

2021 IEEE/SICE International Symposium on System Integration (SII 2021)

**Virtual Conference
11-14 January 2021**

Pages 1-414



**IEEE Catalog Number: CFP21SST-POD
ISBN: 978-1-7281-7659-8**

**Copyright © 2021 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP21SST-POD
ISBN (Print-On-Demand):	978-1-7281-7659-8
ISBN (Online):	978-1-7281-7658-1
ISSN:	2474-2317

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

TABLE OF CONTENTS

POSITIVE WEAK SUPERVISION QUALITY INCREASE BY CONSOLIDATION FOR ACOUSTIC DEFECT DETECTION IN CONCRETE STRUCTURES	1
<i>Jun Younes Louhi Kasahara; Atsushi Yamashita; Hajime Asama</i>	
AN UNSUPERVISED LEARNING APPROACH TOWARD AUTOMATIC SELECTION OF RECOGNITION PARAMETERS FOR MOBILE ROBOT NAVIGATION IN LESS STRUCTURED ENVIRONMENTS	6
<i>Seima Tanaka; Yuichi Kobayashi</i>	
EFFECTS OF VIDEO FILTERS FOR LEARNING AN ACTION RECOGNITION MODEL FOR CONSTRUCTION MACHINERY FROM SIMULATED TRAINING DATA	12
<i>Jinhyeok Sim; Jun Younes Louhi Kasahara; Shota Chikushi; Keiji Nagatani; Takumi Chiba; Kazuhiro Chayama; Atsushi Yamashita; Hajime Asama</i>	
EVALUATION OF MAPPING AND PATH PLANNING FOR NON-HOLONOMIC MOBILE ROBOT NAVIGATION IN NARROW PATHWAY FOR AGRICULTURAL APPLICATION	17
<i>Anupam Choudhary; Yuichi Kobayashi; Francisco J. Arjonilla; Satoshi Nagasaka; Megumu Koike</i>	
POTENTIAL OF INCORPORATING MOTION ESTIMATION FOR IMAGE CAPTIONING	23
<i>Kiyohiko Iwamura; Jun Younes Louhi Kasahara; Alessandro Moro; Atsushi Yamashita; Hajime Asama</i>	
DISTANCE INVARIANT SPARSE AUTOENCODER FOR WIRELESS SIGNAL STRENGTH MAPPING	29
<i>Renato Miyagusuku; Koichi Ozaki</i>	
EVALUATION OF TOMATO FRUIT HARVESTABILITY FOR ROBOTIC HARVESTING	35
<i>Takuya Fujinaga; Shinsuke Yasukawa; Kazuo Ishii</i>	
AZIMUTH ANGLE ESTIMATION BASED ON SOUND WAVE REFLECTION FOR MIRRORS AND TRANSPARENT OBJECTS	40
<i>Hiroki Katayama; Takuya Kiyokawa; Jun Takamatsu; Tsukasa Ogasawara</i>	
ERROR IDENTIFICATION AND RECOVERY IN ROBOTIC SNAP ASSEMBLY	46
<i>Yusuke Hayami; Weiwei Wan; Keisuke Koyama; Peihao Shi; Juan Rojas; Kensuke Harada</i>	
PICKING OF ONE SHEET OF COTTON CLOTH BY ROLLING UP USING CYLINDRICAL BRUSHES	54
<i>Yuichi Kawasaki; Solvi Arnold; Kimitoshi Yamazaki</i>	
AUTOMATIC TOOLPATH PATTERN RECOMMENDATION FOR VARIOUS INDUSTRIAL APPLICATIONS BASED ON DEEP LEARNING*	60
<i>Zhen Xie; Nikhil Somani; Yong-Jian Samuel Tan; Josh Chen Ye Seng</i>	
CHARACTERIZATION AND MODELING OF GRINDING SPEED AND BELT WEAR CONDITION FOR ROBOTIC GRINDING PROCESS	66
<i>Hsuan-Yu Yang; Feng-Li Lian</i>	
THE FLATWORM-LIKE PEDAL LOCOMOTORY ROBOT WORMESH-I: LOCOMOTION BASED ON THE COMBINATION OF PEDAL WAVES	72
<i>G. V. C. Rasanga; R. Hodoshima; S. Kotosaka</i>	
EMERGENCE OF MOTOR SYNERGY IN MULTI-DIRECTIONAL REACHING WITH DEEP REINFORCEMENT LEARNING	78
<i>Jihui Han; Jiazheng Chai; Mitsuhiro Hayashibe</i>	
LASER SCANNING DRIVE OF THE PERISTALTIC MICRO-GELROBOT WITH SOFT RIGID HYBRID STRUCTURES	83
<i>Shunnosuke Kodera; Tomoki Watanabe; Yoshiyuki Yokoyama; Takeshi Hayakawa</i>	
STIFFNESS CONTROL OF VARIABLE STIFFNESS LINK USING A CONDUCTIVE FABRIC BASED PROXIMITY SENSOR	87
<i>Mana Ishihara; Takahiro Matsuno; Kaspar Althoefer; Shinichi Hirai</i>	
GAMMA-RAY IMAGE NOISE GENERATION USING ENERGY-IMAGE CONVERTER BASED ON IMAGE HISTOGRAM	93
<i>Ren Komatsu; Hanwool Woo; Yusuke Tamura; Atsushi Yamashita; Hajime Asama</i>	
