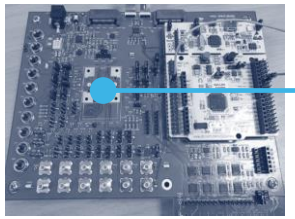
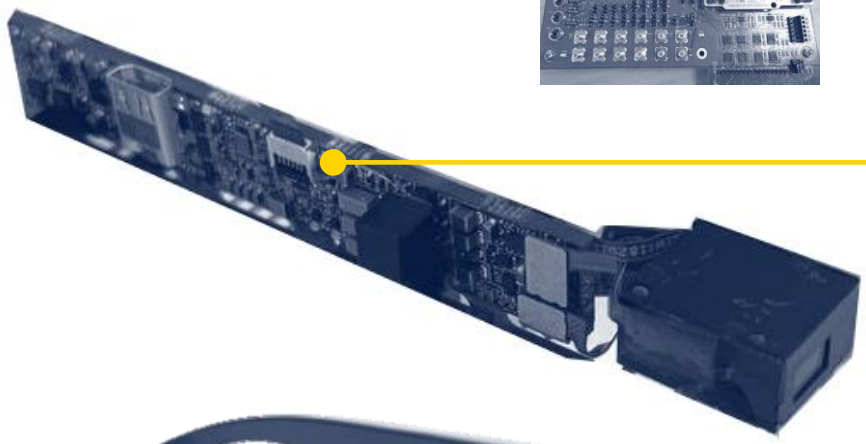
Laser Beam Scanning for Augmented Reality





Components

Development boards

STAR1 reference design

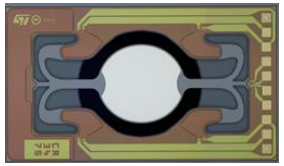
Glasses reference design
&
Manufacturing partner

life.augmented

Components: mirrors

MMR40100

- Resonant mono-axial
  - PεTRA™ TF PZT material
- Aluminum coating
- PZR position sensing

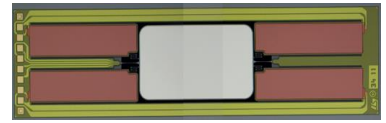


Eng. samples available now

- 1.1 mm diameter mirror
- 27 kHz resonant freq.
- ± 14˚ mechanical angle
- 4.0 x 2.4 mm^2

MML40100

- Linear mono-axial
  - PεTRA™ TF PZT material
- Aluminum coating
- PZR position sensing



Eng. samples available now

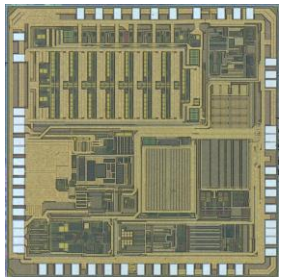
- 2.45 x 1.44 mm^2 mirror
- Up to 250 Hz refresh rate
- ± 8˚ mechanical angle
- 7.5 x 2.3 mm^2

life.augmented

Components: drivers

MMD40100

- Linear / resonant driver
- Configurable HW control loops:
  - Resonant mirror
  - Linear mirror
- Integrated safety mechanism
- Embedded environmental compensation

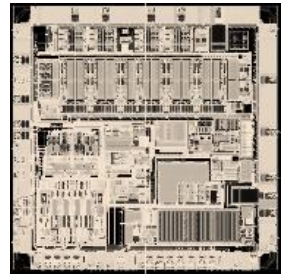


Eng. samples available now

- Low power consumption
- Energy charge recovery
- Compact dimensions
  - BGA 5 x 5 x 1 mm^3 package

STLDDx

- Laser diode driver
- 2 device options:
  - Up To 4 laser diode drive channels
- Low-power mode:
  - Automatically triggered based on input pixel data



Eng. samples available now

- 500 ps rise / fall time
- Up to 260 MHz pixel rate
- Compact dimensions
  - <20 mm^2 (WLCSP)

