



## Report on Dissemination Planning

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### Abstract:

This document presents the efforts that are dedicated to the promotion of the IMMERSENCE project and the dissemination of results. In addition it provides a description of the expected results besides a preliminary outline of the exploitation and use potential.

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# 1 Introduction

The *Report on Dissemination Planning* describes schemes for the dissemination of knowledge gained during the IMMERSENCE project. It addresses the following issues:

- Promotion of the IMMERSENCE project
- Activities for disseminating results

The *Report on Dissemination Planning* can be recognized as the pre-stage to the first *Plan for Using and Disseminating the Knowledge* which is due at month 13. The latter will present the actual dissemination and use of the project results as well as activities planned within the next 3 years after the end of the project. Thus, the *Plan for Using and Disseminating the Knowledge* provides only a preliminary view on the dissemination plans of the consortium. It is expected that an adaptation and expansion will be necessary and a concretion possible as the project evolves and the actual results become apparent.

This document focuses on the finished and planned promotion and dissemination activities, which will be presented separately for each contractor.

## 2 Dissemination and Promotion Activities

### 2.1 The IMMERSENCE.INFO Website

The official IMMERSENCE website (<http://www.immersence.info>) has been established in February 2006 (month 2 of the project). Based on the slim structure of the TOUCH-HapSys project website, it provides the essential information and communication facilities necessary for effective project management and result dissemination. The online content is divided in the following sections:

The **Project Presentation** section gives besides some general information (start, duration, consortium and structure) a brief overview of the project's objectives, the main research needs, the technical approach, and the expected achievements.

The **Consortium** section presenting the IMMERSENCE project team provides the contact addresses of the participating institutions and their group leaders. Email addresses and links to the homepages of the researchers are given in the **Researchers** section.

For users interested in project details a public version of **Annex 1** is available in the **Project Specification** section.

All deliverable reports open for public can be found in the **Documents** section. Considering that all deliverables of IMMERSENCE are supposed to be accessible for public the webpage constitutes the most important resource for the dissemination of project results.

The **Calendar of Events** section lists all relevant project dates. Conferences, meetings, workshops, and demonstrations (potentially open for public) are announced here.

The **Internal** section is the only part not accessible for public. It is intended for the internal dissemination of information within the consortium (see section 2.5).

### 2.2 Meetings and Conferences

A regular attendance and presentation at international conferences and meetings is planned in order to communicate and discuss the project results. Furthermore, it is intended to participate at exhibitions at conferences to present prototypes to the public. These demonstrations will give the public the opportunity to "experience" the results of IMMERSENCE. The diversity of the consortium will ensure the dissemination of project results to a wide audience. Each partner engages in mentioning grant from the EC 6<sup>th</sup> Framework and IMMERSENCE in a dedicated acknowledgment section within each published paper whenever this is allowed.

The (non-exhaustive) list of potential conferences the consortium plans to attend includes:

*Computer Vision:*

- International Conference on Computer Vision (ICCV)
- Computer Vision and Pattern Recognition (CVPR)
- European Conference on Computer Vision (ECCV)
- International Conference on Pattern Recognition (ICPR)
- 3-D Digital Imaging and Modeling (3DIM)
- International Symposium on 3D Data Processing (3DPVT)

*VR/AR:*

- Int. Symp. on Mixed and Augmented Reality (ISMAR)
- IEEE VR
- Haptics Symposium
- Multimodal Interfaces
- HCI Int.
- CASA - Computer Animation And Social Agents

- EuroHaptics
- Presence Cluster meetings
- Presence Conference
- ACM Virtual Reality Software and Technology (VRST)
- IEEE International Workshop on Haptic Audio Visual Environments and their Applications (HAVE)

*Applications:*

- Medicine Meets VR (MMVR)
- Medical Image Computing and Computer-Assisted Intervention (MICCAI)
- Int. Symp. on VR, Archaeology & Intelligent Cultural Heritage (VAST)
- Computer Applications and Quantitative Methods in Archaeology (CAA)
- Applied Perception in Graphics and Visualization (APGV)

*Graphics:*

- SIGGRAPH
- Eurographics
- Pacific Graphics
- IEEE International conference on visualization
- CASA

*Psychology/Neuroscience:*

- Int. Multisensory Research Forum (IMRF)
- Vision Sciences Society Annual Meeting (VSS)
- European Conf. on Visual Perception (ECVP)
- Experimental Psychology Society
- Psychonomics Society Annual Meeting
- Society for Neuroscience annual meeting
- Tübinger Wahrnehmungskonferenz (TWK)
- Spatial Cognition Conference
- Vision Fall Meeting (VFM)

*Robotics:*

- IEEE Int. Conf. on Robotics and Automation (ICRA)
- IEEE/RSJ International Conf. on Intelligent Robots and Systems (IROS)
- Int. Conf. on Advanced Robotics (ICAR)
- IEEE International conference on robotics and biomimetics
- Robotics: science and systems
- IEEE/RSJ Humanoids

*Control/Mechatronics:*

- IEEE Int. Conf. on Decision and Control (CDC)
- European Control Conf. (ECC)
- ACC American Control Conference
- IFAC Symp. on Robot Control (SyRoCo)
- Int. Congress of Theoretical and Applied Mechanics (ICTAM)
- Int. Conf. on the Theory of Machines a. Mechanisms (IFTaMM)
- Int. Design Engin. Technical Conf. & the Computers & Information in Engin. Conf. (ASME DETC)
- EUROMECH Colloquium on Real-time Simulation and VR Applications of Multibody System
- Symposium of the Int. Union of Theoretic and Applied Mechanics (IUTAM)

