

2011-08-10 XPP CSPAD alignment parameters

Optical measurement for XPP CSPAD

We use 2011-08-10 optical measurements from Chris:

[2011-08-10-Metrology.xlsx](#),

[2011-08-10-Metrology.txt](#).

Procedure and table of results

We calculate

S1 - 1st short side of 2x1

S2 - 2nd short side of 2x1

L1 - 1st long side of 2x1

L2 - 2nd long side of 2x1

dS and dL are the deviations of the 1st and 2nd corner along the short and long sides, respectively. The sign of all dS are chosen in order to provide correct sign for the tilt angle (the same direction for all 2x1 sensors).

Everything, excluding <dS/L> and angle(deg), are in micrometers.

pair:	S1	S2	dS1	dS2	L1	L2	dL1	dL2	<dS/L>	angle(deg)
Quad 0										
pair: 0	20908	20908	-47	-47	43530	43536	20	26	-0.00108	-0.06186
pair: 1	20902	20884	10	-8	43538	43542	0	4	-0.00009	-0.00526
pair: 2	20903	20903	130	130	43541	43541	65	65	0.00299	0.17107
pair: 3	20904	20773	59	190	43538	43540	90	92	0.00286	0.16384
pair: 4	20906	20894	-15	-27	43541	43540	9	8	-0.00048	-0.02763
pair: 5	20905	20903	293	291	43535	43539	-140	-136	0.00671	0.38428
pair: 6	20898	20903	38	33	43540	43533	20	13	0.00082	0.04672
pair: 7	20901	20903	89	87	43539	43538	43	42	0.00202	0.11581
Quad 1										
pair: 0	20905	20906	-48	-47	43539	43541	17	19	-0.00109	-0.06251
pair: 1	20906	20899	3	-4	43536	43536	4	4	-0.00001	-0.00066
pair: 2	20906	20896	-57	-47	43539	43536	-23	-26	-0.00119	-0.06843
pair: 3	20902	20909	14	7	43537	43540	2	5	0.00024	0.01382
pair: 4	20906	20891	-108	-123	43544	43537	64	57	-0.00265	-0.15199
pair: 5	20908	20903	-70	-75	43539	43545	32	38	-0.00167	-0.09540
pair: 6	20899	20902	42	39	43541	43539	24	22	0.00093	0.05330
pair: 7	20911	20896	-62	-47	43540	43538	-24	-26	-0.00125	-0.07172
Quad 2										
pair: 0	20902	20909	-207	-200	43538	43535	104	101	-0.00467	-0.26781
pair: 1	20909	20904	1	-4	43537	43539	0	2	-0.00005	-0.00263
pair: 2	20899	20904	-212	-217	43538	43540	-104	-102	-0.00493	-0.28227
pair: 3	20902	20899	-94	-91	43539	43541	-48	-46	-0.00212	-0.12172
pair: 4	20908	20902	-181	-187	43541	43543	87	89	-0.00423	-0.24212
pair: 5	20906	20906	1	1	43540	43540	0	0	0.00000	0.00000
pair: 6	20913	20906	-90	-83	43541	43542	-42	-41	-0.00199	-0.11382
pair: 7	20896	20904	-96	-104	43538	43539	-46	-45	-0.00230	-0.13160
Quad 3										
pair: 0	20906	20904	-166	-168	43535	43857	77	399	-0.00382	-0.21897
pair: 1	20902	20898	3	-1	43538	43537	2	1	0.00002	0.00132
pair: 2	20907	20899	0	8	43539	43537	4	2	0.00009	0.00526
pair: 3	20903	20907	-62	-66	43540	43533	-26	-33	-0.00147	-0.08423
pair: 4	20905	20669	-122	-358	43539	43476	59	-4	-0.00552	-0.31617
pair: 5	20900	20905	6	11	43540	43542	-2	0	0.00007	0.00395
pair: 6	20893	20902	-43	-52	43538	43543	-26	-21	-0.00109	-0.06251
pair: 7	20906	20904	15	17	43537	43535	7	5	0.00037	0.02106

- Problematic measurements are:
In quad0, row 18, Y: 76200 is changed for 67200. Chris confirm that it might be a typo.
- All measurements are consistent with each other within +/-10um.
- Angles of 2x1 are in the range from -0.31 to +0.38 degree.

