

CHAPTER ONE: INTRODUCTION.....	1
STUDY GOALS AND OBJECTIVES.....	1
REASONS FOR DOING THE STUDY	2
SCOPE OF REPORT	2
INTENDED AUDIENCE.....	3
METHODOLOGY	3
INFORMATION SOURCES.....	4
ANALYST CREDENTIALS.....	4
RELATED REPORTS	4
BCC ONLINE SERVICES.....	4
DISCLAIMER	5
 CHAPTER TWO: SUMMARY.....	 6
SUMMARY.....	6
<i>SUMMARY TABLE GLOBAL MARKET FOR MV SYSTEM</i>	
<i>COMPONENTS, THROUGH 2015 (\$ MILLIONS)</i>	7
<i>SUMMARY FIGURE GLOBAL MARKET FOR MV SYSTEM</i>	
<i>COMPONENTS, 2008–2015 (\$ MILLIONS)</i>	7
 CHAPTER THREE: OVERVIEW	 8
INDUSTRY DEFINITION.....	8
INDUSTRY CONCEPTS	9
IMPORTANCE OF THE INDUSTRY	9
PRODUCT LIFE CYCLE.....	10
TECHNOLOGY LIFE CYCLE	11
INDUSTRY HISTORY AND DEVELOPMENT	11
HISTORY OF MV IN THE FOOD PROCESSING INDUSTRY	12
HISTORY OF MV IN THE CONTAINER INDUSTRY.....	13
HISTORY OF MV IN PACKAGING	13
THE FUTURE OF MV SYSTEMS	13
FUTURE MV SYSTEM CHARACTERISTICS.....	14
Faster Hardware	14
Ease of Use.....	15
Easy Up-Gradation.....	15
Flexible MV Systems	16
Programmable Lighting	16
Flexible MV Camera and Electronically Controlled	
Optics	16
Electronically Controlled Camera and Light	
Positioning	17
Control and Interface Bus for the Camera and	
Peripherals.....	17
Programming Environment.....	17
GOVERNMENT REGULATIONS	17
RESTRICTION OF HAZARDOUS SUBSTANCES (ROHS).....	18

RoHS and Cameras	18
REGULATIONS IN THE FOOD PROCESSING INDUSTRY.....	18
Fair Packaging and Labeling Act	19
Current Good Manufacturing Practice (cGMP)	
Regulations for Foods.....	19
Consumer Product Safety Act	19
Federal Food, Drug, and Cosmetic Act (FD&C)	20
Nutrition Labeling and Education Act (NLEA)	20
REGULATIONS IN THE AUTOMOBILE INDUSTRY	20
Transportation Recall Enhancement, Accountability and	
Documentation Act (TREAD):	20
Vehicle Identification Number Requirements.....	20
Manufacturer Identification.....	20
Defect and Noncompliance Reports	20
Automobile Parts Content Labeling	21
REGULATIONS IN THE PHARMACEUTICAL INDUSTRY	21
FD&C Act.....	21
cGMP for Finished Pharmaceuticals	21
REGULATIONS IN SECURITY AND SURVEILLANCE	21
U.S. Patriot Act.....	21
Bioterrorism Act of 2002	21

CHAPTER FOUR: GLOBAL MARKET FOR MV SYSTEM TECHNOLOGY

AND COMPONENTS.....	22
GLOBAL MARKET FOR MV SYSTEM TECHNOLOGY ...	22
MV SYSTEM SECTORS: INDUSTRIAL AND NONINDUSTRIAL	23
<i>TABLE 1 GLOBAL MARKET FOR INDUSTRIAL AND</i>	
<i>NONINDUSTRIAL MV APPLICATIONS, THROUGH 2015 (\$</i>	
<i>MILLIONS)</i>	23
<i>FIGURE 1 GLOBAL MARKET FOR INDUSTRIAL AND</i>	
<i>NONINDUSTRIAL MV APPLICATIONS, 2008–2015 (\$ MILLIONS)</i>	23
GLOBAL MV COMPONENTS MARKET BASED ON SECTOR	24
<i>TABLE 2 GLOBAL MARKET FOR MV COMPONENTS BY</i>	
<i>INDUSTRIAL AND NONINDUSTRIAL SECTORS, THROUGH 2015</i>	
<i>(\$ MILLIONS)</i>	24
GLOBAL MARKET FOR MV SYSTEMS	25
<i>TABLE 3 GLOBAL MARKET FOR MV SYSTEMS, THROUGH 2015 (\$</i>	
<i>MILLIONS)</i>	25
<i>FIGURE 2 GLOBAL MARKET FOR MV SYSTEMS, 2008–2015 (\$</i>	
<i>MILLIONS)</i>	26
GLOBAL MARKET FOR INDUSTRIAL MV SYSTEM	
COMPONENTS	26
<i>TABLE 4 GLOBAL MARKET FOR INDUSTRIAL MV SYSTEM</i>	
<i>COMPONENTS, THROUGH 2015 (\$ MILLIONS)</i>	26
<i>TABLE 4 (CONTINUED)</i>	27

<i>FIGURE 3 GLOBAL MARKET FOR INDUSTRIAL MV SYSTEM COMPONENTS, 2008–2015 (\$ MILLIONS)</i>	27
Cameras in MV Systems	27
<i>TABLE 5 GLOBAL MARKET FOR CAMERAS IN INDUSTRIAL MV SYSTEMS BY INDUSTRY END USER, THROUGH 2015 (\$ MILLIONS)</i>	28
<i>FIGURE 4 GLOBAL MARKET FOR CAMERAS IN INDUSTRIAL MV SYSTEMS BY INDUSTRY END USER, 2008–2015 (\$ MILLIONS)</i>	28
Smart Cameras in MV Systems.....	29
<i>TABLE 6 GLOBAL MARKET FOR SMART CAMERAS IN INDUSTRIAL MV SYSTEMS BY INDUSTRY END USER, THROUGH 2015 (\$ MILLIONS)</i>	29
<i>FIGURE 5 GLOBAL MARKET FOR SMART CAMERAS IN INDUSTRIAL MV SYSTEMS BY INDUSTRY END USER, 2008–2015 (\$ MILLIONS)</i>	30
Lighting in MV Systems.....	30
<i>TABLE 7 GLOBAL MARKET FOR LIGHTING IN MV SYSTEMS BY INDUSTRY END USER, THROUGH 2015 (\$ MILLIONS)</i>	31
<i>FIGURE 6 GLOBAL MARKET FOR LIGHTING IN INDUSTRIAL MV SYSTEMS BY INDUSTRY END USER, 2008–2015 (\$ MILLIONS)</i>	31
Frame Grabbers in MV Systems.....	32
<i>TABLE 8 GLOBAL MARKET FOR FRAME GRABBERS IN INDUSTRIAL MV SYSTEMS BY INDUSTRY END USER, THROUGH 2015 (\$ MILLIONS)</i>	32
<i>FIGURE 7 GLOBAL MARKET FOR FRAME GRABBERS IN INDUSTRIAL MV SYSTEMS BY INDUSTRY END USER, 2008–2015 (\$ MILLIONS)</i>	32
Optics in MV Systems	33
<i>TABLE 9 GLOBAL MARKET FOR OPTICS IN INDUSTRIAL MV SYSTEMS BY INDUSTRY END USER, THROUGH 2015 (\$ MILLIONS)</i>	33
<i>FIGURE 8 GLOBAL MARKET FOR OPTICS IN INDUSTRIAL MV SYSTEMS BY INDUSTRY END USER, 2008–2015 (\$ MILLIONS)</i>	33
Hardware in MV Systems	34
<i>TABLE 10 GLOBAL MARKET FOR HARDWARE IN INDUSTRIAL MV SYSTEMS BY INDUSTRY END USER, THROUGH 2015 (\$ MILLIONS)</i>	34
<i>FIGURE 9 GLOBAL INDUSTRIAL MARKET FOR HARDWARE IN MV SYSTEMS BY INDUSTRY END USER, 2008–2015 (\$ MILLIONS)</i>	34
Imaging Software in MV Systems	35
<i>TABLE 11 GLOBAL MARKET FOR IMAGE PROCESSING SOFTWARE IN INDUSTRIAL MV SYSTEMS BY INDUSTRY END USER, THROUGH 2015 (\$ MILLIONS)</i>	35