ICP-BASED SLAM USING LIDAR INTENSITY AND NEAR-INFRARED DATA	100
<i>Ryosuke Kataoka; Ryuki Suzuki; Yonghoon Ji; Hiromitsu Fujii; Hitoshi Kono; Kazunori Umeda</i>	
SIMPLIFIED IMAGE RECONSTRUCTION METHOD IN 4π COMPTON IMAGING FOR RADIOACTIVE SOURCE IDENTIFICATION	105
<i>Atsushi Mukai; Hideki Tomita; Shintaro Hara; Keita Yamagishi; Ryohei Terabayashi; Tetsuya Shimoyama; Kenji Shimazoe</i>	
PRIMARY-VIEW-CONSISTENT OPERATION METHOD OF MASTER CONTROLLER IN MULTIPLE SCREEN TELEOPERATION SYSTEM	110
<i>Hiroki Tsuji; Raita Katayama; Hikaru Nagano; Yuichi Tazaki; Yasuyoshi Yokokohji</i>	
NON-CONTACT TEMPERATURE SENSING USING RESONANCE FREQUENCY FOR THE ROBOTIC ARM WITH LMPA JOINTS	116
<i>Akira Seino; Noriaki Seto; Takayuki Takahashi</i>	
VIRTUAL KINESTHETIC TEACHING FOR BIMANUAL TELEMANIPULATION	120
<i>Inmo Jang; Hanlin Niu; Emily C. Collins; Andrew Weightman; Joaquin Carrasco; Barry Lennox</i>	
LOCALIZATION IN A SEMANTIC MAP VIA BOUNDING BOX INFORMATION AND FEATURE POINTS	126
<i>Sarthak Pathak; Irem Uygur; Lin Shize; Renato Miyagusuku; Alessandro Moro; Atsushi Yamashita; Hajime Asama</i>	
MAGNETIC-BASED LOCALIZATION CONSIDERING ROBOT'S ATTITUDE IN SLOPES	132
<i>Akinori Fukushima; Renato Miyagusuku; Koichi Ozaki</i>	

DEVELOPMENT AND TESTING OF GARBAGE DETECTION FOR AUTONOMOUS ROBOTS IN OUTDOOR ENVIRONMENTS	138
<i>Yuki Arai; Renato Miyagusuku; Koichi Ozaki</i>	
ACCELERATED SIM-TO-REAL DEEP REINFORCEMENT LEARNING: LEARNING COLLISION AVOIDANCE FROM HUMAN PLAYER	144
<i>Hanlin Niu; Ze Ji; Farshad Arvin; Barry Lennox; Hujun Yin; Joaquin Carrasco</i>	
BRAIN-MOBILITY-INTERFACE BASED ON DEEP LEARNING TECHNIQUES FOR CLASSIFYING EEG SIGNALS INTO CONTROL COMMANDS	150
<i>Satoshi Hoshino; Takuya Tagami; Hideaki Yagi; Kohnosuke Kanda</i>	
AUTONOMOUS MOBILE ROBOT FOR APPLE PLANT DISEASE DETECTION BASED ON CNN AND MULTI-SPECTRAL VISION SYSTEM	157
<i>Pavel Karpyshev; Valery Ilin; Ivan Kalinov; Alexander Petrovsky; Dzmityr Tsetserukou</i>	
FINER-LEVEL SEQUENTIAL WIFI-BASED INDOOR LOCALIZATION	163
<i>Yerbolat Khassanov; Mukhmet Nurpeissov; Azamat Sarkytbayev; Askat Kuzdeuov; Huseyin Atakan Varol</i>	
AUTONOMOUS NAVIGATION IN COMPLEX ENVIRONMENTS USING MEMORY-AIDED DEEP REINFORCEMENT LEARNING	170
<i>Linh Kästner; Zhengcheng Shen; Cornelius Marx; Jens Lambrecht</i>	
ACTIVE EXPLORATION FOR UNSUPERVISED OBJECT CATEGORIZATION BASED ON MULTIMODAL HIERARCHICAL DIRICHLET PROCESS	176
<i>Ryo Yoshino; Toshiaki Takano; Hiroki Tanaka; Tadahiro Taniguchi</i>	
BEHAVIORAL CLONING FROM OBSERVATION WITH BI-DIRECTIONAL DYNAMICS MODEL	184
<i>Betz Tobias; Hidehito Fujiishi; Taisuke Kobayashi</i>	
TOWARDS DEEP ROBOT LEARNING WITH OPTIMIZER APPLICABLE TO NON-STATIONARY PROBLEMS	190
<i>Taisuke Kobayashi</i>	
COOKING ACTIONS INFERENCE BASED ON INGREDIENT'S PHYSICAL FEATURES	195
<i>Ischel G. Ramirez-Alpizar; Ryosuke Hiraki; Kensuke Harada</i>	
COOPERATION BETWEEN MEDIA CHANGING ROBOT SYSTEM AND HUMANS FOR CELL PROCESSING	201
<i>Ryosuke Nonoyama; Makoto Jinno; Koichiro Yori; Keiichi Sugiura; Tadashi Sameshima</i>	
ARCHITECTURE FOR TASK-DEPENDENT HUMAN-ROBOT COLLABORATION	207
<i>Beibei Shu; Bjørn Solvang</i>	
THE APPLICATION OF VIRTUAL REALITY IN PROGRAMMING OF A MANUFACTURING CELL	213
<i>Halldor Arnarson; Bjørn Solvang; Beibei Shu</i>	
APPLICATION TO BIOMATERIAL OF A VIBRATION EXCITER FOR ULTRASONIC CONTROLLED GROWING ROD SYSTEM	219
