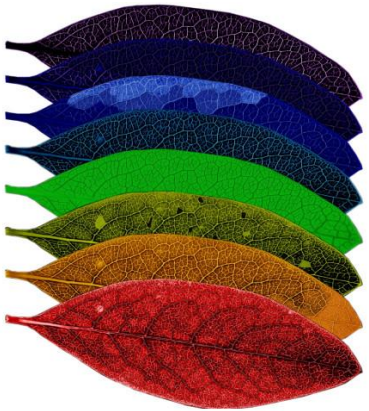
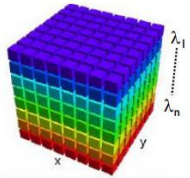
Hyperspectral Imaging

- Gray scale → 1 color channel
- RGB → 3 color channels
- Hyperspectral image → Up to thousands of “colors”/bands. May extend beyond the visible range.







```
#define GST_HYPERSPECTRAL_FRACTION_RANGE "(fraction) [ 0, max ]"
#define GST_HYPERSPECTRAL_FORMATS_ALL "{ GRAY8, GRAY16_BE, GRAY16_LE }"
#define GST_HYPERSPECTRAL_CUBE_FORMATS_ALL "{ multiplane, interleaved }"

#define GST_HYPERSPECTRAL_CAPS_MAKE(format)                             \
    "video/hyperspectral-cube, "                                        \
      "format = (string) " format ", "                                  \
      "width = " GST_VIDEO_SIZE_RANGE ", "                              \
      "height = " GST_VIDEO_SIZE_RANGE ", "                             \
      "bands = " GST_VIDEO_SIZE_RANGE ", "                              \
      "pixel-aspect-ratio = " GST_HYPERSPECTRAL_FRACTION_RANGE ", "     \
      "framerate = " GST_HYPERSPECTRAL_FRACTION_RANGE ", "              \
      "layout = " GST_HYPERSPECTRAL_CUBE_FORMATS_ALL

#define GST_HYPERSPECTRAL_CAPS_MAKE_WITH_ALL_FORMATS()                  \
    "video/hyperspectral-cube, "                                        \
      "format = (string) " GST_HYPERSPECTRAL_FORMATS_ALL ", "           \
      "width = " GST_VIDEO_SIZE_RANGE ", "                              \
      "height = " GST_VIDEO_SIZE_RANGE ", "                             \
      "bands = " GST_VIDEO_SIZE_RANGE ", "                              \
      "pixel-aspect-ratio = " GST_HYPERSPECTRAL_FRACTION_RANGE ", "     \
      "framerate = " GST_HYPERSPECTRAL_FRACTION_RANGE ", "              \
      "layout = " GST_HYPERSPECTRAL_CUBE_FORMATS_ALL


#endif /* __GST_HYPERSPECTRAL_FORMAT_H__ */
```

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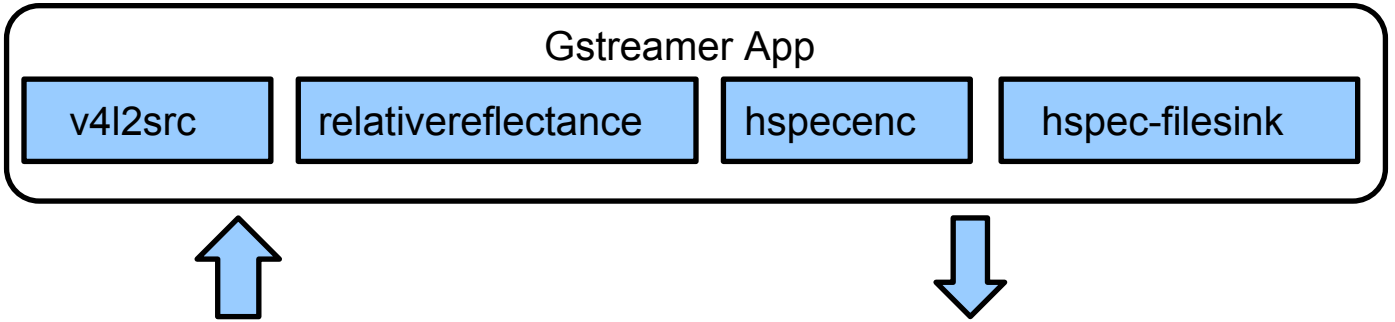
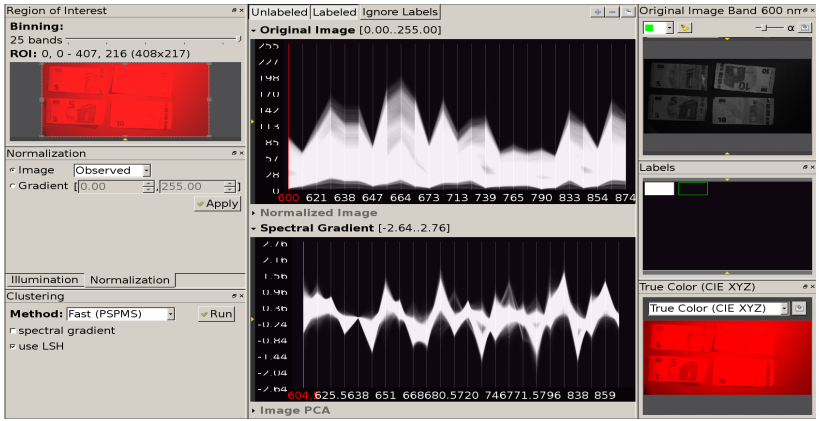
Example Pipeline





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Conclusions

- Can perform basic processing of hyperspectral images
- Room for improvement/optimization
- Goal is to push upstream!
- Who is responsible for accepting such patches?
- How can we help in the process?