<i>FIGURE 10 GLOBAL MARKET FOR IMAGE PROCESSING SOFTWARE IN INDUSTRIAL MV SYSTEMS BY INDUSTRY END USER, 2008–2015 (\$ MILLIONS)</i>	35
Miscellaneous Components in MV Systems	36
<i>TABLE 12 GLOBAL MARKET FOR MISCELLANEOUS COMPONENTS IN INDUSTRIAL MV SYSTEMS BY INDUSTRY END USER, THROUGH 2015 (\$ MILLIONS)</i>	36
<i>FIGURE 11 GLOBAL MARKET FOR MISCELLANEOUS COMPONENTS IN INDUSTRIAL MV SYSTEMS BY INDUSTRY END USER, 2008–2015 (\$ MILLIONS)</i>	37
GLOBAL MARKET FOR NONINDUSTRIAL MV SYSTEM COMPONENTS	37
<i>TABLE 13 GLOBAL MARKET FOR NONINDUSTRIAL MV SYSTEM COMPONENTS, THROUGH 2015 (\$ MILLIONS)</i>	37
<i>FIGURE 12 GLOBAL MARKET FOR NONINDUSTRIAL MV SYSTEM COMPONENTS, 2008–2015 (\$ MILLIONS)</i>	38
Lighting in MV Systems.....	38
<i>TABLE 14 GLOBAL MARKET FOR LIGHTING IN NONINDUSTRIAL MV SYSTEMS BY APPLICATION, THROUGH 2015 (\$ MILLIONS)</i>	39
<i>FIGURE 13 GLOBAL MARKET FOR LIGHTING IN NONINDUSTRIAL MV SYSTEMS BY APPLICATION, 2008–2015 (\$ MILLIONS)</i>	39
Cameras in MV Systems	39
<i>TABLE 15 GLOBAL MARKET FOR CAMERAS IN NONINDUSTRIAL MV SYSTEMS BY APPLICATION, THROUGH 2015 (\$ MILLIONS)</i>	40
<i>FIGURE 14 GLOBAL MARKET FOR CAMERAS IN NONINDUSTRIAL MV SYSTEMS BY APPLICATION, 2008–2015 (\$ MILLIONS)</i>	40
Smart Cameras in MV Systems.....	41
<i>TABLE 16 GLOBAL MARKET FOR SMART CAMERAS IN NONINDUSTRIAL MV SYSTEMS BY APPLICATION, THROUGH 2015 (\$ MILLIONS)</i>	41
<i>FIGURE 15 GLOBAL MARKET FOR SMART CAMERAS IN NONINDUSTRIAL MV SYSTEMS BY APPLICATION, 2008–2015 (\$ MILLIONS)</i>	41
Frame Grabbers in MV Systems.....	42
<i>TABLE 17 GLOBAL MARKET FOR FRAME GRABBERS IN NONINDUSTRIAL MV SYSTEMS BY APPLICATION, THROUGH 2015 (\$ MILLIONS)</i>	42
<i>FIGURE 16 GLOBAL MARKET FOR FRAME GRABBERS IN NONINDUSTRIAL MV SYSTEMS BY APPLICATION, 2008–2015 (\$ MILLIONS)</i>	42
Optics in MV Systems	43
<i>TABLE 18 GLOBAL MARKET FOR OPTICS IN NONINDUSTRIAL MV SYSTEMS BY APPLICATION, 2008–2015 (\$ MILLIONS)</i>	43

<i>FIGURE 17 GLOBAL MARKET FOR OPTICS IN NONINDUSTRIAL MV SYSTEMS BY APPLICATION, 2008–2015 (\$ MILLIONS)</i>	43
Hardware in MV Systems	44
<i>TABLE 19 GLOBAL MARKET FOR HARDWARE IN NONINDUSTRIAL MV SYSTEMS BY APPLICATION, THROUGH 2015 (\$ MILLIONS)</i>	44
<i>FIGURE 18 GLOBAL MARKET FOR HARDWARE IN NONINDUSTRIAL MV SYSTEMS BY APPLICATION, 2008–2015 (\$ MILLIONS)</i>	44
Imaging Software in MV Systems	45
<i>TABLE 20 GLOBAL MARKET FOR IMAGE PROCESSING SOFTWARE IN NONINDUSTRIAL MV SYSTEMS BY APPLICATION, THROUGH 2015 (\$ MILLIONS)</i>	45
<i>FIGURE 19 GLOBAL MARKET FOR IMAGE PROCESSING SOFTWARE IN NONINDUSTRIAL MV SYSTEMS BY APPLICATION, 2008–2015 (\$ MILLIONS)</i>	45
Miscellaneous Components in MV Systems.....	46
<i>TABLE 21 GLOBAL MARKET FOR MISCELLANEOUS COMPONENTS IN NONINDUSTRIAL MV SYSTEMS BY APPLICATION, THROUGH 2015 (\$ MILLIONS)</i>	46
<i>FIGURE 20 GLOBAL MARKET FOR MISCELLANEOUS COMPONENTS IN NONINDUSTRIAL MV SYSTEMS BY APPLICATION, 2008–2015 (\$ MILLIONS)</i>	46
GLOBAL MARKET FOR MV SYSTEM COMPONENTS BY REGION	47
<i>TABLE 22 GLOBAL MARKET FOR MV SYSTEM COMPONENTS BY REGION, THROUGH 2015 (\$ MILLIONS)</i>	47
<i>FIGURE 21 GLOBAL MARKET FOR COMPONENTS OF MV SYSTEMS BY REGION, 2008–2015 (\$ MILLIONS)</i>	47
Lighting in MV Systems.....	48
<i>TABLE 23 GLOBAL MARKET FOR LIGHTING IN INDUSTRIAL/NONINDUSTRIAL MV SYSTEMS BY REGION, THROUGH 2015 (\$ MILLIONS)</i>	48
<i>FIGURE 22 GLOBAL MARKET FOR LIGHTING IN INDUSTRIAL/NONINDUSTRIAL MV SYSTEMS BY REGION, 2008–2015 (\$ MILLIONS)</i>	48
Cameras in MV Systems	49
<i>TABLE 24 GLOBAL MARKET FOR CAMERAS IN INDUSTRIAL/NONINDUSTRIAL MV SYSTEMS BY REGION, THROUGH 2015 (\$ MILLIONS)</i>	49
<i>FIGURE 23 GLOBAL MARKET FOR LIGHTING IN INDUSTRIAL/NONINDUSTRIAL MV SYSTEMS BY REGION, 2008–2015 (\$ MILLIONS)</i>	49
Smart Cameras in MV Systems.....	50