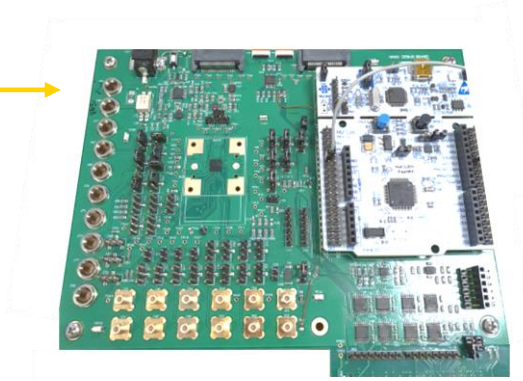
life.augmented

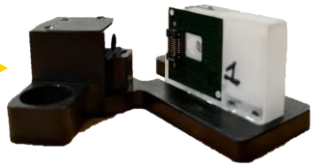
ST piezo mirror evaluation kit

Full modular approach for Laser Beam Scanning

- Access to ST components through dedicated boards:
  1. **Mirror driver** board
  2. **Laser driver** board
  3. Mirror **projection module**

- Multiple interfaces for expansion:
  - Microcontroller
  - Application processor
  - FPGA



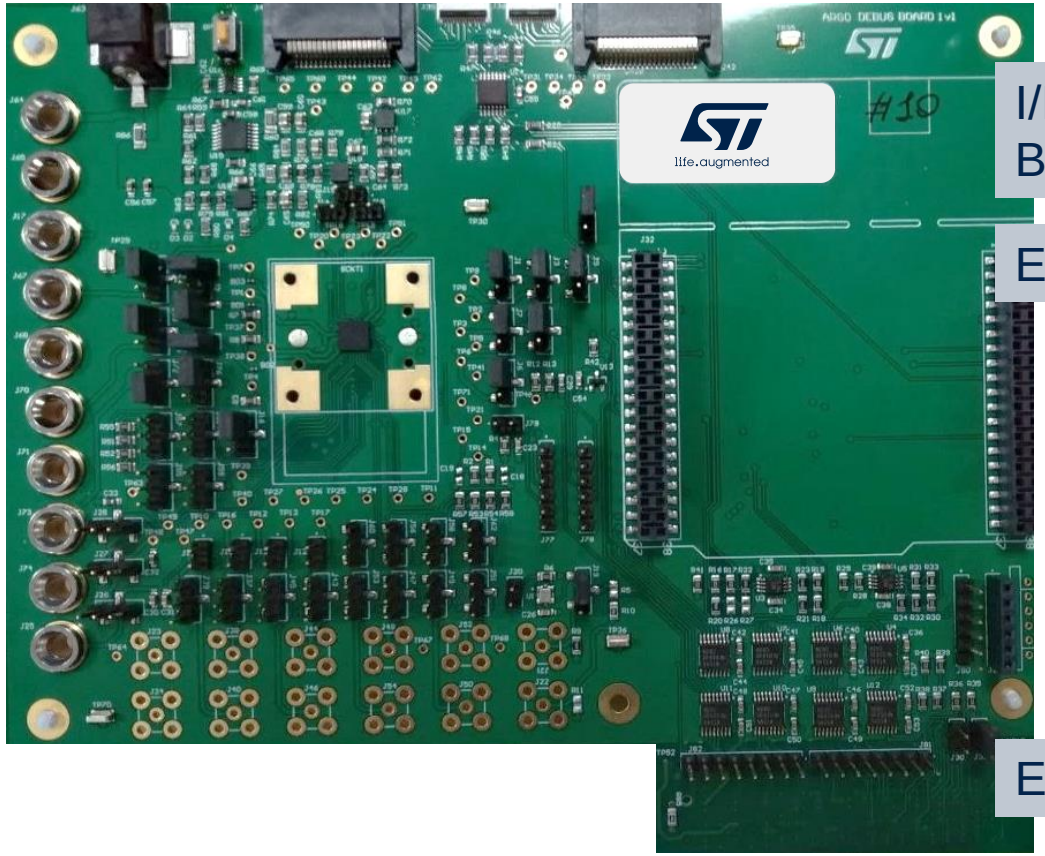


Supporting a wide range of applications:
- Smart glasses & video projection
- 3D scanning & LiDAR

life.augmented

Mirrors driver board

- MEMS Mirrors Driver
- Mirrors position sensing
- MEMS Mirrors Control Loop
- Safety
- Test Points