<i>Koji Makino; Yudai Kitano; Naofumi Taniguchi; Tetsuro Ohba; Takaaki Ishii; Masaki Miyashita; Kento Ota; Hirotaka Haro; Hidetsugu Terada</i>	
DESIGN AND BASIC EXPERIMENT OF ONLINE FEEDBACK TRAINING SYSTEM FOR GOLF PUTTING	223
<i>Hibiki Kawano; Sho Yokota; Akihiro Matsumoto; Daisuke Chugo; Hiroshi Hashimoto</i>	
UNDERWATER 3D SCANNER USING RGB LASER PATTERN	229
<i>Y. Nishida; S. Yasukawa; K. Ishii</i>	
A PRELIMINARY RESEARCH TO DEVELOP OBSTACLE DETECTION SYSTEM INCLUDING DISTANCE MEASUREMENT	233
<i>K. Hakozaiki; E. Shimizu</i>	
COMPUTATIONAL AND EXPERIMENTAL INVESTIGATION OF A NEGATIVE PRESSURE EFFECT PLATE FOR UNDERWATER INSPECTION ROBOTS	239
<i>Takazumi Iwahori; Takahiro Takebayashi; Norimitsu Sakagami; Sadao Kawamura</i>	
SOUND ANALYSIS TO DEVELOP OPERATION CONFIRMATION SYSTEM FOR REMOTELY-CONTROLLED SHIP	244
<i>Ai Hoshino; Ayako Umeda; Etsuro Shimizu</i>	
COOPERATIVE MANIPULATION OF A FLOATING OBJECT BY TWO UNDERWATER ROBOTS WITH ARMS	250
<i>Shinichi Sagara; Takuya Takahashi; Radzi Ambar</i>	
MODEL CHECKING FOR DECISION MAKING SYSTEM OF LONG ENDURANCE UNMANNED SURFACE VEHICLE	256
<i>Hanlin Niu; Ze Ji; A. Savvaris; Antonios Tsourdos; Joaquin Carrasco</i>	
DEVELOPMENT OF PRESSURE MEASUREMENT EQUIPMENT FABRICATED BY ROBOT PACKAGING METHOD	263
<i>Mizuho Shibata; Norimitsu Sakagami</i>	
MULTI-PERSON POSE TRACKING WITH OCCLUSION SOLVING USING MOTION MODELS	270
<i>Lucas Gamez; Yusuke Yoshiyasu; Eiichi Yoshida</i>	
FAULT-DIAGNOSING MONOCULAR-SLAM FOR SCALE-AWARE CHANGE DETECTION	276
<i>Sugimoto Takuma; Yamaguchi Kousuke; Bao Zhongshan; Ye Mingying; Hiroki Tomoe; Tanaka Kanji</i>	
CYLINDER DETECTION FROM RGBD DATA BASED ON RADIUS ESTIMATION USING NUMBER OF MEASUREMENT POINTS	284
<i>Tomoki Kawagoshi; Kimitoshi Yamazaki</i>	
VISUAL SERVOING USING VIRTUAL SPACE FOR BOTH LEARNING AND TASK EXECUTION	292
<i>Tomoki Kawagoshi; Solvi Arnold; Kimitoshi Yamazaki</i>	

DIAGNOSING DEEP SELF-LOCALIZATION NETWORK FOR DOMAIN-SHIFT LOCALIZATION	298
<i>Tanaka Kanji</i>	
STUDY OF IMAGE PROCESSING METHODS FOR SPACE DEBRIS CAPTURE	304
<i>Taichi Kobayashi; Shin-Ichiro Nishida; Shunsuke Nakamura; Shintaro Nakatani</i>	
HIERARCHICAL PROBABILISTIC TASK RECOGNITION BASED ON SPATIAL MEMORY FOR CARE SUPPORT	310
<i>Tappei Katsunaga; Takayuki Tanaka; Mihoko Niitsuma; Saburo Takahashi; Toshihisa Abe</i>	
POSE IDENTIFICATION FOR TASK RECOGNITION IN CARE WORK	315
<i>Shinnosuke Kato; Mihoko Niitsuma; Takayuki Tanaka</i>	
TEACHING SYSTEM FOR MULTIMODAL OBJECT CATEGORIZATION BY HUMAN-ROBOT INTERACTION IN MIXED REALITY	320
<i>Lotfi El Hafji; Hitoshi Nakamura; Akira Taniguchi; Yoshinobu Hagiwara; Tadahiro Taniguchi</i>	
BIDIRECTIONAL GENERATION OF OBJECT IMAGES AND POSITIONS USING DEEP GENERATIVE MODELS FOR SERVICE ROBOTICS APPLICATIONS	325
<i>Kaede Hayashi; Wenru Zheng; Lotfi El Hafji; Yoshinobu Hagiwara; Tadahiro Taniguchi</i>	
REARRANGING TASKS IN DAILY-LIFE ENVIRONMENTS USING A MONTE CARLO TREE SEARCH AND A FEASIBILITY DATABASE	330
<i>Pedro Miguel Uriguen Eljuri; Gustavo Alfonso Garcia Ricardez; Nishanth Koganti; Jun Takamatsu; Tsukasa Ogasawara</i>	
A FREE-ROTATING GRIPPER FOR GRASPING OR ROTATING AN OBJECT	336
<i>Tomoya Teraguchi; Kazuyoshi Wada; Masashi Seki; Tetsuo Tomizawa</i>	
A GROUND-STAIR WALKING STRATEGY OF THE ASSISTIVE DEVICE BASED ON THE RGB-D CAMERA	341
<i>Shuai-Hong Yu; Bo-Rong Yang; Hee-Hyol Lee; Eiichiro Tanaka</i>	