<i>TABLE 25 GLOBAL MARKET FOR SMART CAMERAS IN INDUSTRIAL/NONINDUSTRIAL MV SYSTEMS BY REGION, THROUGH 2015 (\$ MILLIONS)</i>	50
<i>FIGURE 24 GLOBAL MARKET FOR SMART CAMERAS IN INDUSTRIAL/NONINDUSTRIAL MV SYSTEMS BY REGION, 2008–2015 (\$ MILLIONS)</i>	50
Frame Grabbers in MV Systems.....	51
<i>TABLE 26 GLOBAL MARKET FOR FRAME GRABBERS IN INDUSTRIAL/ NONINDUSTRIAL MV SYSTEMS BY REGION, THROUGH 2015 (\$ MILLIONS)</i>	51
<i>FIGURE 25 GLOBAL MARKET FOR FRAME GRABBERS IN INDUSTRIAL/NONINDUSTRIAL MV SYSTEMS BY REGION, 2008–2015 (\$ MILLIONS)</i>	51
Optics in MV Systems	52
<i>TABLE 27 GLOBAL MARKET FOR OPTICS IN INDUSTRIAL/NONINDUSTRIAL MV SYSTEMS BY REGION, THROUGH 2015 (\$ MILLIONS)</i>	52
<i>FIGURE 26 GLOBAL MARKET FOR OPTICS IN INDUSTRIAL/NONINDUSTRIAL MV SYSTEMS BY REGION, 2008–2015 (\$ MILLIONS)</i>	52
Hardware in MV Systems	53
<i>TABLE 28 GLOBAL MARKET FOR HARDWARE IN INDUSTRIAL/ NONINDUSTRIAL MV SYSTEMS BY REGION, THROUGH 2015 (\$ MILLIONS)</i>	53
<i>FIGURE 27 GLOBAL MARKET FOR HARDWARE IN INDUSTRIAL/ NONINDUSTRIAL MV SYSTEMS BY REGION, 2008–2015 (\$ MILLIONS)</i>	53
Image Processing Software in MV Systems	54
<i>TABLE 29 GLOBAL MARKET FOR IMAGE PROCESSING SOFTWARE IN INDUSTRIAL/ NONINDUSTRIAL MV SYSTEMS BY REGION, THROUGH 2015 (\$ MILLIONS)</i>	54
<i>FIGURE 28 GLOBAL MARKET FOR IMAGE PROCESSING SOFTWARE IN INDUSTRIAL/NONINDUSTRIAL MV SYSTEMS BY REGION, 2008–2015 (\$ MILLIONS)</i>	54
Miscellaneous Components in MV Systems	55
<i>TABLE 30 GLOBAL MARKET FOR MISCELLANEOUS COMPONENTS IN INDUSTRIAL/ NONINDUSTRIAL MV SYSTEMS BY REGION, THROUGH 2015 (\$ MILLIONS)</i>	55
<i>FIGURE 29 GLOBAL MARKET FOR MISCELLANEOUS COMPONENTS IN INDUSTRIAL/NONINDUSTRIAL MV SYSTEMS BY REGION, 2008–2015 (\$ MILLIONS)</i>	55
GLOBAL MARKET FOR MV TECHNOLOGY.....	56
GLOBAL MARKET FOR INDUSTRIAL MV SYSTEMS BASED ON TECHNOLOGY	56

<i>TABLE 31 GLOBAL MARKET FOR INDUSTRIAL MV SYSTEMS BASED ON TECHNOLOGY, THROUGH 2015 (\$ MILLIONS)</i>	56
<i>FIGURE 30 GLOBAL MARKET FOR INDUSTRIAL MV SYSTEMS BASED ON TECHNOLOGY, 2008–2015 (\$ MILLIONS)</i>	57
MV Systems in the Automobile Industry	57
<i>TABLE 32 GLOBAL MARKET FOR MV SYSTEMS IN THE AUTOMOBILE INDUSTRY BASED ON TECHNOLOGY, THROUGH 2015 (\$ MILLIONS)</i>	58
<i>FIGURE 31 GLOBAL MARKET FOR MV SYSTEMS IN THE AUTOMOBILE INDUSTRY BASED ON TECHNOLOGY, 2008–2015 (\$ MILLIONS)</i>	58
MV Systems in the IC/Semiconductor Industry	59
<i>TABLE 33 GLOBAL MARKET FOR MV SYSTEMS IN THE IC/SEMICONDUCTOR INDUSTRY BASED ON TECHNOLOGY, THROUGH 2015 (\$ MILLIONS)</i>	59
<i>FIGURE 32 GLOBAL MARKET FOR MV SYSTEMS IN THE IC/SEMICONDUCTOR INDUSTRY BASED ON TECHNOLOGY, 2008–2015 (\$ MILLIONS)</i>	60
MV Systems in the Pharmaceutical/Medical Devices Industry	60
<i>TABLE 34 GLOBAL MARKET FOR MV SYSTEMS IN THE PHARMACEUTICAL/ MEDICAL DEVICES INDUSTRY BASED ON TECHNOLOGY, THROUGH 2015 (\$ MILLIONS)</i>	61
<i>FIGURE 33 GLOBAL MARKET FOR MV SYSTEMS IN THE PHARMACEUTICAL/ MEDICAL DEVICES INDUSTRY BASED ON TECHNOLOGY, 2008–2015 (\$ MILLIONS)</i>	61
MV Systems in the Electronics/Electrical Industry	62
<i>TABLE 35 GLOBAL MARKET FOR MV SYSTEMS IN THE ELECTRONICS/ELECTRICAL INDUSTRY BASED ON TECHNOLOGY, THROUGH 2015 (\$ MILLIONS)</i>	62
<i>FIGURE 34 GLOBAL MARKET FOR MV SYSTEMS IN THE ELECTRONICS/ELECTRICAL INDUSTRY BASED ON TECHNOLOGY, 2008–2015 (\$ MILLIONS)</i>	63
MV Systems in the Food/Beverage Processing Industry	63
<i>TABLE 36 GLOBAL MARKET FOR MV SYSTEMS IN THE FOOD/BEVERAGE PROCESSING INDUSTRY BASED ON TECHNOLOGY, THROUGH 2015 (\$ MILLIONS)</i>	64
<i>FIGURE 35 GLOBAL MARKET FOR MV SYSTEMS IN THE FOOD/BEVERAGE PROCESSING INDUSTRY BASED ON TECHNOLOGY, 2008–2015 (\$ MILLIONS)</i>	64
MV Systems in the Printing/Publishing Industry	64
<i>TABLE 37 GLOBAL MARKET FOR MV SYSTEMS IN THE PRINTING/PUBLISHING INDUSTRY BASED ON TECHNOLOGY, THROUGH 2015 (\$ MILLIONS)</i>	65

