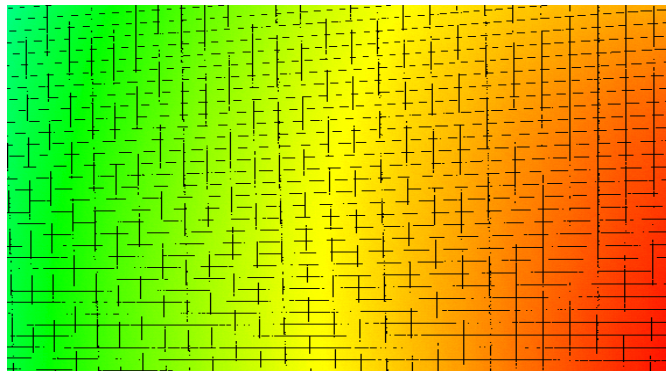


# Agenda

- DLP 3D scanning Introduction
- DLP 3D scanning SDK Introduction
- **Advance features for existing SDK**
  - Increasing scanning speed from 20Hz to 400Hz
  - Improve the lost point cloud
- 3D Machine Vision Applications: Performance of adaptive patterns
- DMD Performance and Stability for 3D Machine Vision Applications

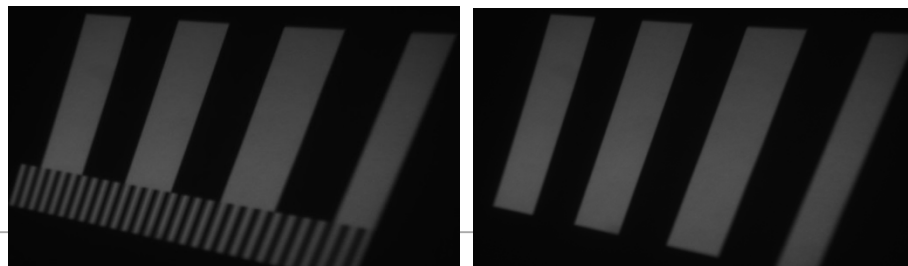
## Advance features for existing SDK

- In existing SDK, pattern rate for steps 8(Horizontal + vertical + hybrid pattern (phase shift + Gray code)) is about 20 Hz on LCR4500. How to improve the pattern rate?
- In existing SDK, there is lost scanning data when using hybrid algorithm. How to improve it?



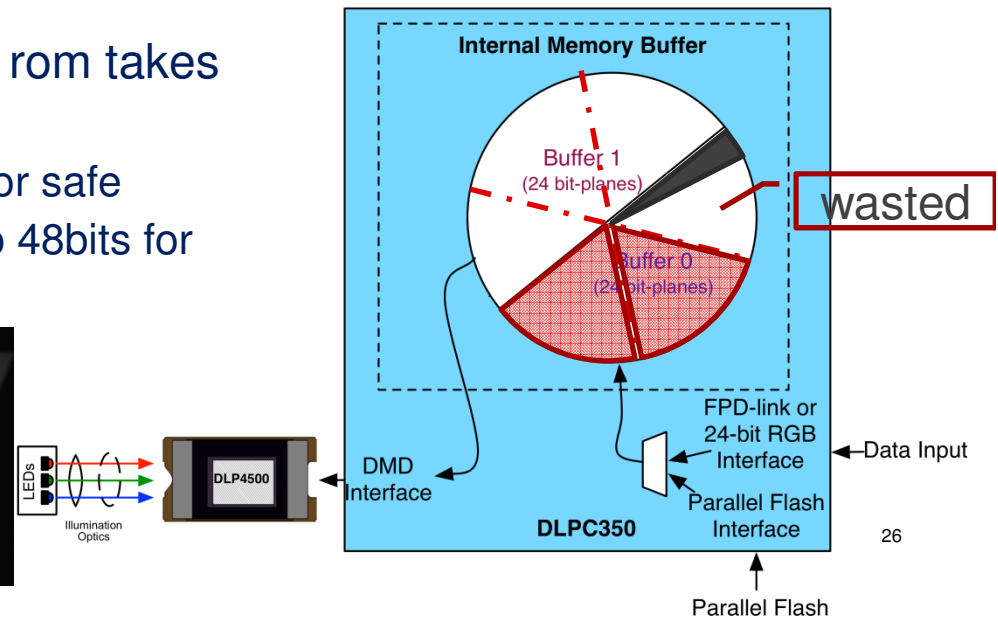
# Increasing Pattern rate from 20Hz to 400Hz for DLP4500 – root cause\ solution

1. The calibration pattern is located at first bit for default. It wastes first 8 bits.
  - Solution: Not share the calibration pattern with scanning pattern in the same buffer. Load it when it is needed.
2. Load the data for buffer 1 from flash rom takes ~130ms.
  - $130\text{ms}/3 \text{ patterns} = 43\text{ms} \Rightarrow 20\text{Hz}$  for safe
  - Solution: must fit all scanning data to 48bits for DLP4500 platform



Not correct(mixed pattern)

Correct



## Increasing Pattern rate from 20Hz to 400Hz for DLP4500 – root cause\ solution

3. The image buffer in DLPC350 is only 48bits. Pattern data for step 8 is  $6*8 + 16 + 18 = 82$  bits.

Solution: reduce the size

- Change the bit depth for phase shift pattern to 6 bit in config file.

**THREE\_PHASE\_PARAMETERS\_BITDEPTH = MONO\_6BPP**

- Reduce gray code to 6 patterns by changing the pixels for phase period in config file.

**THREE\_PHASE\_PARAMETERS\_PIXELS\_PER\_PERIOD = 144**

**THREE\_PHASE\_PARAMETERS\_PIXELS\_PER\_PERIOD = 120**

Bit number for H + V patterns =  $6\text{bit depth} * 6(\text{phase shift patterns}) + 6 * 2(\text{gray code patterns}) = 48\text{bit}$ .

At this condition, the max speed could achieve **400Hz**

## Demo: standard SDK and max speed

	standard		Max speed
pattern rate	20Hz (limit by DLPC350)		180Hz (limit by camera\ PC)
camera resolution	1280x1024	528x362	528x362

Code change:



DLP\_LightCrafter\_4500\_3D\_Scan\_Application.cpp



lcr4500.cpp



gray\_code.cpp