KINEMATIC GAIT STABILITY INDEX HIGHLY CORRELATED WITH THE MARGIN OF STABILITY: CONCEPT AND INTERIM REPORT	347
<i>Tomoyuki Iwasaki; Shogo Okamoto; Yasuhiro Akiyama; Takashi Inagaki; Yoji Yamada</i>	
CONSIDERATION ABOUT STRUCTURE OF GAIT MOTION ASSIST DEVICE FOR TRUNK USING MCKIBBEN TYPE PNEUMATIC ARTIFICIAL MUSCLE	351
<i>Hayato Yase; Daisuke Sasaki; Jun Kadowaki; Taiga Kimura</i>	
EXTRACTION OF SHOULDER PARTS TO AVOID HEAVY LOAD BASED ON PAIN WHILE WALKING WITH BACKPACK	357
<i>Nenta Wako; Tamon Miyake; Shigeki Sugano</i>	
INVESTIGATION OF RELATIONSHIP BETWEEN MULTI-POINT MECHANICAL STIMULI ON SHOULDER AND OVERALL PAIN ON BACKPACK WEARERS	363
<i>Nenta Wako; Tamon Miyake; Shigeki Sugano</i>	
ASSESSMENT OF A BEAMFORMING IMPLEMENTATION DEVELOPED FOR SURFACE SOUND SOURCE SEPARATION	369
<i>Zhi Zhong; Muhammad Shakeel; Katsutoshi Itoyama; Kenji Nishida; Kazuhiro Nakadai</i>	
AN UNSUPERVISED AUDITORY SCENE ANALYSIS SYSTEM USING INCREMENTAL LOW-DIMENSIONAL EMBEDDING	375
<i>Kenta Shinzato; Ryosuke Kojima</i>	
MULTI-CHANNEL ENVIRONMENTAL SOUND SEGMENTATION UTILIZING SOUND SOURCE LOCALIZATION AND SEPARATION U-NET	382
<i>Yui Sudo; Katsutoshi Itoyama; Kenji Nishida; Kazuhiro Nakadai</i>	
EMC: EARTHQUAKE MAGNITUDES CLASSIFICATION ON SEISMIC SIGNALS VIA CONVOLUTIONAL RECURRENT NETWORKS	388
<i>Muhammad Shakeel; Katsutoshi Itoyama; Kenji Nishida; Kazuhiro Nakadai</i>	
SOUND SOURCE TRACKING USING INTEGRATED DIRECTION LIKELIHOOD FOR DRONES WITH MICROPHONE ARRAYS	394
<i>Taiki Yamada; Katsutoshi Itoyama; Kenji Nishida; Kazuhiro Nakadai</i>	
AUTOMATIC WOOD SPLINTER DETECTION SYSTEM USING COTTON FOR GYMNASIUM INSPECTION	400
<i>Moriaki Inamine; Wataru Inaba; Satoki Tsuichihara; Hiroshi Takemura; Shigeki Sumiya</i>	
A LONG-TIME AUTOMATED HONEYBEES COUNT SYSTEM USING HIGH-SPEED VISION	404
<i>Hironori Yoshida; Kohei Shimasaki; Taku Senoo; Idaku Ishii; Kazuhiko Yamamoto</i>	
VIEWPOINT PLANNING FOR AUTOMATED FRUIT HARVESTING USING DEEP LEARNING	409
<i>Hafiza Ufaq Rehman; Jun Miura</i>	
KMOP-VSLAM: DYNAMIC VISUAL SLAM FOR RGB-D CAMERAS USING K-MEANS AND OPENPOSE	415
<i>Yubao Liu; Jun Miura</i>	
REAL-TIME INTERPOLATION METHOD FOR SPARSE LIDAR POINT CLOUD USING RGB CAMERA	421
<i>Tomohiko Hasegawa; Takanori Emaru; Ankit A. Ravankar</i>	
POSE ESTIMATION OF A SIMPLE-SHAPED OBJECT BASED ON POSECLASS USING RGBD CAMERA	426
<i>Rikuto Yamada; Koki Yamamori; Tsuyoshi Tasaki</i>	
EFFICIENT TAILORING OF UNIVERSAL SOFTWARE COMPONENTS FOR CONSERVING RESOURCES: EVALUATION IN PRACTICAL ROS-BASED SYSTEM	431
<i>Takuya Shizukuishi; Katsuya Matsubara</i>	
DETERMINING THE CONFIGURATION OF A MANIPULATOR USING MINIMAL AMOUNT OF PASSIVE FIDUCIAL MARKERS	437
<i>Floris Erich; Noriaki Ando</i>	

A 3-DIMENSIONAL PRINTING SYSTEM USING AN INDUSTRIAL ROBOTIC ARM	443
<i>Quan Khanh Luu; Hung Manh La; Van Anh Ho</i>	
DEVELOPMENT OF IOT EDUCATIONAL MATERIALS FOR ENGINEERING STUDENTS	449
<i>Noriyuki Kimura; Yuto Okita; Ryota Goka; Takuto Yamazaki; Toshifumi Satake; Naoki Igo</i>	
DEVELOPMENT OF A TOWER-TYPE COOKING ROBOT	455
<i>Masahiro Inagawa; Toshinobu Takei; Etsujiro Imanishi</i>	
A LEARNING-FROM-OBSERVATION FRAMEWORK: ONE-SHOT ROBOT TEACHING FOR GRASP-MANIPULATION-RELEASE HOUSEHOLD OPERATIONS	461
<i>Naoki Wake; Riku Arakawa; Iori Yanokura; Takuya Kiyokawa; Kazuhiro Sasabuchi; Jun Takamatsu; Katsushi Ikeuchi</i>	
HUMAN POSE RECOGNITION UNDER CLOTH-LIKE OBJECTS FROM DEPTH IMAGES USING A SYNTHETIC IMAGE DATASET WITH CLOTH SIMULATION	467