<i>FIGURE 36 GLOBAL MARKET FOR MV SYSTEMS IN THE PRINTING/PUBLISHING INDUSTRY BASED ON TECHNOLOGY, 2008–2015 (\$ MILLIONS)</i>	66
MV Systems in the Packaging Industry	66
<i>TABLE 38 GLOBAL MARKET FOR MV SYSTEMS IN THE PACKAGING INDUSTRY BASED ON TECHNOLOGY, THROUGH 2015 (\$ MILLIONS)</i>	67
<i>FIGURE 37 GLOBAL MARKET FOR MV SYSTEMS IN THE PACKAGING INDUSTRY BASED ON TECHNOLOGY, 2008–2015 (\$ MILLIONS)</i>	67
MV Systems in Miscellaneous Industries	67
<i>TABLE 39 GLOBAL MARKET FOR MV SYSTEMS IN MISCELLANEOUS INDUSTRIES BASED ON TECHNOLOGY, THROUGH 2015 (\$ MILLIONS)</i>	68
<i>FIGURE 38 GLOBAL MARKET FOR MV SYSTEMS IN MISCELLANEOUS INDUSTRIES BASED ON TECHNOLOGY, 2008–2015 (\$ MILLIONS)</i>	69
GLOBAL MARKET FOR NONINDUSTRIAL MV SYSTEMS BASED ON TECHNOLOGY	69
<i>TABLE 40 GLOBAL MARKET FOR NONINDUSTRIAL MV SYSTEMS BASED ON TECHNOLOGY, THROUGH 2015 (\$ MILLIONS)</i>	70
<i>FIGURE 39 GLOBAL MARKET FOR NONINDUSTRIAL MV SYSTEMS BASED ON TECHNOLOGY, 2008–2015 (\$ MILLIONS)</i>	70
MV Systems in Biometrics	71
<i>TABLE 41 GLOBAL MARKET FOR MV SYSTEMS IN BIOMETRICS BASED ON TECHNOLOGY, THROUGH 2015 (\$ MILLIONS)</i>	71
<i>FIGURE 40 GLOBAL MARKET FOR MV SYSTEMS IN BIOMETRICS BASED ON TECHNOLOGY, 2008–2015 (\$ MILLIONS)</i>	72
MV Systems in Transport/Traffic Management	72
<i>TABLE 42 GLOBAL MARKET FOR MV SYSTEMS IN TRANSPORT/TRAFFIC MANAGEMENT BASED ON TECHNOLOGY, THROUGH 2015 (\$ MILLIONS)</i>	73
<i>FIGURE 41 GLOBAL MARKET FOR MV SYSTEMS IN TRANSPORT/TRAFFIC MANAGEMENT BASED ON TECHNOLOGY, 2008–2015 (\$ MILLIONS)</i>	73
MV Systems in Postal and Banking	73
<i>TABLE 43 GLOBAL MARKET FOR MV SYSTEMS IN POSTAL AND BANKING BASED ON TECHNOLOGY, THROUGH 2015 (\$ MILLIONS)</i>	74
<i>FIGURE 42 GLOBAL MARKET FOR NONINDUSTRIAL MV SYSTEMS IN POSTAL AND BANKING BASED ON TECHNOLOGY, 2008–2015 (\$ MILLIONS)</i>	74
MV Systems in Surveillance and Security	75

<i>TABLE 44 GLOBAL MARKET FOR MV SYSTEMS IN SURVEILLANCE AND SECURITY BASED ON TECHNOLOGY, THROUGH 2015 (\$ MILLIONS)</i>	75
<i>FIGURE 43 GLOBAL MARKET FOR MV SYSTEMS IN SURVEILLANCE AND SECURITY BASED ON TECHNOLOGY, 2008–2015 (\$ MILLIONS)</i>	75
MV Systems in Medical Imaging and Lab Automation.....	76
<i>TABLE 45 GLOBAL MARKET FOR MV SYSTEMS IN MEDICAL IMAGING AND LAB AUTOMATION BASED ON TECHNOLOGY, THROUGH 2015 (\$ MILLIONS)</i>	76
<i>FIGURE 44 GLOBAL MARKET FOR MV SYSTEMS IN MEDICAL IMAGING AND LAB AUTOMATION BASED ON TECHNOLOGY, 2008–2015 (\$ MILLIONS)</i>	76
MV Systems in Other Miscellaneous Applications.....	77
<i>TABLE 46 GLOBAL MARKET FOR MV SYSTEMS IN MISCELLANEOUS APPLICATIONS BASED ON TECHNOLOGY, THROUGH 2015 (\$ MILLIONS)</i>	77
<i>FIGURE 45 GLOBAL MARKET FOR MV SYSTEMS IN MISCELLANEOUS APPLICATIONS BASED ON TECHNOLOGY, 2008–2015 (\$ MILLIONS)</i>	78
CHAPTER FIVE: APPLICATIONS OF MV.....	79
GLOBAL MARKET FOR INDUSTRIAL SECTOR APPLICATIONS.....	79
<i>TABLE 47 GLOBAL MARKET FOR INDUSTRIAL MV SYSTEMS BY INDUSTRY END USER, THROUGH 2015 (\$ MILLIONS)</i>	80
<i>FIGURE 46 GLOBAL MARKET FOR INDUSTRIAL MV SYSTEMS BY INDUSTRY END USER, 2008–2015 (\$ MILLIONS)</i>	81
INDUSTRIAL MV APPLICATIONS IN THE AUTOMOTIVE INDUSTRY.....	81
Quality Assurance/Error Proofing/Flaw Detection.....	82
Robot Guidance/Positioning.....	82
Gauging/Dimensional Measurement.....	82
Assembly Verification/Inspection.....	82
Part Identification/Part Tracking.....	82
Presence/Absence Detection.....	83
Miscellaneous Tasks.....	83
Robot Guidance.....	83
3D MV.....	84
3D-Based MV in Automotive Production Lines.....	84
MV Systems Monitor Dispensing Applications.....	85
MV Systems for Inspection of Microelectromechanical Systems (MEMS) Sensors in Airbags.....	86
MV Systems for Various Assemblies.....	86
Engine and Power Train Assemblies.....	86
Electronic Controls Assembly.....	87

Vehicle Interiors.....	87
Vehicle Instrument Clusters	87
Future of MV in the Automobile Industry.....	88
MV Applications in “Smart Automobiles”	88
Rear-Vision Monitoring	88
Lane Change and Departure Warning Systems.....	88
Interior Passenger Detection and Position.....	89
Pedestrian Protection	89
GLOBAL MARKET FOR MV SYSTEM APPLICATIONS IN THE AUTOMOBILE INDUSTRY	89
<i>TABLE 48 GLOBAL MARKET FOR MV APPLICATIONS IN THE AUTOMOBILE INDUSTRY, THROUGH 2015 (\$ MILLIONS)</i>	90
<i>FIGURE 47 GLOBAL MARKET FOR MV APPLICATIONS IN THE AUTOMOBILE INDUSTRY, 2008–2015 (\$ MILLIONS)</i>	90
MV APPLICATIONS IN THE SEMICONDUCTOR INDUSTRY.....	91
MV Inspection of Wafers	92
GLOBAL MARKET FOR MV APPLICATIONS IN THE IC/SEMICONDUCTOR INDUSTRY.....	92
<i>TABLE 49 GLOBAL MARKET FOR MV APPLICATIONS IN THE IC/SEMICONDUCTOR INDUSTRY, THROUGH 2015 (\$ MILLIONS)</i>	93
<i>FIGURE 48 GLOBAL MARKET FOR MV APPLICATIONS IN THE IC/SEMICONDUCTOR INDUSTRY, 2008–2015 (\$ MILLIONS)</i>	94
MV APPLICATIONS IN THE ELECTRICAL/ELECTRONICS INDUSTRIES.....	94
MV Applications in PCB Assembly.....	94
MV in Bare Board Manufacturing.....	95
MV in PCB Assembly Operation.....	95
Trends in the PCB Industry.....	96
Shrinking MV Systems.....	97
3D MV Systems for the Electronics Industry	98
Future of 3D MV in the Electronics Industry.....	98
GLOBAL MARKET FOR MV APPLICATIONS IN ELECTRICAL/ELECTRONIC INDUSTRIES.....	98
<i>TABLE 50 GLOBAL MARKET FOR MV APPLICATIONS IN THE ELECTRICAL/ELECTRONICS INDUSTRIES, THROUGH 2015 (\$ MILLIONS)</i>	99
<i>FIGURE 49 GLOBAL MARKET FOR MV APPLICATIONS IN THE ELECTRICAL/ELECTRONICS INDUSTRIES, 2008–2015 (\$ MILLIONS)</i>	100
MV APPLICATIONS IN THE FOOD PROCESSING INDUSTRY.....	100
Sorting and Grading.....	101
Sort by Size	102
Sort by Shape	102