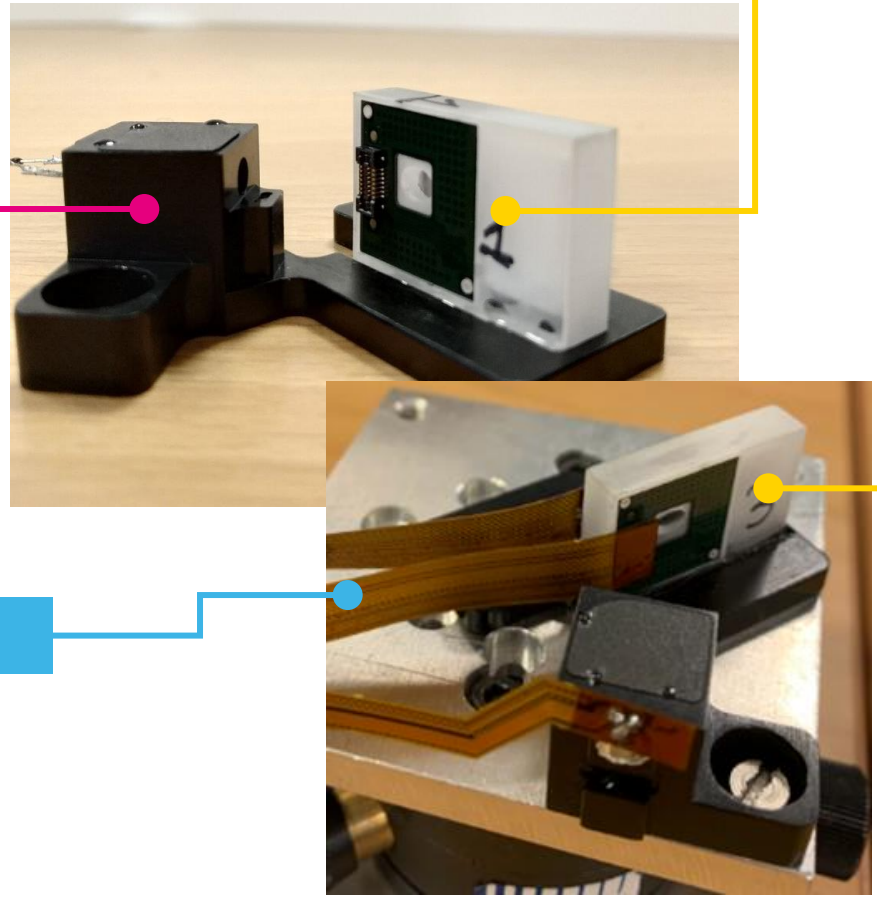


- I/F for any kind of STM32 Nucleo Boards
- External Laser Driver I/F
- External FPGA FMC LPC I/F