<i>Shunsuke Ochi; Jun Miura</i>	
URINE VOLUME ESTIMATION BY ELECTRICAL IMPEDANCE TOMOGRAPHY WITH FEWER ELECTRODES: A SIMULATION STUDY	473
<i>Shuhei S. Noyori; Hiroshi Noguchi; Gojiro Nakagami; Taketoshi Mori; Hiromi Sanada</i>	
MOTION ANALYSIS OF TRANSFER OPERATION FROM BED TO WHEELCHAIR FOR CARE-GIVER AND -RECEIVER WITH WEARABLE MOTION CAPTURE	477
<i>Takehito Kikuchi; Okito Shimazu; Yasuhiro Yamamoto; Mikiko Nakano; Sachiko Ichiyama; Sayuri Kawai; Asuka Orii; Shinichi Tanabe</i>	
DEVELOPMENT OF MICROSTRUCTURED LOW NOISE PROPELLER FOR AERIAL ACOUSTIC SURVEILLANCE	482
<i>Ryusuke Noda; Toshiyuki Nakata; Kei Senda; Hao Liu</i>	
VISUALIZING DIRECTIONAL SOUNDSCAPES OF BIRD VOCALIZATIONS USING ROBOT AUDITION TECHNIQUES	487
<i>Reiji Suzuki; Hao Zhao; Shinji Sumitani; Shiho Matsubayashi; Takaya Arita; Kazuhiro Nakada; Hiroshi G. Okuno</i>	
OBSERVING NOCTURNAL BIRDS USING LOCALIZATION TECHNIQUES	493
<i>Shiho Matsubayashi; Fumiyuki Saito; Reiji Suzuki; Kazuhiro Nakada; Hiroshi G. Okuno</i>	
LOCAL PATH PLANNING METHOD BASED ON VIRTUAL MANIPULATORS AND DYNAMIC WINDOW APPROACH FOR A WHEELED MOBILE ROBOT	499
<i>Masato Kobayashi; Naoki Motoi</i>	
SPHERICOL: A DRIVING ASSISTANCE SYSTEM FOR POWER WHEELCHAIRS BASED ON SPHERICAL VISION AND RANGE MEASUREMENTS	505
<i>Sarah Delmas; Fabio Morbidi; Guillaume Caron; Julien Albrand; Méven Jeanne-Rose; Louise Devigne; Marie Babel</i>	
QUICK TORSION TORQUE CONTROL BASED ON MODEL ERROR COMPENSATOR AND DISTURBANCE OBSERVER WITH TORSION TORQUE SENSOR	511
<i>Yusuke Kawai; Sora Nagao; Yuki Yokokura; Kiyoshi Ohishi; Toshimasa Miyazaki</i>	
TRACKING METHOD OF MEDAKA CONSIDERING PROXIMITY STATE	517
<i>Takanori Sakakibara; Satoru Takahashi; Kuniaki Kawabata; Shoji Oda</i>	
ROBUST HEARTBEAT INTERVAL ESTIMATION METHOD AGAINST VARIOUS POSTURES ON BED USING CONTACTLESS MEASUREMENT	524
<i>Tsuyoshi Sato; Toshiya Nakaigawa; Nozomu Hamada; Yasue Mitsukura</i>	
DEVELOPMENT AND DEMONSTRATION OF THE MISSION CONTROL SYSTEM FOR ARTIFICIAL METEOR GENERATING MICRO-SATELLITES	531
<i>Yoshihiko Shibuya; Yuji Sato; Hannah Tomio; Toshinori Kuwahara; Shinya Fujita; Koh Kamachi; Hayato Watanabe</i>	
ROWMA: A RECONFIGURABLE ROBOT NETWORK CONSTRUCTION SYSTEM	537
<i>Ryota Suenaga; Kazuyuki Morioka</i>	
A SIMULATION-BASED APPROACH FOR IMPROVING THE PERFORMANCE OF A MANUFACTURING SYSTEM	543
<i>Mohammad Azarian; Hao Yu; Wei Deng Solvang</i>	
SUBJECTIVE EVALUATION OF LUMBAR LOAD AND TIGHTENING FORCE USING A PELVIC BELT	548
<i>Yoshio Tsuchiya; Takayuki Tanaka; Michihiro Yoshida</i>	
DEVELOPMENT OF WALKING ASSIST ROBOT WITH BODY WEIGHT SUPPORT MECHANISM	554
<i>Zonghao Dong; Jose Victorio Salazar Luces; Yasuhisa Hirata</i>	
TASK-SPACE CONTROL INTERFACE FOR SOFTBANK HUMANOID ROBOTS AND ITS HUMAN-ROBOT INTERACTION APPLICATIONS	560
<i>Anastasia Bolotnikova; Pierre Gergondet; Arnaud Tanguy; Sébastien Courtois; Abderrahmane Kheddar</i>	
THE EFFECT OF PASSIVE LOWER LIMB ASSIST DEVICE ON MUSCLE SYNERGY IN STANDING-UP MOTION	566
<i>Shunsuke Torigai; Takayuki Tanaka</i>	
CARE TRAINING ASSISTANT ROBOT AND VISUAL-BASED FEEDBACK FOR ELDERLY CARE EDUCATION ENVIRONMENT	572
<i>Miran Lee; Dinh Tuan Tran; Hirotake Yamazoe; Joo-Ho Lee</i>	
ADVANCED COLLABORATIVE ROBOTS FOR THE FACTORY OF THE FUTURE	578
<i>Kongkiat Rothomphiwat; Athanat Harnkhamen; Tanyatep Tothong; Tachadol Suthisomboon; Nat Dilokthanakul; Poramate Manoonpong</i>	