Sort by Ripeness.....	102
Sort by Grade or a by Combination of Size, Shape, Ripeness, Color	102
Portioning	103
Processing	103
Packing.....	104
X-ray Inspection Systems.....	104
3D Vision Inspection Systems.....	105
GLOBAL MARKET FOR MV APPLICATIONS IN THE FOOD PROCESSING INDUSTRY	105
<i>TABLE 51 GLOBAL MARKET FOR MV APPLICATIONS IN THE FOOD/BEVERAGE PROCESSING INDUSTRY, THROUGH 2015 (\$ MILLIONS)</i>	106
<i>FIGURE 50 GLOBAL MARKET FOR MV APPLICATIONS IN THE FOOD/BEVERAGE PROCESSING INDUSTRY, 2008–2015 (\$ MILLIONS)</i>	107
MV APPLICATIONS IN THE PHARMACEUTICAL/MEDICAL DEVICES INDUSTRY.....	107
Applications in the Pharmaceutical Industry	108
Standard MV Applications	109
Standard ... (Continued)	110
MV Applications in the Medical Devices Industry.....	111
Standard MV Applications	111
New MV Applications	112
Inspecting Needles for Tip Sharpness.....	112
Inspection of Biochips	112
Stretching of Valve Tissues.....	113
Tracking Digital Magnetic Beads.....	113
Digital X-rays	113
Medical Imaging.....	113
Inspection of Appliances.....	114
Precision Medical Device Assembly	114
Inspection of Heart Catheters.....	114
GLOBAL MARKET FOR MV APPLICATIONS IN THE PHARMACEUTICAL/ MEDICAL DEVICES INDUSTRY	114
<i>TABLE 52 GLOBAL MARKET FOR MV APPLICATIONS IN THE PHARMACEUTICAL/ MEDICAL DEVICES INDUSTRY, THROUGH 2015 (\$ MILLIONS)</i>	115
<i>FIGURE 51 GLOBAL MARKET FOR MV APPLICATIONS IN THE PHARMACEUTICAL/ MEDICAL DEVICES INDUSTRY, 2010–2015 (\$ MILLIONS)</i>	116
MV APPLICATIONS IN THE PRINTING AND PUBLISHING INDUSTRIES.....	116
Necessity of MV Systems	117

Advantages of MV systems in the Printing Industry	118
Print Verification	118
Code Reading	119
Future Trends	119
GLOBAL MARKET FOR MV APPLICATIONS IN THE PRINTING/PUBLISHING INDUSTRY	119
<i>TABLE 53 GLOBAL MARKET FOR MV APPLICATIONS IN THE PRINTING/PUBLISHING INDUSTRY, THROUGH 2015 (\$ MILLIONS)</i>	120
<i>FIGURE 52 GLOBAL MARKET FOR MV APPLICATIONS IN THE PRINTING/PUBLISHING INDUSTRY, 2008–2015 (\$ MILLIONS)</i>	120
MV IN PACKAGING INDUSTRY APPLICATIONS	121
Advantages of MV Systems in Packaging	121
MV Applications in the Bottling Industry	122
Glass Bottles (Pre-filling)	122
Glass Bottles (Post-filling)	122
PET Bottles (Pre-filling)	123
Polyethylene Terephthalate (PET) Bottles (Post- filling)	123
MV in Canning Industry Packaging Applications	124
Inspection of Beverage and Food Cans and Lids	124
Inspection of the Outside of the Can	124
Detection of the Presence/Absence of a Campaign Sticker on Canned Drinks	124
Detecting the Presence/Absence or Peeling of Sealing Stickers	124
Checking Seal Integrity Following Can Fill	124
MV in Pharmaceutical Industry Packaging Applications	124
Blister Packaging	125
Detecting Pinholes in Aluminum Packaging Material	125
Checking the Print on Aluminum Packaging Material	125
MV-Based Proofreading	125
Inspection of Dressing Containers	125
Inspection of Inkjet Printing	126
GLOBAL MARKET FOR MV IN PACKAGING APPLICATIONS	126
<i>TABLE 54 GLOBAL MARKET FOR MV APPLICATIONS IN THE PACKAGING INDUSTRY, THROUGH 2015 (\$ MILLIONS)</i>	127
<i>FIGURE 53 GLOBAL MARKET FOR MV APPLICATIONS IN THE PACKAGING INDUSTRY, 2008–2015 (\$ MILLIONS)</i>	127
MV APPLICATIONS: MISCELLANEOUS INDUSTRIES	128
GLOBAL MARKET FOR NONINDUSTRIAL SECTOR MV APPLICATIONS	128

<i>TABLE 55 GLOBAL MARKET FOR MARKET FOR VARIOUS NONINDUSTRIAL APPLICATIONS, THROUGH 2015 (\$ MILLIONS).....</i>	<i>129</i>
<i>FIGURE 54 GLOBAL MARKET FOR MARKET FOR VARIOUS NONINDUSTRIAL APPLICATIONS, 2008–2015 (\$ MILLIONS).....</i>	<i>129</i>
GLOBAL MARKET FOR MV IN SURVEILLANCE/SECURITY APPLICATIONS	130
<i>TABLE 56 GLOBAL MARKET FOR MV APPLICATIONS IN SURVEILLANCE/ SECURITY, THROUGH 2015 (\$ MILLIONS).....</i>	<i>130</i>
<i>FIGURE 55 GLOBAL MARKET FOR MV APPLICATIONS IN SURVEILLANCE/ SECURITY, 2008–2015 (\$ MILLIONS).....</i>	<i>131</i>
GLOBAL MARKET FOR MV IN BIOMETRICS APPLICATIONS	131
<i>TABLE 57 GLOBAL MARKET FOR MV APPLICATIONS IN BIOMETRICS, THROUGH 2015 (\$ MILLIONS)</i>	<i>132</i>
<i>FIGURE 56 GLOBAL MARKET FOR MV APPLICATIONS IN BIOMETRICS, 2008–2015 (\$ MILLIONS).....</i>	<i>132</i>
GLOBAL MARKET FOR MV FOR TRANSPORT/TRAFFIC MANAGEMENT APPLICATIONS	133
<i>TABLE 58 GLOBAL MARKET FOR MV APPLICATIONS IN TRANSPORT AND TRAFFIC MANAGEMENT, THROUGH 2015 (\$ MILLIONS).....</i>	<i>133</i>
<i>FIGURE 57 GLOBAL MARKET FOR MV APPLICATIONS IN TRANSPORT AND TRAFFIC MANAGEMENT, 2008–2015 (\$ MILLIONS).....</i>	<i>134</i>
GLOBAL MARKET FOR MV APPLICATIONS IN POSTAL AND BANKING	134
<i>TABLE 59 GLOBAL MARKET FOR MV APPLICATIONS IN POSTAL AND BANKING, THROUGH 2015 (\$ MILLIONS).....</i>	<i>135</i>
<i>FIGURE 58 GLOBAL MARKET FOR MV APPLICATIONS IN POSTAL AND BANKING, 2008–2015 (\$ MILLIONS)</i>	<i>135</i>
GLOBAL MARKET FOR MVAPPLICATIONS IN MEDICAL IMAGING/LAB AUTOMATION	136
<i>TABLE 60 GLOBAL MARKET FOR MV APPLICATIONS IN MEDICAL IMAGING AND LAB AUTOMATION, THROUGH 2015 (\$ MILLIONS).....</i>	<i>136</i>
<i>FIGURE 59 GLOBAL MARKET FOR MV APPLICATIONS IN MEDICAL IMAGING AND LAB AUTOMATION, 2008–2015 (\$ MILLIONS)</i>	<i>137</i>
MISCELLANEOUS NONINDUSTRIAL APPLICATIONS	137
CHAPTER SIX: TECHNOLOGY	138
CAPABILITIES OF MV SYSTEMS	138
ADVANTAGES OF MV SYSTEMS.....	139
COLOR MV	140
COLOR SPACES.....	140
NEW APPLICATIONS.....	141