Projection module: LEDA

Monochromatic laser

MMR40100 & MML40100



Flexure connection to board

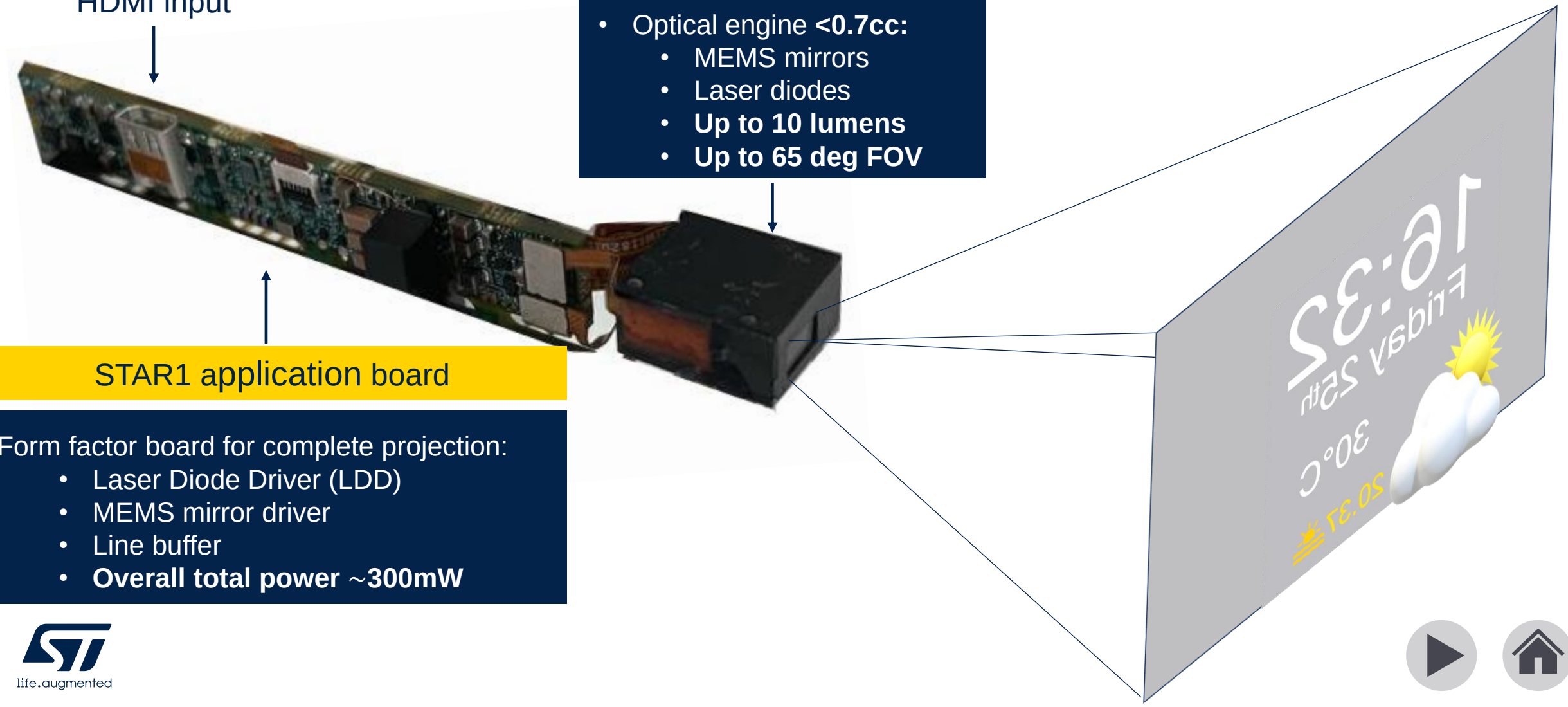
life.augmented

STAR1 reference design

HDMI input

Optical engine module

- Optical engine **<0.7cc:**
  - MEMS mirrors
  - Laser diodes
  - **Up to 10 lumens**
  - **Up to 65 deg FOV**



STAR1 application board

Form factor board for complete projection:

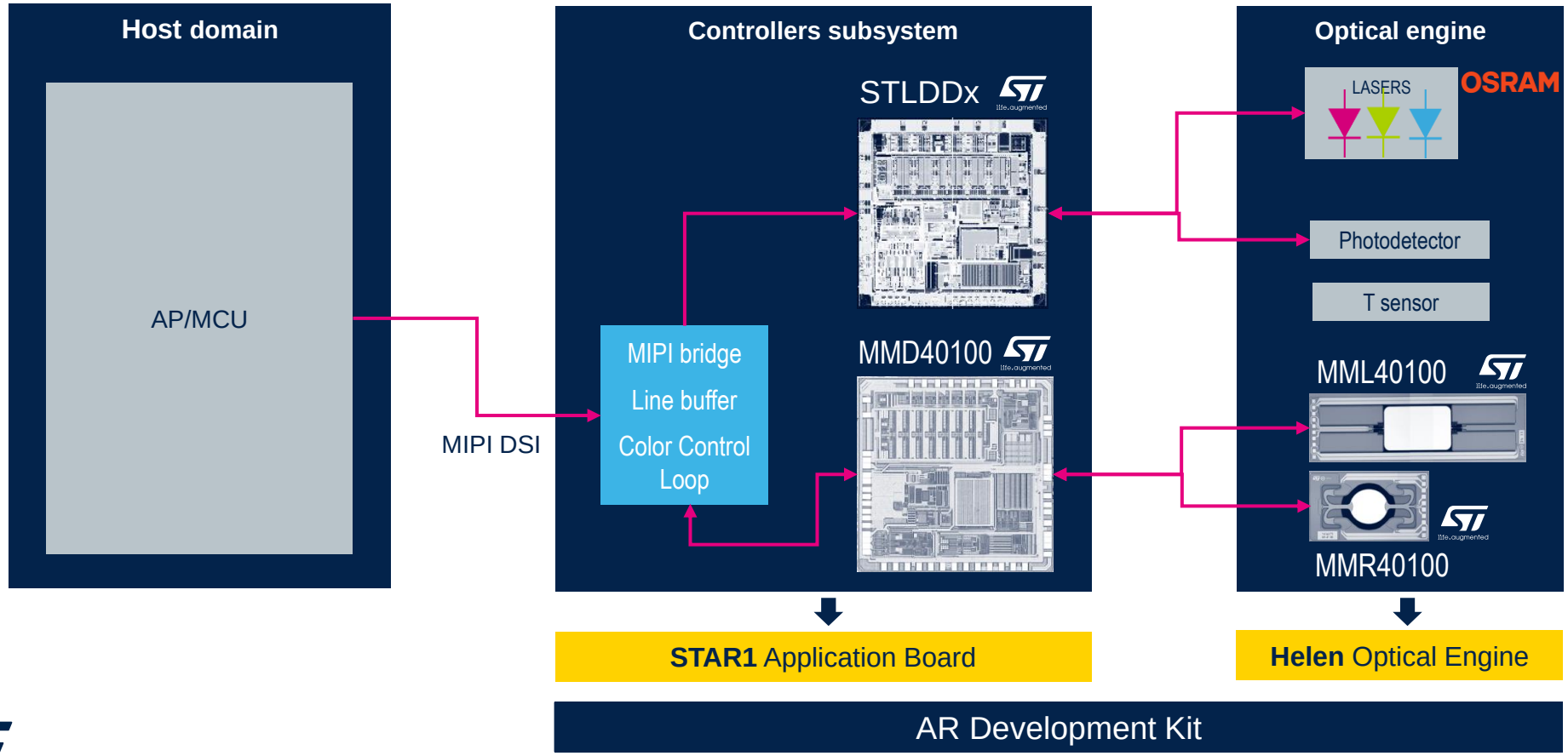
- Laser Diode Driver (LDD)
- MEMS mirror driver
- Line buffer
- **Overall total power ~300mW**

life.augmented

STAR1 reference design

LBS subsystem reference design for near to eye display

Based on ST piezo mirror technology



AR development kit: STAR1 application board

STAR application board

Complete projection system driver, including:

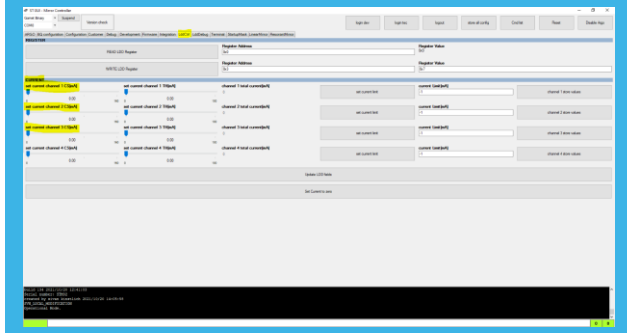
- Mirrors driver & controller (MMD40100)
- Laser Diode Driver (STLDDx)
- STM32 microcontroller
- FPGA MIPI bridge and line buffer
- HDMI to MIPI bridge
- Power management

Form factor

Non-form factor

ST Graphical User Interface

for easy board configuration



The LaSAR Alliance Ecosystem

LaSAR

is an acronym for

Laser Scanning
for Augmented Reality

An ecosystem of key technology, component, device and solution providers

> 19 total members and counting

Regular Members

META, EssilorLuxottica, CORNING, OCTOMED, INKRON, OPTOFIDELITY, SCHOTT, HENSOLDT, evatec, Lochn Optics, Greatar 呈格, oomii

Associate Members

EXALOS, KST, b com

life.augmented