

Intelligent Robotic Systems in Support of a Declining Birthrate and an Aging Population

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Abstract

According to the Japanese National Institute of Population and Social Security Research, the productive age population (between 15 and 64 years old) will continue to decrease. And in 2060, one out of every 2.5 people will be 65 years old or older. The challenge can be summarized as a declining birthrate and an aging population, with two consequences: (i) the increase of caring cost and (ii) the shortage of young labor.

Confronting these challenges: (i) on one hand, we tried to achieve high-level cognitive intelligence on personal care robot (understanding people) so that caring tasks can be conducted as required where no care givers are available; (ii) on the other hand, we focus on the intelligent of understanding the environments, that enables autonomous material transportation in construction sites, so that the effect caused by the lack of young labor in construction sites can be effectively decreased.

All the presented approaches have been evaluated in a real household environment and construction sites respectively.

Contents

1	Outline	1
2	Personal Care for the Bedridden Elderly	3
2.1	System Overview	5
2.1.1	Hardware and Sensors	5
2.1.2	Mathematical Model	7
2.2	Pose Estimation of Daily Containers	9
2.2.1	Related Work	10
2.2.2	Method	11
2.2.3	Experiments	16
2.3	Context-Aware Local Planning	18
2.3.1	Related Work	19
2.3.2	Method	20
2.3.3	System Configuration	24
2.3.4	Experiments	25
2.4	Desire-Driven Reasoning	27
2.4.1	Related Work	29
2.4.2	Household Environment Description	31
2.4.3	Desire-Driven Reasoning Approach	38
2.4.4	Experiments	43
2.5	Conclusion	50

3	Automatic Material Transportation in Construction Sites	53
3.1	Introduction	54
3.1.1	Motivation	54
3.1.2	Contribution	59
3.2	Related Work	60
3.2.1	Navigation Approaches	60
3.2.2	Autonomous Material Transportation Robots	61
3.3	Gate-Type Material Transportation Robot	63
3.3.1	Mechanical Design	63
3.3.2	Hardware Configuration	63
3.3.3	Mathematical Model	63
3.4	Material Transportation Task	68
3.5	Path Planning: A Guidance Based Approach	69
3.5.1	Knowledge Transfer from Employees to Robots	69
3.5.2	Knowledge Transfer Method: HEIGA	72
3.5.3	Material Transportation with HEIGA	78
3.6	Trajectory Planning: Actual Material Handling	78
3.6.1	Cart Manipulation	78
3.6.2	Directional Instructions: Perception and Execution	80
3.6.3	Construction Site Configuration with Info Points	84
3.7	Experiments	85
3.7.1	Abandoned Supermarket: ACOOP	85
3.7.2	Construction Laboratory: ICI	89
3.7.3	Construction Site in Shinagawa, Tokyo	92
3.7.4	Construction Site in Nagoya	92
3.8	Discussion	98
3.9	Conclusions and Future Work	99
4	Conclusion	101
	Bibliography	110

List of Publications

115

Acknowledgement

118

List of Figures

1-1	Outline of the research.	2
2-1	Shortage of caregivers.	3
2-2	Inconvenient life.	4
2-3	Robotic assistance.	5
2-4	Personal care robot: KUT-PCR.	6
2-5	Model of the mobile platform.	7
2-6	Pose-estimation pipeline.	12
2-7	Pose initialization.	13
2-8	Valuable parts of a container.	14
2-9	Self-occlusion examples.	15
2-10	Examples of partial occlusions.	16
2-11	Successful registration scenarios with partial occlusions.	16
2-12	Scenarios used to evaluate accuracy.	17
2-13	Container-fetching experiment with KUT-PCR.	18
2-14	Perception range and work space.	20
2-15	Dynamic footprint.	21
2-16	Velocity search space.	23
2-17	Additional limitation on velocity search space.	24
2-18	Control system diagram.	25
2-19	Experimental trials without and with dynamic footprint.	26
2-20	Behavioral pattern configurations.	26
2-21	Personal care trial considering environmental context.	27