STUDY ON GENERALITY OF ROLLER CHAIN ASSEMBLY STRATEGY WITH PARALLEL JAW GRIPPER	580
<i>Keiki Tatemura; Hiroki Dobashi</i>	
TEACH AND PLAYBACK FOR ROBOTIC HANDLING THROUGH OBJECT RECOGNITION	582
<i>Satoshi Hoshino; Kazuki Urayama</i>	

DEVELOPMENT OF RACK LOADING SYSTEM FOR PLATING PROCESS	584
<i>Kenta Asaishi; Syuhei Miura; Hiroshi Chiba; Tasaku Miyoshi</i>	
DEVELOPMENT OF AUTONOMOUS EXPLORER FOR ARCTIC ICE SURVEY	586
<i>Tatsuro Yonekura; Morimichi Furudate; Ryo Sato; Hiroshi Yoshida; Tasaku Miyoshi</i>	
POSITION CONTROL OF REMOTELY OPERATED VEHICLE USING TEMPLATE MATCHING	588
<i>Chikara Masuzaki; Akihiro Morinaga; Ikuo Yamamoto</i>	
DESIGN, INTEGRATION AND SEA TRIALS OF 3D PRINTED UNMANNED AERIAL VEHICLE AND UNMANNED SURFACE VEHICLE FOR COOPERATIVE MISSIONS	590
<i>Hanlin Niu; Ze Ji; Pietro Liguori; Hujun Yin; Joaquin Carrasco</i>	
3D VISION-GUIDED PICK-AND-PLACE USING KUKA LBR IIWA ROBOT	592
<i>Hanlin Niu; Ze Ji; Zihang Zhu; Hujun Yin; Joaquin Carrasco</i>	
DESIGN AND IMPLEMENTATION OF INVOLUTE-CURVE-SHAPED-MECHANISM FOR STAIR CLIMBING	594
<i>Ryosuke Fukuda; Hiroshi Okamoto; Taku Kitahara; Ryota Yamashina</i>	
AN ENERGY BASED CONTROL FOR VIBRATION SUPPRESSION IN A RIGID PARALLEL SERIES ELASTIC ACTUATOR	600
<i>Ujjal Krishnanand Mavinkurve; Seyed Amir Tafreshi; Ayato Kanada; Motoji Yamamoto</i>	
TOWARDS ROBUST WHEEL-LEGGED BIPED ROBOT SYSTEM: COMBINING FEEDFORWARD AND FEEDBACK CONTROL	606
<i>Fahad Raza; Mitsuhiro Hayashibe</i>	
HIGH-SPEED SERVO SPHERE	613
<i>Yasushi Iwatani</i>	
DEVELOPMENT OF HIGH-SPEED GRIPPER WITH CLOSING AND RELEASING CAPABILITY	619
<i>Ryosuke Iwazawa; Kenichi Ohara; Makoto Kaneko</i>	
OPTIMAL DESIGN OF ROTATIONAL CHUCK-TYPE HAND WITH THREE PARALLEL STICK FINGERS FOR ASSEMBLY TASKS THROUGH GRASP OPTIMIZATION	623
<i>Masaya Fukunishi; Hiroki Dobashi; Yasuyoshi Yokokohji</i>	
DEVELOPMENT AND EVALUATION OF A TOMATO FRUIT SUCTION CUTTING DEVICE	628
<i>Takuya Fujinaga; Shinsuke Yasukawa; Kazuo Ishii</i>	
2D LASER AND 3D CAMERA DATA INTEGRATION AND FILTERING FOR HUMAN TRAJECTORY TRACKING	634
<i>Hamed Bozorgi; Xuan Tung Truong; Hung Manh La; Trung Dung Ngo</i>	
VISION-BASED ASSISTIVE NAVIGATION ALGORITHM FOR BLIND AND VISUALLY IMPAIRED PEOPLE USING MONOCULAR CAMERA	640
<i>Gabriel D. Marzullo; Kang-Hyun Jo; Danilo Cáceres</i>	
SEAMLESS POSITIONING SYSTEM USING GPS AND BEACONS FOR COMMUNITY SERVICE ROBOT	646
<i>Satoru Miki; Takuya Nishioka; Nobuto Matsuhira</i>	
RECOGNITION OF HUMAN CHARACTERISTICS USING MULTIPLE MOBILE ROBOTS WITH 3D LIDARS	650
<i>Koki Makita; Dražen Bršćic; Takayuki Kanda</i>	
AUTOMATED MISSION PLANNING SYSTEM FOR OCEAN OBSERVATION OF MICRO-SATELLITE RISESAT	656
<i>Naoya Shiraiishi; Kazuki Kibune; Shinya Fujita; Yoshihiko Shibuya; Yuji Sato; Toshinori Kuwahara; Junichi Kurihara</i>	
DESIGN, IMPLEMENTATION AND IN-ORBIT DEMONSTRATION OF ATTITUDE AND ORBIT CONTROL SYSTEM FOR MICRO-SATELLITE ALE-2	662
<i>Yuji Sato; Shinya Fujita; Toshinori Kuwahara; Yoshihiko Shibuya; Koh Kamachi</i>	
A CASCADED GENETIC ALGORITHM WITH ADAPTIVE LENGTH OF THE CHROMOSOME FOR BLIND SYSTEM ORDER AND PARAMETERS IDENTIFICATION	669
<i>Tin Lun Lam</i>	
A GENETIC ALGORITHM APPROACH TO PID TUNING OF A QUADCOPTER UAV MODEL	675
<i>Marc Francis Q. Say; Edwin Sybingco; Argel A. Bandala; Ryan Rhay P. Vicerra; Alvin Y. Chua</i>	
2D POSITION CONTROL OF A UAV USING FUZZY LOGIC CONTROL	679