PROCESSES INVOLVED IN MV SYSTEMS	141
COMPONENTS OF AN MV SYSTEM.....	142
COMPONENTS OF AN MV SYSTEM (CONTINUED)	143
CAMERAS FOR MV SYSTEMS	144
Types of Cameras	145
Analog Cameras	145
Digital Cameras	145
X-ray Cameras	145
IR Cameras	146
Interlaced Cameras.....	146
CCD and Complementary Metal Oxide Semiconductor (CMOS) Technology for MV Cameras	146
<i>TABLE 61 COMPARISON OF CCD AND CMOS TECHNOLOGY FOR CAMERAS.....</i>	<i>146</i>
Progressive Scan	147
Line Scan.....	147
Area Scan	147
Video Standards.....	147
Digital Interfaces Available	148
SMART CAMERAS FOR MV APPLICATIONS	148
Smart Cameras ... (Continued).....	149
Different Types of Smart Cameras	150
Stand-alone Smart Cameras	150
Single-Chip Smart Cameras.....	150
Embedded System-Based Smart Cameras	150
PC-Based Smart Cameras	150
Use of Smart Cameras.....	151
FRAME GRABBERS FOR MV SYSTEMS	151
Types of Frame Grabbers	151
Analog Frame Grabbers	151
Digital Frame Grabbers.....	152
Selection of a Frame Grabber for MV Applications	152
IMAGE PROCESSING HARDWARE FOR MV SYSTEMS.....	153
Personal Computer	153
I/O Board for Communicating with Other Devices	154
Operator Interface	154
Display Unit.....	154
IMAGE PROCESSING SOFTWARE FOR MV SYSTEMS	154
Image Processing Software ... (Continued)	155
Image Processing Software ... (Continued)	156
LIGHTING IN MV SYSTEMS.....	157
Application Requirements.....	157
Part Characteristics	157
Lighting Techniques	158

Light Sources	159
<i>TABLE 62 COMPARISON OF VARIOUS LIGHT SOURCES</i>	<i>160</i>
Modifying Lights.....	160
Filters.....	160
OPTICS FOR MV SYSTEMS.....	161
Lenses	161
Types of Lenses	162
Filters.....	163
Beam Splitters	163
Mirrors	163
MISCELLANEOUS COMPONENTS IN MV SYSTEMS.....	163
Mechanical Components	164
Electrical Components.....	164
<i>TABLE 63 PERCENTAGE VALUE OF MECHANICAL AND</i> <i>ELECTRICAL COMPONENTS OF THE TOTAL VALUE OF AN MV</i> <i>SYSTEM (%)</i>	<i>164</i>
SECTORWISE USE OF MV SYSTEMS	165
INDUSTRIAL SECTOR.....	165
PC-Based MV Systems.....	165
General-Purpose MV System Technology.....	165
ASMV System Technology.....	166
Smart Camera-Based MV Systems	166
NONINDUSTRIAL SECTOR	167
PC-Based MV Systems.....	167
Advantages of PC-Based MV Systems.....	167
Disadvantages of PC-Based MV Systems.....	167
Smart Camera-Based MV Systems (Compact and Stand- alone MV Systems).....	168
Advantages of Smart Camera-Based MV Systems	168
Disadvantages of Smart Camera-Based MV Systems.....	168
Differences between PC- and Smart Camera-Based MV Systems	169
MV APPLICATIONS	169
QUALITY ASSURANCE/DEFECT INSPECTION/ERROR PROOFING/FLAW DETECTION	170
PRESENCE/ABSENCE DETECTION.....	170
PART IDENTIFICATION/PART TRACKING.....	170
GAUGING/DIMENSIONAL MEASUREMENT	171
VERIFY ASSEMBLY/ASSEMBLY INSPECTION.....	172
GUIDANCE/POSITIONING/ROBOT GUIDANCE	172
2D ROBOT VISION	173
Automated 3D Position Detection.....	173
Guidance	173

IDENTIFICATION.....	174
MEASUREMENT.....	175
INSPECTION	176
Inspection: Shape (or Appearance) Conformity Checking	176
Inspection: Flaw Detection (Discrete Items)	176
Inspection: Flaw Detection (Web Materials)	176
Inspection: Print Verification.....	176
Inspection: Color Confirmation.....	177
Assembly Inspection/Verification	177
MV APPLICATIONS: MISCELLANEOUS INDUSTRIES.....	177
MV APPLICATIONS IN THE TEXTILE INDUSTRY	178
Woolen Textiles.....	178
Cotton Textiles.....	178
Fabric Inspection	178
Denim Fabric Inspection	179
MV System Integrated into Weaving Loom	180
MV System for Monitoring of Industrial Webs	180
MV APPLICATIONS IN THE SOLAR CELL INDUSTRY	181
MV Applications ...(Continued)	182
MV Applications ...(Continued)	183
MV Applications ...(Continued)	184
MV IN CONTAINER INDUSTRY APPLICATIONS.....	185
Metal Containers	186
Plastic Containers/Bottles.....	186
MV APPLICATIONS IN THE RUBBER/PLASTICS INDUSTRY ...	187
MV SYSTEMS IN THE PAPER AND BOARD INDUSTRY	188
Advantages of MV Systems in Paper Mills	189
MV APPLICATIONS IN THE AEROSPACE INDUSTRY.....	189
MV Applications In ... (Continued).....	190
MV APPLICATIONS IN THE TOBACCO INDUSTRY	191
MV APPLICATIONS IN ROBOTICS.....	191
NONINDUSTRIAL APPLICATIONS OF MV	192
NONINDUSTRIAL SECTOR APPLICATIONS	193
MV IN BIOMETRICS APPLICATIONS	193
Features Needed in a Biometric System	194
Stages of the Biometric Acquisition Process	195
Biometric Acquisition Technology/Devices	195
<i>TABLE 64 BIOMETRIC DEVICES BY TECHNOLOGY.....</i>	<i>196</i>
MV APPLICATIONS IN SURVEILLANCE AND SECURITY	196
Evolving MV Technologies for the Military.....	197
MV Applications in Border Control	198
MV Systems for Security and Surveillance.....	199
MV Applications in Crowd Control.....	200
Reasons for Counting People.....	200

