

LIST OF FIGURES

1.1 A figure shows that one of the example of contacting-devices existed of human respiration; Electrocardiograph (ECG).	2
1.2 A figure shows that one of the example of contacting-devices existed of human respiration; Spirometer.	3
1.3 A prototype simulation for detecting human respiratory rate.	4
2.1 A figure shows that the human respiration which is caused by the pulmonary activities is such a small displacement which can be generates by the radar system.	8
2.2 A figure explains the equation of (2.1).	9
2.3 A figure shows that the human respiration which is caused by the pulmonary activities is such a small displacement which can be generates by the radar system.	9
2.4 A simple scheme of detector periodic chest wall movement which is caused by phase shift.	11
2.5 A figure shows that inside of the HB100 parts. In this thesis, a CW radar is applied for detecting a small displacement of human chest wall.	13
3.1 A figure shows that the block diagram of proposed technique of detection human chest wall movement (as a object detected) which is from the respiration pattern.	15
3.2 A periodic chest wall movement which is caused by phase shift. The CW radar system is a scheme of module of HB100 is going toing to detect the difference of human chest wall movement.	18
3.3 A simple block diagram for detecting human respiratory rate.	18
3.4 A figure shows that the resumption of detection human chest wall movement which is from the respiration pattern.	19
3.5 A figure shows that the experiment model of this thesis. The detection of human chest wall is detected by the CW radar module of HB100.	21

3.6	A figure shows that the CW radar module of HB100. There are some part at this module to connected with the PC and power supply. This module is for getting the results on the experimental model.	22
4.1	An LPF output in the time-domain which represents a three-different of respiration rate.	25
4.2	An LPF output in the time-domain which represents a two-different of respiration rate.	25
4.3	An LPF output in the frequency-domain which represents a three-different of respiration rate.	26
4.4	An LPF output in the frequency-domain which represents a two-different of respiration rate.	26
4.5	An LPF output in time-domain for different respiration amplitude in 0.26 Hz.	27
4.6	An LPF output in time-domain for different respiration amplitude in 0.33 Hz.	27
4.7	An LPF output in time-domain for different respiration amplitude in 0.5 Hz.	27
4.8	An LPF output in time-domain for different respiration amplitude in 0.74 Hz.	28
4.9	An LPF output in time-domain for different respiration amplitude in 0.84 Hz	28
4.10	An LPF output in frequency-domain for two-different respiration amplitude with the respiration rate of 0.33 Hz.	29
4.11	The normalized spectrum of LPF output for adult human respiration cases.	29
4.12	The normalized spectrum of LPF output for children human respiration cases.	30
4.13	The normalized spectrum of LPF output for toddler human respiration cases.	30
4.14	The normalized spectrum of LPF output for newborn human respiration cases.	31
4.15	The normalized spectrum of LPF output for infants human respiration cases.	31
4.16	A power spectrum of normalized LPF output.	32
4.17	A figure shows that the three-different respiration rate in normalized value.	34

- 4.18 A figure shows that the three-different respiration amplitude in normalized value. This result represents of 0 times/minutes of respiration. 35
- 4.19 A figure shows that the three-different respiration amplitude in normalized value. This result represents of 16 times/minutes of respiration. 36
- 4.20 A figure shows that the three-different respiration amplitude in normalized value. This result represents of 40 times/minutes of respiration. 36