



Novel System Approach for a mm-range Precision Indoor Positioning System

Renhai Xiong

Information

Band / Volume 63

ISBN 978-3-95806-517-8

Forschungszentrum Jülich GmbH
Zentralinstitut für Engineering, Elektronik und Analytik (ZEA)
Systeme der Elektronik (ZEA-2)

Novel System Approach for a mm-range Precision Indoor Positioning System

Renhui Xiong

Schriften des Forschungszentrums Jülich
Reihe Information / Information

Band / Volume 63

ISSN 1866-1777

ISBN 978-3-95806-517-8

ABSTRACT

KURZFASSUNG

Contents

List of Figures	viii
List of Tables	xii
1 Introduction	1
1.1 Motivation	3
1.2 Objective and Challenges	4
1.3 Contribution of this Work	5
1.4 Dissertation Structure	7
2 State-of-the-Art Indoor Positioning Technologies	9
2.1 Positioning Signal	9
2.2 Positioning Principle	14
2.3 Positioning Algorithms	21
2.4 Existing Indoor Positioning Systems	37
3 Research Methodology	41
3.1 System Strategy	41
3.2 System Hardware	52
3.3 Signal Processing System	70
4 Prototyping and Evaluation	86
4.1 Implementation of the Prototype System	86
4.2 1D Ranging Measurement	92
4.3 3D Positioning Measurement	100
5 Conclusion	105
5.1 Contributions	105
5.2 Challenges	106
5.3 Error Sources	107
6 Future Work	108
Appendices	109
A Schematic	109
B PCB Layout	117
C Bill of Material	120
D Lowpass Filter Design	122
E Newton-Raphson Equations	127
Bibliography	129
List of Abbreviations	141

Information
Band / Volume 63
ISBN 978-3-95806-517-8

Mitglied der Helmholtz-Gemeinschaft

