Supplementary material for: Oulu Remote-photoplethysmography Physical Domain Attacks Database (ORPDAD)

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1 Extended Experimental Results

The main manuscript contains only the RMSE and SNR metrics. In this supplemental material we provide the extended experimental results that include MAE, RMSE, R and SNR metrics. As these are extended versions of the same results from the main paper, we maintain the same table numbering. Results for Illumination, Movement and Concealment scenarios, are shown in Tabs. 2 to 4.

Table 2: Results on illumination attacks I1-I6. Symbols denote: □ hand-crafted, supervised ⧫ end-to-end and ◇ non-end-to-end, ▼ self-supervised.

MAE↓|RMSE↓ R↑|SNR↑		S1-S3 (still)	I1+I4 (small)	I2+I5 (med.)	I3+I6 (large)
GREEN [10]□		3.68|8.57 0.77|-7.4	20.9|25.7 0.00|-6.7	25.0|27.9 0.00|-4.1	25.0|27.7 0.00|-2.5
CHROM [2]□		0.49|0.91 0.99|-3.7	0.77|1.87 0.98|-4.7	5.66|13.3 0.56|-4.4	11.8|19.5 0.26|-4.3
POS [11]□		0.34|0.70 0.99|-3.4	1.31|5.77 0.88|-4.4	4.37|11.4 0.65|-4.8	6.18|13.8 0.53|-4.8
LGI [6]□		0.54|1.05 0.99|-3.5	2.37|8.16 0.79|-4.4	12.4|20.7 0.17|-4.2	21.4|25.9 0.00|-3.3
ICA [7]□		0.48|1.14 0.99|-2.9	15.9|22.3 0.13|-3.7	24.1|27.6 0.00|-1.4	25.0|27.7 0.00| 0.2
PCA [3]□		0.65|1.35 0.99|-5.1	4.05|10.5 0.66|-6.2	7.82|15.6 0.45|-6.5	6.62|13.1 0.61|-7.2
DeepPhys [1]⧫	AU	0.46|1.02 0.99|-2.7	1.41|5.53 0.89|-3.9	15.0|22.6 0.04|-3.4	23.1|26.8 0.00|-2.4
	AA	0.40|0.79 0.99|-2.8	0.40|0.63 0.99|-3.7	2.47|8.23 0.80|-4.0	6.67|13.9 0.52|-4.4
TS-CAN [4]⧫	AU	0.60|1.16 0.99|-3.6	1.70|6.31 0.87|-4.7	16.5|23.5 0.04|-4.1	24.3|27.4 0.00|-3.1
	AA	0.50|0.88 0.99|-3.5	0.49|0.76 0.99|-3.9	0.59|1.09 0.99|-4.2	1.82|5.90 0.88|-4.5
PhysNet [12]⧫	AU	0.34|0.88 0.99|-3.1	1.18|4.58 0.92|-4.2	6.62|13.2 0.55|-4.6	10.3|16.1 0.43|-4.7
	AA	0.26|0.55 0.99|-2.8	0.27|0.51 0.99|-3.1	0.23|0.46 0.99|-3.5	0.63|1.61 0.99|-4.1
CVD [5]◇	AU	0.47|1.03 0.99|-3.1	0.65|1.51 0.99|-3.9	1.59|5.47 0.88|-4.6	2.45|7.17 0.81|-5.2
	AA	0.37|0.79 0.99|-2.4	0.48|1.10 0.99|-2.7	0.52|0.95 0.99|-3.0	0.96|4.08 0.93|-3.4
Physformer [13]⧫	AU	0.33|0.95 0.99|-3.0	0.50|1.01 0.99|-3.8	4.06|10.0 0.70|-4.5	8.55|14.8 0.46|-4.6
	AA	0.34|1.34 0.99|-2.4	0.45|1.59 0.99|-2.7	0.27|0.57 0.99|-3.1	2.45|7.51 0.80|-3.8
PhySU-Net [8]◇	AU	0.29|0.74 0.99|-1.9	0.35|0.62 0.99|-2.9	1.48|5.71 0.88|-3.7	1.91|6.24 0.86|-4.0
	AA	0.25|0.50 0.99|-1.8	0.36|0.93 0.99|-2.1	0.53|1.41 0.99|-2.6	0.91|3.15 0.96|-2.7
Contrast-Phys [9]▼	AU	0.44|0.95 0.99|-2.8	0.71|1.51 0.99|-3.8	7.26|13.9 0.50|-4.3	11.0|17.2 0.31|-4.4
	AA	9.73|20.1 0.54|-3.6	10.5|20.9 0.53|-3.7	10.7|21.6 0.53|-4.1	12.1|21.9 0.51|-4.5

Table 3: Results on movement attacks M1-M11. Symbols denote: □ hand-crafted, supervised ♦ end-to-end and ◇ non-end-to-end, ▼ self-supervised.