2-22	Instance knowledge for the objects in one room.	34
2-23	Example of initializing a knowledge base.	36
2-24	Updating the knowledge base.	38
2-25	Flowchart for the desire-driven reasoning system.	39
2-26	Workflow of the DDR module.	40
2-27	Flowchart of DDRS cooperating with LSTCPM.	42
2-28	Workflow considering t_0 requests.	43
2-29	Experimental domain.	44
2-30	Photographs of the experimental care domain.	44
2-31	Personal care scenario.	45
2-32	Route during Trial 1.	46
2-33	Photographs taken at times t_1-t_4 during Trial 1.	47
2-34	Route during Trial 2.	48
2-35	Photographs taken at times t_1-t_5 during Trial 2.	49
2-36	Route during Trial 3.	50
2-37	Photographs taken at times t_1-t_4 during Trial 3.	51
3-1	Human manipulation of cart.	54
3-2	Demonstration of a material handling task.	55
3-3	Undergoing interior renovation.	56
3-4	Dynamic construction environment.	57
3-5	Dynamic environment concerning laser data.	57
3-6	Dim and nonuniform illustration.	58
3-7	Different types of robots for material handling.	62
3-8	Mechanical design of Capper.	64
3-9	A gate-type material handling robot.	65
3-10	Kinematic model of the mobile platform.	66
3-11	Dynamic model of the mobile platform.	67
3-12	A material transportation task: from the viewpoint of robots.	69
3-13	Directional guidance in hotels and construction sites.	70

3-14	Overview of the knowledge transfer system.	71
3-15	Schema of a HEIGA system	73
3-16	Relational description vs. absolute description	74
3-17	Material transportation with HEIGA.	79
3-18	Loading action: first stage.	80
3-19	Loading action: second stage.	80
3-20	AR marker-based info point boards and use cases	81
3-21	Two roles of AR markers	82
3-22	Local marker tracking examples	83
3-23	Usage of AR markers	84
3-24	Automatic material handling flowchart.	86
3-25	Basic information of ACOOP.	87
3-26	ACOOP: Trial 1 (marker configuration).	88
3-27	ACOOP: Trial 1 (photos).	89
3-28	Basic information of ICI lab.	90
3-29	ICI: Trial 1 (marker configuration).	91
3-30	ICI: Trial 1 (photos).	92
3-31	ICI: Trial 2 (marker configuration).	93
3-32	ICI: Trial 2 (photos).	93
3-33	Basic information of the Yamato construction site.	94
3-34	Shinagawa: Trial 1 (marker configuration).	95
3-35	Shinagawa: Trial 1 (photos).	96
3-36	Basic information of Fuji Machinery Construction Site.	96
3-37	Nagoya: Trial 1 (marker configuration).	97
3-38	Nagoya: Trial 1 (photos).	97
3-39	Nagoya: Trial 2 (marker configuration).	98
3-40	Nagoya: Trial 2 (photos).	99

List of Tables

2.1	Footprint Inflation Algorithm	22
2.2	Commonsense Knowledge	32
2.3	Instance Knowledge	34
2.4	Knowledge Base Update Algorithm	37
2.5	DDR Algorithm	40
2.6	Object Ranking Algorithm	41
3.1	Guidance Generation Algorithm	77

Chapter 1

Outline

The challenge of a declining birthrate and an aging population comes with two consequences: (i) the increase of caring cost; and (ii) the shortage of young labor.

Confronting these challenges, we have conducted two novel studies (Figure 1-1) accordingly: (i) personal care robots, to help reducing the caring cost of human care givers, and (ii) autonomous material transportation robots, to deal with the time-consuming and laborious on-site handling.

In the rest of this thesis, (i) in Chapter 2, we introduce a series of approaches and methods to achieve high-level intelligence (understanding people) on personal care robot KUT-PCR so that caring tasks can be conducted as required where no care givers are available. As a result, the quality of life of the care recipients can be improved while the caring cost will be decreased; (ii) in Chapter 3, we discuss how the automatic material transportation can be achieved through "understanding environments", so that the effect caused by the lack of young labor in construction sites can be effectively decreased.

All the presented approaches have been evaluated in a real household environment and construction sites respectively.

Figure 1-1: Outline of the research.