<i>Marc Francis Q. Say; Edwin Sybingco; Argel A. Bandala; Ryan Rhay P. Vicerra; Alvin Y. Chua</i>	
NAVIGATION OF OMNI-DIRECTIONAL MOBILE ROBOT IN UNSTRUCTURED ENVIRONMENTS USING FUZZY LOGIC CONTROL	684
<i>Mohamed Abdelwahab; Victor Parque; A. A. Abouelsoud; Ahmed M. R. Fath</i>	
DEVELOPMENT OF CONTROL METHOD FOR ACTIVE BALL JOINT MECHANISM CONSIDERING SINGULARITY OF SPHERICAL GEAR	690
<i>Kazuki Abe; Riichiro Tadakuma</i>	
GALILEO AID DRONE: A SYSTEM INTEGRATION FOR AUTONOMOUS WILDFIRE ASSISTANTS	696
<i>Diego Calderón; Rodrigo Cordero; Ariel González; Ali Lemus; Julio Fajardo</i>	
IN-CAR SAFETY JUDGMENT USING MACHINE LEARNING	698
<i>Y. Tomita; S. Kato; M. Itami</i>	
SVM BASED PEDESTRIAN DETECTION SYSTEM FOR SIDEWALK SNOW REMOVING MACHINES	700
<i>Yuta Sasaki; Takanori Emaru; Ankit A. Ravankar</i>	
IMPROVED SCAN MATCHING PERFORMANCE IN SNOWY ENVIRONMENTS USING SEMANTIC SEGMENTATION	702
<i>Masahiro Obuchi; Takanori Emaru; Ankit A. Ravankar</i>	
DYNAMIC 3D-OBSTACLES DETECTION BY A MONOCULAR CAMERA AND A 3D MAP	704
<i>Junya Shikishima; Tsuyoshi Tasaki</i>	

DESIGN OF CLASS IN UNKNOWN OBJECT SEGMENTATION FOCUSING ON 3D OBJECT DETECTION IN DEPTH IMAGE	706
<i>Tatsuya Amemiya; Tsuyoshi Tasaki</i>	
AN IMPLEMENTATION OF LINEAR TEMPORAL LOGIC FOR DRIVING SAFETY SUITABLE FOR THE CONCEPT OF LOCAL DYNAMIC MAP	708
<i>Arvind Kumar; Hiroaki Wagatsuma</i>	
TOILET CLEANING SERVICE BY MOBILE ROBOT EQUIPPED WITH RGB-D CAMERA AND SINGLE ARM	710
<i>Takuo Suzuki; Yuki Sakata; Atsuno Yamaguchi</i>	
A ROBUST STRATEGY OF MAP QUALITY ASSESSMENT FOR AUTONOMOUS DRIVING BASED ON LIDAR ROAD-SURFACE REFLECTANCE	712
<i>Mohammad Aldibaja; Naoki Suganuma; Lu Cao; Reo Yanase; Keisuke Yoneda</i>	
MONOCULAR VISUAL-INERTIAL LOCALIZATION IN A POINT CLOUD MAP USING FEATURE-TO-DISTRIBUTION REGISTRATION	720
<i>Su Wang; Ankit A. Ravankar; Abhijeet Ravankar; Takanori Emaru; Yukinori Kobayashi</i>	
FOREST ROAD SURFACE DETECTION USING LIDAR-SLAM AND U-NET	727
<i>Hiroyuki Nakagomi; Yoshihiro Fuse; Yasuki Nagata; Hidehiko Hosaka; Hironaga Miyamoto; Masashi Yokozuka; Akiya Kamimura; Hiromi Watanabe; Tsutomu Tanzawa; Shinji Kotani</i>	
DNN-BASED SELF-ATTITUDE ESTIMATION BY LEARNING LANDSCAPE INFORMATION	733
<i>Ryota Ozaki; Yoji Kuroda</i>	
EVALUATION OF VISUALIZATION PERFORMANCE OF CNN MODELS USING DRIVER MODEL	739
<i>Chenkai Zhang; Yuki Okafuji; Takahiro Wada</i>	
HIERARCHICAL MODELING OF INDIVIDUAL TACTILE, EMOTIONAL, AND PREFERENTIAL RESPONSES TO LEATHERS USING BAYESIAN STRUCTURAL EQUATION MODELING	745
<i>Shin Inami; Shogo Okamoto; Kunitoshi Ito; Ryuji Ozaki</i>	
A LIGHT-WEIGHT HAND-WAVING GESTURE RECOGNITION METHOD USING KINECT V2 AND FREQUENCY ANALYSIS	750
<i>Yuki Misaki; Yutaka Hiroi; Akinori Ito</i>	
FEASIBILITY EVALUATION OF MIXED REALITY OBSTACLES ON TREADMILL USING HOLOLENS TO ELICIT REAL OBSTACLE NEGOTIATION	756
<i>Tamon Miyake; Mohammed Al-Sada; Tingting Zhong; Wei Wang; Shigeki Sugano</i>	
AN OPERATOR AND OBSERVER STYLE TELEOPERATION USER INTERFACE FOR REMOTE OBJECT SEARCH	762
<i>Masanori Matsushita; Kotaro Hayashi; Jun Miura</i>	
TWITTER-BASED SELECTION OF TOPICS THAT USERS ARE INTERESTED IN BUT ARE NOT FAMILIAR WITH	769
<i>Yuya Sakai; Mitsuharu Matsumoto</i>	
DEVELOPMENT OF MOTOR-LESS POWER ASSIST DEVICE FOR INDIRECT HOT-LINE WORK USING MECHANICAL SELF-WEIGHT COMPENSATION MECHANISM	775