MAE↓|RMSE↓ R↑|SNR↑		S1-S3 (still)	M1+M6 (s. ver.)	M2+M7 (l. ver.)	M3+M8 (s. hor.)	M4+M9 (l. hor.)	M5+M10 (mouth)	M11 (talk)
GREEN [10]□		3.68|8.57 0.77|-7.4	23.9|26.6 0.06|-4.4	23.8|26.8 0.12|-2.8	18.9|23.5 0.10|-6.7	26.5|31.0 0.00|-5.6	23.7|26.9 0.03|-5.2	16.5|23.1 0.08|-8.7
CHROM [2]□		0.49|0.91 0.99|-3.7	4.15|10.4 0.71|-4.9	4.92|11.5 0.60|-5.8	2.30|6.34 0.86|-5.0	11.7|19.3 0.36|-5.9	4.38|10.6 0.68|-5.5	0.90|1.35 0.99|-6.8
POS [11]□		0.34|0.70 0.99|-3.4	3.08|8.60 0.78|-4.8	6.39|13.8 0.49|-5.7	2.60|8.22 0.78|-4.8	7.74|14.5 0.46|-6.1	4.28|10.3 0.71|-5.4	0.80|1.20 0.99|-6.5
LGI [6]□		0.54|1.05 0.99|-3.5	11.0|18.0 0.32|-4.9	22.5|26.1 0.16|-3.8	4.90|11.4 0.66|-4.9	17.8|24.2 0.07|-5.1	6.11|12.7 0.62|-5.3	1.47|5.45 0.91|-6.7
ICA [7]□		0.48|1.14 0.99|-2.9	21.6|25.5 0.09|-3.3	20.5|24.9 0.25|-2.7	15.9|21.8 0.16|-4.7	21.7|26.3 0.08|-4.1	19.0|23.4 0.21|-4.0	1.53|3.99 0.95|-6.4
PCA [3]□		0.65|1.35 0.99|-5.1	5.54|13.4 0.52|-5.4	10.4|16.6 0.47|-7.3	7.62|14.5 0.52|-5.9	18.8|23.9 0.23|-6.4	5.61|13.5 0.48|-5.7	2.07|6.13 0.90|-7.1
DeepPhys [1]♦	AU	0.46|1.02 0.99|-2.7	12.7|19.4 0.28|-4.6	22.7|26.3 0.12|-3.5	18.2|23.7 0.10|-4.6	21.0|25.1 0.11|-4.7	10.4|17.2 0.41|-4.9	1.97|5.65 0.91|-6.6
	AA	0.40|0.79 0.99|-2.8	1.84|6.16 0.88|-3.9	9.43|15.9 0.51|-5.1	7.02|15.0 0.39|-4.6	13.6|20.6 0.18|-5.3	3.65|9.38 0.77|-4.1	1.47|7.47 0.83|-5.4
TS-CAN [4]♦	AU	0.60|1.16 0.99|-3.6	19.5|24.2 0.11|-4.5	23.8|26.8 0.12|-3.2	19.5|24.4 0.05|-5.3	22.6|26.0 0.05|-4.8	14.0|19.8 0.38|-5.0	1.20|1.79 0.99|-7.2
	AA	0.50|0.88 0.99|-3.5	1.80|5.99 0.88|-4.3	11.5|18.5 0.39|-5.3	6.95|15.2 0.40|-5.0	14.8|21.0 0.17|-5.8	5.14|11.7 0.66|-4.7	0.91|1.45 0.99|-5.7
PhysNet [12]♦	AU	0.34|0.88 0.99|-3.1	9.65|17.1 0.23|-5.0	18.5|22.6 0.14|-4.9	4.32|9.45 0.70|-5.3	15.1|20.6 0.00|-6.3	3.22|8.86 0.76|-4.5	1.74|6.21 0.88|-5.0
	AA	0.26|0.55 0.99|-2.8	0.92|3.61 0.95|-3.3	4.63|11.5 0.63|-4.4	0.82|3.62 0.94|-3.7	3.87|9.11 0.72|-5.5	0.37|0.71 0.99|-3.6	0.73|3.37 0.96|-4.2
CVD [5]◇	AU	0.47|1.03 0.99|-3.1	4.39|10.6 0.60|-5.5	11.5|16.8 0.26|-7.4	1.71|6.62 0.82|-4.2	6.27|11.2 0.52|-6.1	2.02|5.23 0.89|-5.1	2.47|8.74 0.74|-4.9
	AA	0.37|0.79 0.99|-2.4	1.42|4.64 0.91|-3.4	7.31|12.9 0.31|-5.8	0.46|0.83 0.99|-2.7	2.56|5.96 0.86|-4.5	1.09|2.97 0.96|-3.6	1.77|6.30 0.88|-3.7
Physformer [13]♦	AU	0.33|0.95 0.99|-3.0	4.28|11.0 0.62|-4.3	12.6|18.3 0.28|-5.0	4.70|12.0 0.50|-4.8	14.8|20.5 0.00|-5.7	3.09|8.55 0.76|-4.6	2.47|8.68 0.75|-5.2
	AA	0.34|1.34 0.99|-2.4	0.33|0.69 0.99|-2.6	4.50|10.8 0.64|-4.0	1.87|7.30 0.79|-3.1	5.31|11.7 0.55|-4.8	1.52|5.94 0.87|-3.2	1.20|5.67 0.90|-3.9
PhySU-Net [8]◇	AU	0.29|0.74 0.99|-1.9	1.96|5.93 0.88|-4.2	9.07|15.2 0.31|-6.5	1.05|3.58 0.94|-3.9	5.75|9.48 0.66|-6.2	0.41|0.69 0.99|-3.6	1.86|7.71 0.81|-4.2
	AA	0.25|0.50 0.99|-1.8	0.51|1.31 0.99|-2.3	3.62|9.17 0.67|-3.8	0.34|0.69 0.99|-2.2	2.88|7.04 0.79|-4.2	0.35|0.62 0.99|-2.2	1.61|7.56 0.82|-3.1
Contrast-Phys [9]▼	AU	0.44|0.95 0.99|-2.8	8.79|15.0 0.49|-4.8	17.7|21.6 0.31|-4.6	2.57|6.84 0.84|-4.9	12.8|18.1 0.25|-5.9	3.26|9.54 0.70|-4.6	1.24|3.41 0.97|-5.0
	AA	9.73|20.1 0.54|-3.6	15.3|25.5 0.36|-4.6	19.8|27.1 0.12|-5.8	19.5|27.8 0.17|-5.2	25.1|28.8 0.04|-5.4	10.9|22.3 0.51|-4.4	13.2|24.1 0.41|-5.0