Configuration parameters

Configuration parameters are shown in number of pixels.

For 2x1 pairs in each quad

Coordinates of the 2x1 centers

- Use the same orientation as in optical measurement, center is calculated as an average of 4 corner coordinates
- All coordinates in pixels

```
self.pairXInQaud, self.pairYInQaud, self.pairZInQaud =
X(pixel):
198.48, 198.05, 307.91, 95.69, 625.60, 624.69, 709.79, 497.97,
198.36, 198.05, 310.89, 98.49, 627.36, 627.76, 712.15, 498.90,
198.78, 198.04, 310.98, 97.86, 627.09, 627.61, 713.33, 500.94,
198.90, 198.05, 309.48, 96.66, 626.23, 626.67, 712.47, 499.68,
Y(pixel):
306.92, 95.08, 625.56, 625.52, 516.16, 729.09, 200.58, 201.70,
307.40, 95.09, 624.41, 624.85, 519.48, 731.87, 204.71, 205.30,
307.61, 95.10, 625.99, 626.70, 514.76, 727.56, 200.39, 201.28,
308.23, 95.08, 624.73, 625.09, 513.34, 726.52, 196.72, 196.82,
Z(pixel):
0.33, 0.28, 0.21, 0.08, 0.43, 0.43, 0.54, 0.48,
-0.68, -0.42, -1.15, -0.87, -1.63, -1.86, -1.53, -1.07,
-0.37, -0.01, -0.50, -0.33, -0.89, -0.95, -1.01, -0.77,
-0.46, -0.37, -0.68, -0.41, -1.16, -1.25, -1.11, -1.79,
```

Hand-maid coordinate correction for 2x1 in quads (in pixel)

```
self.dXInQaud = [
# 0 1 2 3 4 5 6 7
[ 0, 0, 0, 0, 0, 0, 0, 0],
[ 0, 0, 0, 0, 0, 0, 0, 0],
[ 0, 0, 0, 0, 0, 0, 0, 0],
[ 0, 0, 0, 0, 0, 0, 0, 0]]

self.dYInQaud = [
[ 0, 0, 0, 0, 0, 0, 0, 0],
[ 0, 0, 0, 0, -7, -7, -10, -10],
[ 0, 0, 0, 0, 0, 0, 0, 0],
[ 0, 0, 0, 0, 0, 0, 0, 2]]
```

2x1-pair orientation angle (degree) in quads

```
self.pairInQaudOrient = [
[ 270, 270, 180, 180, 90, 90, 180, 180],
[ 270, 270, 180, 180, 90, 90, 180, 180],
[ 270, 270, 180, 180, 90, 90, 180, 180],
[ 270, 270, 180, 180, 90, 90, 180, 180] ]
```

Sensor tilt angle (dergee) from optical measurement

```
self.dPhi = [
[-0.06186, -0.00526, 0.17107, 0.16384, -0.02763, 0.38428, 0.04672, 0.11581],
[-0.06251, -0.00066, -0.06843, 0.01382, -0.15199, -0.09540, 0.05330, -0.07172],
[-0.26781, -0.00263, -0.28227, -0.12172, -0.24212, 0.00000, -0.11382, -0.13160],
[-0.21897, 0.00132, 0.00526, -0.08423, -0.31617, 0.00395, -0.06251, 0.02106] ]
```

Quad coordinates in the detector

```
offX    = 40
offY    = 40
gapX    = 0
gapY    = 0
shiftX  = 38
shiftY  = 38

self.quadXOffset = [ off+0-gapX+shiftX,  off+ 0+0-gapX-shiftX,  off+834-2+gapX-shiftX,  off+834+0+gapX+shiftX]
self.quadYOffset = [ off+3-gapY-shiftY,  off+834-1+gapY-shiftY,  off+834-5+gapY+shiftY,  off+ 0+2-gapY+shiftY]
```