<i>Kotono Nishiyama; Michiru Tanaka; Yoshitora Moriyama; Yoshiki Nishikawa; Takayuki Nakayama; Teppei Kuroki; Yoshinori Takeshima; Takeji Mandai</i>	
DYNAMICAL IMPROVEMENT OF NETWORK CONNECTIVITY FOR MULTI-ROBOT ROBUSTNESS USING PERTURBED ALGEBRAIC CONNECTIVITY	781
<i>Toru Murayama</i>	
GENERATING CURVED PATH WALKING GAITS FOR BIPED ROBOTS WITH DEFICIENT DEGREES OF FREEDOM	786
<i>K. S. Prasanna Venkatesan; Prajwal Rajendra Mahendrakar</i>	
REFERENCE ZMP GENERATION FOR TELEOPERATED BIPEDAL ROBOTS WALKING ON NON-FLAT TERRAINS	794
<i>Tomoya Ando; Tomofumi Watari; Ryo Kikuuwe</i>	
FOOD PEELING METHOD FOR DUAL-ARM COOKING ROBOT	801
<i>Chenyu Dong; Liangliang Yu; Masaru Takizawa; Shunsuke Kudoh; Takashi Suehiro</i>	
TRANSPORTING A HEAVY OBJECT ON A FRICTIONAL FLOOR BY A MOBILE MANIPULATOR BASED ON ADAPTIVE MPC FRAMEWORK	807
<i>Yunzhuo Wang; Hitoshi Kusano; Tomomichi Sugihara</i>	
DYNAMIC IRIS AUTHENTICATION BY HIGH-SPEED GAZE AND FOCUS CONTROL	813
<i>Tomohiro Sueishi; Arata Jingu; Shoji Yachida; Michiaki Inoue; Yuka Ogino; Masatoshi Ishikawa</i>	
A WEARABLE HAPTIC SYSTEM FOR REHABILITATION BASED ON THE ASYMMETRIC VIBRATION	815
<i>Hui-Yuan Duan; Tai-Qi Wang; Hee-Hyol Lee; Eiichiro Tanaka</i>	
PROPOSAL OF BLOOD FLOW PROMOTION METHOD USING ELECTRICAL STIMULATION SYNCHRONIZED WITH ECG	817
<i>Koichi Hattori; Kazuma Nozawa; Suzuka Fujita; Sousuke Nakamura</i>	
BASIC EVALUATION OF CARBONATE STIMULUS AMPLIFICATION AND TASTE CHANGE USING AC ELECTRIC STIMULATION	819
<i>Junpei Kanayama; Ibuki Nomura; Noriki Mochizuki; Takafumi Koike; Sousuke Nakamura</i>	
MULTIPLE OBJECTS DETECTION USING AN AIRBORNE ULTRASONIC PHASED ARRAY WITH MUSIC METHOD	821
<i>Satoki Uehara; Akira Seino; Takayuki Takahashi</i>	

IMPROVEMENT OF SEGMENTATION ACCURACY FOR POSE ESTIMATION BY SELECTING AN INSTANCE	823
<i>Yusuke Ibuki; Tsuyoshi Tasaki</i>	
ONLINE MEASUREMENT OF COMPACT RANGE IMAGE SENSOR USING IMAGE BLUR OF MULTI-SLIT LASER	825
<i>Karin Ohashi; Kazuki Tsumura; Yonghoon Ji; Kazunori Umeda</i>	
A PERPENDICULAR DIRECTION GAUGE USING A LENTICULAR LENS	827
<i>Hideyuki Tanaka</i>	
A NOVEL LENTICULAR ANGLE GAUGE FOR HIGH-ACCURACY FIDUCIAL MARKERS	829
<i>Hideyuki Tanaka</i>	
SCOPE OF HUMAN MANIPULABILITY SHARING WITH VR DEVICE AND EMG SENSOR FOR ONLINE MOTION ANALYSIS	831
<i>Shunya Narukiyo; Yoshiyuki Tanaka; Tadayoshi Aoyama; Mitsuhisa Shiokawa</i>	
HAIROWORLDPLUGIN: A CHOREONOID PLUGIN FOR VIRTUALLY CONFIGURING DECOMMISSIONING TASK ENVIRONMENT FOR THE ROBOTS	833
<i>Kenta Suzuki; Kuniaki Kawabata</i>	
A SIMULATOR-BASED SYSTEM FOR TESTING SKILL TO MANEUVER ROBOT REMOTELY: IMPLEMENTATIONS OF DATA COLLECTION AND PRESENTATION FUNCTIONS RELATED TO ROBOT MANEUVER	835
<i>Fumiaki Abe; Kuniaki Kawabata; Kenta Suzuki; Hiroshi Yashiro</i>	
TRAINING A ROBOT TO ATTEND A PERSON AT SPECIFIC LOCATIONS USING SOFT ACTOR-CRITIC UNDER SIMULATED ENVIRONMENT	837
<i>Chandra Kusuma Dewa; Jun Miura</i>	
CHEMICAL PLUME TRACING MODEL LEARNING FROM INSECT BEHAVIOR	839
<i>Kei Okajima; Shunsuke Shigaki; Kazushi Sanada; Daisuke Kurabayashi</i>	
TOWARDS THE AUTOMATIC OBSERVATION AND CODING OF SIMPLE BEHAVIOURS IN ETHOLOGICAL EXPERIMENTS	841
<i>Dávid Vincze; Márta Gácsi; Szilveszter Kovács; Mihoko Niitsuma; Péter Korondi; ádám Miklósi</i>	
DEMONSTRATION OF EXPERT KNOWLEDGE INJECTION IN FUZZY RULE INTERPOLATION BASED Q-LEARNING	843
<i>Tamá Tompa; Szilveszter Kovács; Dávid Vincze; Mihoko Niitsuma</i>	
Author Index	