Table 4: Results on concealment attacks C1-C6. Symbols denote: □ hand-crafted, supervised ♦ end-to-end and ◇ non-end-to-end, ▼ self-supervised.

MAE↓|RMSE↓ R↑|SNR↑		S1-S3 (still)	C1 (hat)	C2 (mask)	C3 (both)	C4 (primer)	C5 (found.)	C6 (powder)
GREEN [10]□		3.68|8.57 0.77|-7.4	8.23|14.0 0.36|-8.7	15.2|18.9 0.19|-9.1	18.7|21.9 0.00|-9.2	4.33|9.46 0.64|-7.7	6.67|12.1 0.50|-8.8	7.88|13.7 0.37|-8.7
CHROM [2]□		0.49|0.91 0.99|-3.7	0.48|0.72 0.99|-5.3	4.42|11.1 0.54|-7.8	13.4|17.6 0.42|-9.5	0.54|0.87 0.99|-4.1	0.67|1.16 0.99|-5.2	0.65|0.95 0.99|-5.3
POS [11]□		0.34|0.70 0.99|-3.4	0.42|0.69 0.99|-4.7	0.68|0.96 0.99|-6.0	15.1|23.7 0.18|-10.	0.35|0.57 0.99|-3.5	0.52|0.94 0.99|-4.6	0.46|0.80 0.99|-4.6
LGI [6]□		0.54|1.05 0.99|-3.5	0.45|0.70 0.99|-4.9	8.07|14.1 0.48|-8.7	16.2|22.0 0.14|-9.6	0.51|0.84 0.99|-3.6	0.60|1.13 0.99|-4.9	0.61|0.92 0.99|-4.9
ICA [7]□		0.48|1.14 0.99|-2.9	0.46|0.81 0.99|-3.8	0.60|1.03 0.99|-5.2	14.5|17.7 0.38|-9.2	0.46|0.75 0.99|-3.0	0.46|1.05 0.99|-4.4	0.54|0.87 0.99|-4.2
PCA [3]□		0.65|1.35 0.99|-5.1	0.77|1.37 0.99|-5.4	19.5|24.1 0.00|-9.4	18.8|22.0 0.26|-9.0	0.62|1.08 0.99|-4.8	2.35|7.78 0.76|-6.0	2.59|8.32 0.76|-6.1
DeepPhys [1]	AU	0.46|1.02 0.99|-2.7	0.45|0.77 0.99|-3.4	10.3|15.3 0.40|-9.4	14.9|18.9 0.32|-9.3	0.49|0.76 0.99|-2.8	0.48|0.84 0.99|-3.6	0.43|0.75 0.99|-3.4
	AA	0.40|0.79 0.99|-2.8	0.46|0.82 0.99|-3.3	0.58|1.18 0.99|-4.0	0.53|0.85 0.99|-5.8	0.42|0.73 0.99|-2.8	0.50|0.80 0.99|-3.8	0.48|0.81 0.99|-3.7
TS-CAN [4]♦	AU	0.60|1.16 0.99|-3.6	0.60|1.05 0.99|-4.9	13.7|18.4 0.22|-9.0	13.9|17.7 0.38|-8.9	0.51|0.77 0.99|-3.7	0.48|0.91 0.99|-4.9	0.73|1.21 0.99|-4.5
