

OfficeBP: Noninvasive Continuous Blood Pressure Monitoring Based on PPT in Office Environment

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Abstract

Blood pressure (BP), as a crucial vital sign of human beings, reflects the physical state of the cardiovascular system. Currently, blood pressure is mainly measured by collecting the changes in pressure in the vessel using cuff-sensors. It is a manual operation and cannot achieve continuous BP monitoring. In this work, we developed OfficeBP, a novel non-intrusive BP monitoring system for a typical office environment.



Figure 1: Use OfficeBP for Monitoring in Normal Work

Implementation

- This contribution consists of three points:
- 1) presenting an adaptive skin detection algorithm to obtain skin pixels for rPPG extraction, improves the robustness of rPPG extraction in diverse office conditions;
 - 2) adopting existing office devices achieved non-invasive physiological signal collection;
 - 3) extracting of multi-dimensional features to realize BP estimation.

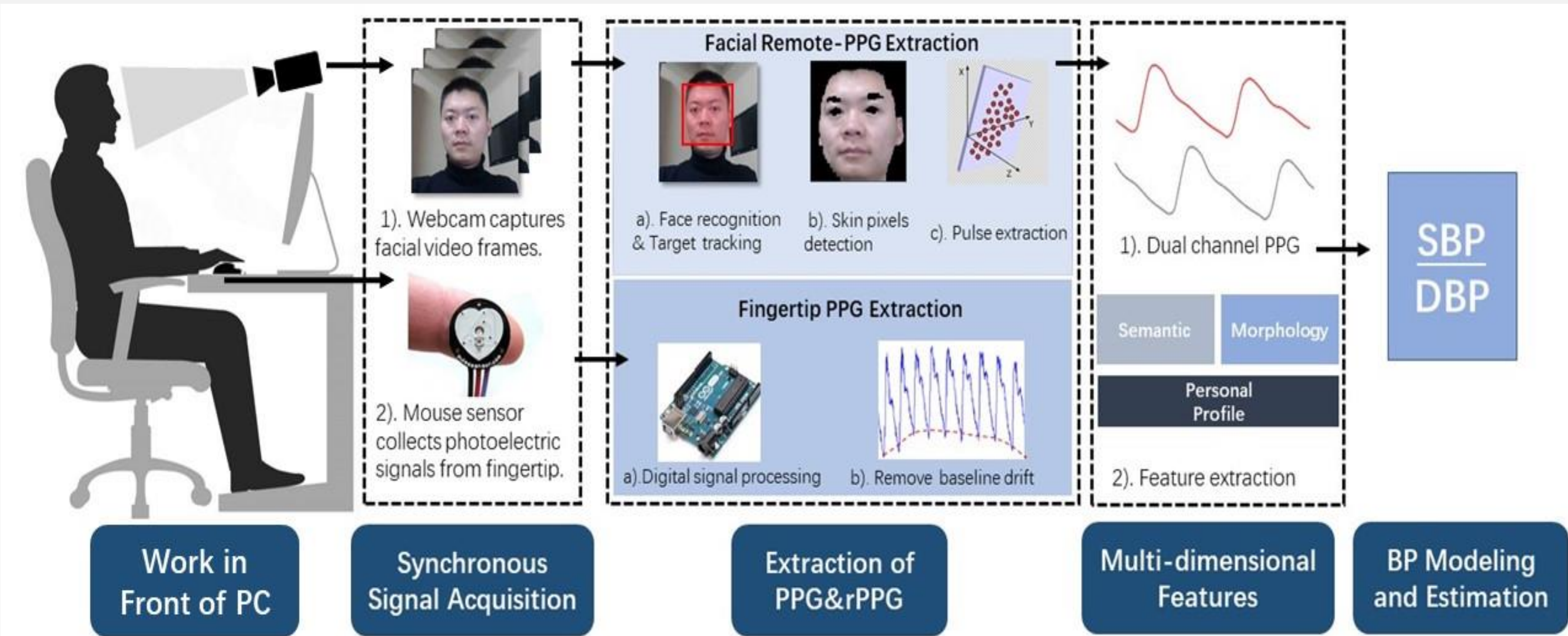


Figure 2: OfficeBP Framework.

The main contribution of this work: to perform non-invasive blood pressure monitoring in an office environment with rPPG & PPG sensing technology based on the pulse transmission.

Result

root mean square error (RMSE) result : diastolic blood pressure (DBP) 4.81 mmHg, systolic blood pressure (SBP) 5.35 mmHg

ID	Age	Sex	Resting BP [mmHg]	Active BP [mmHg]	RMSE DBP [mmHg]	RMSE-SBP [mmHg]
1	21	M	73 - 125	87 - 136	2.39	3.28
2	23	M	72 - 110	85 - 129	6.42	5.57
3	24	M	76 - 125	86 - 133	2.42	3.69
4	24	F	75 - 118	82 - 121	5.68	7.65
5	25	M	61 - 100	71 - 110	7.12	6.31
6	25	F	66 - 99	70 - 104	4.94	6.83
7	26	M	65 - 109	70 - 115	7.55	5.69
8	48	M	70 - 106	65-111	4.42	3.22
9	49	F	61 - 92	73 - 98	3.31	4.92
10	52	M	64 - 118	71 - 122	4.92	6.26
11	54	F	70 - 135	80 - 143	3.73	5.41
μ	34				4.81	5.35
σ	13				1.69	1.39



Figure3. Participant Statistics and Results

Conclusion

In this study, we proposed OfficeBP, a method of non-invasive blood pressure monitoring in an office environment with existing equipment and confirmed the feasibility of rPPG technology to achieve non-invasive blood pressure monitoring in different working conditions. The experimental results show that BP measurements by OfficeBP are highly consistent with the standard devices. We expect that OfficeBP could raise the awareness of self-health management and be useful in the real environment.