MV Applications in Non-motion Detection.....	201
MV Applications in Behavior Analysis.....	201
MV Applications in Baggage Checking.....	202
MV Applications in Government Security.....	202
MV Application in Cargo Inspection.....	202
MV Applications in Asset Management	202
Future of MV Systems in Security.....	203
Improvements in MV System in Security	204
MV IN TRAFFIC AND TRANSPORT MANAGEMENT.....	204
MV In Traffic and ... (Continued).....	205
MV Systems for Traffic Control	206
MV for Safer Automobiles	206
MV Systems for the Safety of Drivers	207
MV IN MEDICAL IMAGING/LAB AUTOMATION.....	207
Lab Automation	207
MV APPLICATIONS IN POST OFFICES	208
Parcel and Carton Sorting.....	209
Automated Postal Sorting	209
MV SYSTEMS FOR BANKS	210
MV Systems for Currency and Stamp Printing	211
MV Systems for Currency Inspection	211
MV APPLICATIONS IN EXHIBITIONS/ENTERTAINMENT	212
MV Applications in Entertainment	213
MV Applications in Athletic Training	213
MV APPLICATIONS IN ENVIRONMENTAL PROTECTION	214
MV APPLICATIONS IN AGRICULTURAL MODERNIZATION	214
MV Applications in Vegetable Production.....	214
MV Applications in the Analysis of Peanut Pods.....	215
MV APPLICATIONS IN OTHER MISCELLANEOUS	
INDUSTRIES.....	215
MV Applications in the Ceramic Industry	215
MV Applications in the Wood Industry	215
MV Systems for Wood Chip Analysis in the Pulp and	
Paper Industry	216
MV Applications in the Mining Industry	216
MV Systems to Inspect Mining Shovels.....	216
MV Applications in the Plastics Recycling Industry.....	216
MV Applications in the Tape Drive Industry.....	216
MV Applications in the Felt-Tip Pen Industry.....	217
MV Applications in the Toothbrush Industry	217
MV Systems in Bitumen Mixing in the Road Construction	
Industry	217
MV Systems for On-line Microscopy in the Pulp and	
Paper Industry	217

MV Systems for Logistics in Mail Order Companies	217
MV SYSTEMS FOR VIDEO CAMERA LENS INSPECTION	
SYSTEMS.....	218
LASER MV SYSTEMS IN WIND TURBINE TOWER	
MANUFACTURING	218
COLOR MV SYSTEMS IN THE MANUFACTURE OF	
EYELINER.....	218
MV STANDARDS	219
PHARMACEUTICAL INDUSTRY	219
STANDARDS FOR CONNECTIVITY BETWEEN THE	
CAMERA AND THE ACQUISITION DEVICE.....	220
Camera Link	220
Power Over Camera Link (PoCL)	221
USB 2.0 Standard.....	221
IEEE 1394 (FireWire).....	222
GigE Vision Standard.....	222
Four Main Elements of GigE Vision	223
GigE Vision Camera Interface Standard Version 1.2	223
GenI Cam Standard.....	224
EMVA 1288 Standard	224
ADDITIONAL MV STANDARDS.....	225
IEEE 1394.....	225
10GigE.....	225
PCIe.....	226
NEW DEVELOPMENTS IN MV STANDARDS.....	226
TECHNOLOGICAL DEVELOPMENTS IN MV SYSTEMS	226
Robot Vision.....	226
IR Spectrum.....	227
PATENT ANALYSIS.....	227
Patent Analysis (Continued).....	228
<i>TABLE 65 U.S. PATENTS FOR MV AND MV TECHNOLOGIES BY</i>	
<i> COUNTRY, 2000–2009 (NUMBER).....</i>	<i>229</i>
<i>TABLE 66 U.S. PATENTS FOR MV AND MV TECHNOLOGIES BY</i>	
<i> APPLICATION, 2000–2009 (NUMBER).....</i>	<i>229</i>
<i>TABLE 67 U.S. PATENTS FOR MV AND MV TECHNOLOGIES BY</i>	
<i> YEAR ISSUED, 2000–2009 (UNITS).....</i>	<i>230</i>
<i>TABLE 68 U.S. PATENTS FOR MV AND MV TECHNOLOGIES BY</i>	
<i> COMPANY, 2000–2009 (NUMBER)</i>	<i>230</i>
CHAPTER SEVEN: INDUSTRY STRUCTURE AND COMPETITIVE	
ANALYSIS.....	231
STRUCTURE OF MV INDUSTRY	231
OEMS.....	231
SUPPLIERS TO THE PRODUCTION FLOOR.....	231
Systems Integrators	231

End Users.....	232
DRIVING FORCES BEHIND THE MV INDUSTRY.....	232
MV MARKET: PRESENT AND FUTURE.....	232
MARKET FOR MV SOFTWARE.....	233
MARKET FOR MV CAMERAS/LIGHTING	233
MARKET FOR FRAME GRABBERS.....	234
NEW FIELDS OF MV APPLICATIONS.....	234
MV MARKET: NORTH AMERICA	234
MV MARKET: EUROPE.....	235
MV MARKET: ASIA.....	235
MV Market: China.....	236
MV Market: India.....	236
MV Market: Japan.....	236
MV MARKET: REST OF THE WORLD.....	236
MAJOR MANUFACTURERS OF MV SYSTEMS AND COMPONENTS....	237
PROFILES OF MV COMPONENT/SYSTEM MANUFACTURERS.....	237
A&B SOFTWARE.....	237
A.C.E., INC.	238
ADEPT TECHNOLOGIES, INC.....	238
ADIMEC	239
ADVANCED VISION TECHNOLOGY, LTD. (AVT).....	240
ALLIED VISION TECHNOLOGIES GMBH	241
ATS AUTOMATION TOOLING SYSTEMS, INC.	241
AUTOMATED VISION, LLC.....	242
BANNER ENGINEERING CORP.....	243
BASLER VISION TECHNOLOGIES.....	243
BAUMER OPTRONIC GMBH.....	244
BITFLOW, INC.	245
COGNEX CORP.	246
Cognex Corp. (continued)	247
DALSA CORP.....	248
DALSA IPD	249
DIAPLOUS MACHINE VISION	250
EDMUND OPTICS.....	250
FAIRCHILD IMAGING	251
FANUC ROBOTICS AMERICA, INC.	252
FSI TECHNOLOGIES	252
GIGALINX, LTD.	253
GRAFTEK IMAGING	253
INTEGRAL VISION, INC.....	254
ISRA VISION AG	254
ISRA Surface Vision, Inc.....	254
JAI, INC.....	255
KEYENCE CORP.....	256

Keyence Corp. of America	256
Keyence Corp. ... (Continued)	257
NATIONAL INSTRUMENTS CORP	258
NAVITAR, INC.....	259
OMRON ELECTRONICS	260
Omron Electronics, LLC.....	260
PHOENIX IMAGING.....	261
POINT GREY RESEARCH, INC.....	262
PPT VISION, INC.	263
SECOND2NONE MACHINE VISION SYSTEMS CO., LTD.	263
STOCKER YALE, INC.....	264
STEMMER IMAGING GMBH.....	264
VITRONIC MACHINE VISION, LTD.....	265
VISION & CONTROL GMBH	265
VISION COMPONENTS GMBH.....	266
WINTRISS ENGINEERING	267