	AA	0.50|0.88 0.99|-3.5	0.56|0.93 0.99|-4.0	0.72|1.48 0.99|-4.4	1.01|3.35 0.95|-6.1	0.50|0.76 0.99|-3.4	0.60|1.01 0.99|-4.8	0.70|1.38 0.99|-4.7
PhysNet [12]♦	AU	0.34|0.88 0.99|-3.1	0.29|0.50 0.99|-3.3	0.36|0.67 0.99|-4.5	8.60|14.8 0.19|-7.6	0.38|0.71 0.99|-3.1	0.39|0.76 0.99|-4.0	0.32|0.60 0.99|-3.7
	AA	0.26|0.55 0.99|-2.8	0.27|0.50 0.99|-3.1	0.24|0.51 0.99|-3.2	0.39|0.79 0.99|-3.9	0.26|0.54 0.99|-2.8	0.34|0.60 0.99|-3.6	0.30|0.52 0.99|-3.3
CVD [5]◇	AU	0.47|1.03 0.99|-3.1	0.58|1.24 0.99|-3.5	4.46|7.07 0.77|-7.5	8.02|10.4 0.31|-8.5	1.55|7.76 0.71|-3.1	0.55|1.05 0.99|-3.7	0.43|0.75 0.99|-3.8
	AA	0.37|0.79 0.99|-2.4	0.40|0.82 0.99|-2.9	0.64|1.16 0.99|-3.8	6.05|8.43 0.56|-7.1	0.43|0.87 0.99|-2.3	0.54|1.03 0.99|-2.9	0.40|0.73 0.99|-3.0
Physformer [13]♦	AU	0.33|0.95 0.99|-3.0	0.49|0.94 0.99|-3.4	3.84|10.8 0.56|-6.6	11.0|16.1 0.15|-7.9	0.38|0.71 0.99|-3.0	0.38|0.68 0.99|-3.9	0.38|0.66 0.99|-3.6
	AA	0.34|1.34 0.99|-2.4	0.53|1.87 0.98|-2.8	0.46|1.09 0.99|-3.1	0.95|2.33 0.97|-3.9	0.26|0.54 0.99|-2.4	0.37|0.69 0.99|-3.2	0.32|0.59 0.99|-2.8
PhySU-Net [8]◇	AU	0.29|0.74 0.99|-1.9	0.34|0.58 0.99|-2.8	3.79|6.47 0.80|-7.2	14.9|18.7 0.00|-8.7	0.35|0.67 0.99|-1.9	0.31|0.57 0.99|-3.0	0.34|0.55 0.99|-2.7
	AA	0.25|0.50 0.99|-1.8	0.32|0.62 0.99|-2.3	0.44|0.84 0.99|-2.8	6.96|10.3 0.33|-6.7	0.28|0.62 0.99|-1.8	0.27|0.63 0.99|-2.5	0.29|0.51 0.99|-2.1
Contrast-Phys [9]▼	AU	0.44|0.95 0.99|-2.8	0.43|0.73 0.99|-3.4	8.83|13.8 0.25|-8.7	10.1|13.6 0.16|-9.0	0.41|0.81 0.99|-2.8	0.54|0.72 0.99|-4.3	0.55|0.86 0.99|-4.4
	AA	9.73|20.1 0.54|-3.6	6.80|18.9 0.57|-3.4	30.3|37.0 0.00|-6.3	29.2|35.8 0.00|-6.0	9.72|20.1 0.45|-3.4	5.33|18.3 0.51|-3.6	4.74|16.7 0.54|-3.5

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