APPENDIX	268
<i>TABLE 69 LIST OF MANUFACTURERS OF COMPLETE MV SYSTEMS...</i>	268
<i>TABLE 69 (CONTINUED)</i>	269
<i>TABLE 69 (CONTINUED)</i>	270
<i>TABLE 69 (CONTINUED)</i>	271
<i>TABLE 69 (CONTINUED)</i>	272
<i>TABLE 69 (CONTINUED)</i>	273
<i>TABLE 69 (CONTINUED)</i>	274
<i>TABLE 69 (CONTINUED)</i>	275
<i>TABLE 70 LIST OF MANUFACTURERS OF 3D MV SYSTEMS</i>	276
<i>TABLE 70 (CONTINUED)</i>	277
<i>TABLE 71 LIST OF MV SYSTEMS INTEGRATORS</i>	278
<i>TABLE 71 (CONTINUED)</i>	279
<i>TABLE 71 (CONTINUED)</i>	280
<i>TABLE 71 (CONTINUED)</i>	281
<i>TABLE 72 LIST OF MANUFACTURERS OF MV LIGHTING</i> <i>EQUIPMENT</i>	281
<i>TABLE 72 (CONTINUED)</i>	282
<i>TABLE 72 (CONTINUED)</i>	283
<i>TABLE 72 (CONTINUED)</i>	284
<i>TABLE 73 LIST OF MANUFACTURERS OF LENSES/OPTICS FOR MV</i> <i>SYSTEMS</i>	285
<i>TABLE 73 (CONTINUED)</i>	286
<i>TABLE 74 LIST OF MV CAMERA MANUFACTURERS</i>	287
<i>TABLE 74 (CONTINUED)</i>	288
<i>TABLE 74 (CONTINUED)</i>	289
<i>TABLE 74 (CONTINUED)</i>	290
<i>TABLE 74 (CONTINUED)</i>	291

TABLE 74 (CONTINUED).....	292
TABLE 74 (CONTINUED).....	293
TABLE 74 (CONTINUED).....	294
TABLE 74 (CONTINUED).....	295
TABLE 75 LIST OF MANUFACTURERS OF FRAME GRABBERS	295
TABLE 75 (CONTINUED).....	296
TABLE 75 (CONTINUED).....	297
TABLE 75 (CONTINUED).....	298
TABLE 76 LIST OF MANUFACTURERS OF MV PROCESSORS	298
TABLE 76 (CONTINUED).....	299
TABLE 76 (CONTINUED).....	300
TABLE 76 (CONTINUED).....	301
TABLE 77 LIST OF SUPPLIERS OF MV SOFTWARE.....	301
TABLE 77 (CONTINUED).....	302
TABLE 77 (CONTINUED).....	303
TABLE 77 (CONTINUED).....	304
TABLE 77 (CONTINUED).....	305
TABLE 78 LIST OF MANUFACTURERS OF MV SYSTEM COMPONENTS	305
TABLE 78 (CONTINUED).....	306
TABLE 78 (CONTINUED).....	307
TABLE 78 (CONTINUED).....	308
TABLE 78 (CONTINUED).....	309
TABLE 79 MV APPLICATIONS IN THE AUTOMOBILE INDUSTRY	310
TABLE 79 (CONTINUED).....	311
TABLE 79 (CONTINUED).....	312
TABLE 79 (CONTINUED).....	313
TABLE 79 (CONTINUED).....	314
TABLE 79 (CONTINUED).....	315
TABLE 79 (CONTINUED).....	316
TABLE 80 MV APPLICATIONS IN THE METAL PROCESSING INDUSTRY	316
TABLE 80 (CONTINUED).....	317
TABLE 80 (CONTINUED).....	318
TABLE 81 MV APPLICATIONS IN THE SEMICONDUCTOR INDUSTRY	318
TABLE 81 (CONTINUED).....	319
TABLE 81 (CONTINUED).....	320
TABLE 82 MV APPLICATIONS IN ELECTRONICS/PCB ASSEMBLY	321
TABLE 82 (CONTINUED).....	322
TABLE 82 (CONTINUED).....	323
TABLE 83 MV APPLICATIONS IN THE FOOD/BEVERAGE PROCESSING INDUSTRY.....	323
TABLE 83 (CONTINUED).....	324

TABLE 83 (CONTINUED).....	325
TABLE 83 (CONTINUED).....	326
TABLE 84 MV APPLICATIONS IN THE PHARMACEUTICAL AND MEDICAL DEVICES INDUSTRY	327
TABLE 84 (CONTINUED).....	328
TABLE 85 MV APPLICATIONS IN THE PACKAGING INDUSTRY	328
TABLE 85 (CONTINUED).....	329
TABLE 86 PACKAGING APPLICATIONS BASED ON INDUSTRY	329
TABLE 86 (CONTINUED).....	330
TABLE 87 MV APPLICATIONS IN THE SOLAR CELL INDUSTRY	330
TABLE 87 MV APPLICATIONS IN THE SOLAR CELL INDUSTRY	331
TABLE 88 MV APPLICATIONS IN INDUSTRIAL R&D.....	331
TABLE 88 (CONTINUED).....	332
TABLE 89 MV APPLICATIONS IN THE CONSTRUCTION INDUSTRY	332
TABLE 90 MV APPLICATIONS IN THE RUBBER/PLASTICS INDUSTRIES	333
TABLE 91 MV APPLICATIONS IN MISCELLANEOUS INDUSTRIES.....	334
TABLE 91 (CONTINUED).....	335
TABLE 91 (CONTINUED).....	336
TABLE 91 (CONTINUED).....	337
TABLE 92 NEW DEVELOPMENTS IN MV COMPONENTS.....	337
TABLE 92 (CONTINUED).....	338
TABLE 92 (CONTINUED).....	339
TABLE 92 (CONTINUED).....	340
TABLE 92 (CONTINUED).....	341
TABLE 92 (CONTINUED).....	342
TABLE 93 LIST OF U.S. PATENTS RELATED TO MV, 2000–2009.....	343
TABLE 93 (CONTINUED).....	344
TABLE 93 (CONTINUED).....	345
TABLE 93 (CONTINUED).....	346
TABLE 93 (CONTINUED).....	347
TABLE 93 (CONTINUED).....	348
TABLE 93 (CONTINUED).....	349
TABLE 93 (CONTINUED).....	350
TABLE 93 (CONTINUED).....	351
TABLE 93 (CONTINUED).....	352
TABLE 93 (CONTINUED).....	353
TABLE 93 (CONTINUED).....	354
TABLE 93 (CONTINUED).....	355
TABLE 94 GLOSSARY OF MV TERMS.....	355
TABLE 94 (CONTINUED).....	356
TABLE 94 (CONTINUED).....	357
TABLE 94 (CONTINUED).....	358
TABLE 94 (CONTINUED).....	359

<i>TABLE 94 (CONTINUED)</i>	360
<i>TABLE 94 (CONTINUED)</i>	361
<i>TABLE 94 (CONTINUED)</i>	362
<i>TABLE 94 (CONTINUED)</i>	363