Papers presenting work conducted within IMMERSENCE have already been submitted to:

- Several conference papers at the EUROHAPTICS 2006 Conference, Paris, France
- Poster presentation at the EUROHAPTICS 2006 Conference, Paris, France
- Poster presentation at the Annual Meeting of the Vision Science Society, 2006, Sarasota, USA
- Poster presentation at the meeting of the International Multisensory Research Forum, 2006, Dublin, Ireland
- Poster presentation at the Tuebinger Wahrnehmungskonferenz, 2006, Tuebingen, Germany
- Invited lecture “Esplorazione funzionale del cervello nella percezione del mondo esterno: l'organizzazione sopramodale delle vie corticali “visive”, Neurologic Clinic Hospital Sant'Agostino - Estense di Modena, April 21, 2006.
- Invited lecture “Seeing With One's Hands: Supramodal Organization of the “Visual” Extrastriate Cortex” Institute of Neuroradiology, University of Zurich, Zurich, Switzerland, April 26, 2006.
- Invited lecture E. Ricciardi. “Vedere con le mani: organizzazione sopramodale della corteccia “visiva” extrastriata”. XV Clinical Physiology meeting. CNR Research Area, Pisa, May 24, 2006.

### 2.3 Publications

The IMMERSENCE consortium will publish scientific results in high profile national and international journals. A list of potential journals includes:

- Perception & Psychophysics
- Perception
- Psychological Science
- Neuropsychologia
- Current Biology
- Nature Neuroscience
- Neuron
- Cyberpsychology
- Psychophysics
- Experimental Brain Research
- Nature
- Canadian Journal of Experimental Psychology
- Vision Research
- Presence
- Journal of Vision
- ACM Transactions on Computer-Human Interaction
- ACM Transactions on Applied Perception
- IEEE Transactions on Robotics or on Multimedia
- MIT Press
- Machine Vision and Applications
- IEEE Trans. on Pattern Analysis and Machine Intelligence Int.
- Journal on Computer Vision
- ACM Journal on Computers and Cultural Heritage
- International Journal of Haptics (currently being launched)
- Other Special Issues on Haptics (CG&A, etc.)

In order to disseminate results to a very wide audience a contribution to public sites in the World Wide Web (e.g. <http://www.presence-research.org> and <http://www.haptics-e.org>), with online papers is planned. In case of outstanding research results the consortium will try to approach the general public by writing press releases and offering results to the radio, TV, or written press.

## 2.4 Presence Research Cluster

IMMERSENCE is deeply enrooted in the evolving European Presence research community, thanks to its participation in the Coordination Action PEACH. As one of the activity leaders of PEACH, the IMMERSENCE coordinator TUM is closely collaborating with all running presence IPs (in particular with PRESENCIA) and a large number of research organisations specialising in this domain. The main task of TUM consists in coordinating a working group, which will produce a map of the Presence research landscape for a better understanding of the actual deficiencies in communication and collaboration. The overall objective of the activity is to enhance the interdisciplinary work within the European community and beyond. Besides, TUM will present IMMERSENCE at all conferences, workshops, trade fairs and summer schools related to PEACH.

In addition to that, the coordinator of the IP PRESENCIA, UPC, is also an IMMERSENCE contractor, providing valuable knowledge for the evaluation of the IMMERSENCE demonstrators.

## 2.5 Internal Dissemination

The dissemination of confidential information within the consortium is organized via the **Internal** section of the website which is not accessible for the public. It provides access to the IMMERSENCE ftp-server where documents not intended to be public can be up- and downloaded. In addition, three IMMERSENCE mailing lists have been created:

- List for the core research team
- List for the managing board of the consortium (administrative core)
- List for dissemination of information to all scientists and students directly involved in the project

Besides, a list for dissemination addressing the evolving Immersence community (interested researchers, journalists, other project or network coordinators, etc.) is to be prepared.

### 3. Dissemination Activities per Contractor

#### 3.1 TUM

Expected results include a deeper understanding in collaborative human machine interaction as well as the measurement and evaluation of artificially generated presence. We aim at interdisciplinary research results combining our engineering and psychological expertise leading to theoretical results (e.g. modelling frameworks, design specifications) and to real applications (demonstrator scenarios).

TUM is involved in the development of all three demonstrator scenarios. We will host the P2P demonstrator and provide hard- and software for the other demonstrators, POP and P2O, as well. Furthermore, we collaborate with the psychophysical-oriented institutes to come up with new methods to measure and evaluate presence-generating systems, especially for collaborative actions. We have special interest in methods that can be executed in real-time.

Potential users of our results cover a broad scope from psychological and engineering research institutes dealing with cognitive systems to industrial manufacturers who employ human machine interfaces to support their employees.

Planned attendance to conferences in order to present work accomplished within IMMERSENCE:

- CCA/CACSD/ISIC, Munich, Germany
- WorldHaptics 2007, Tsukuba, Japan
- Eurohaptics 2008, Madrid, Spain
- IST 2006, Helsinki, Finland

Planned publications of results achieved within IMMERSENCE:

- IEEE journals on control and robotics
- Canadian Journal of Experimental Psychology
- Perception and psychophysics
- Presence

#### 3.2 ETH

The expected result is a new paradigm for haptic interaction based on recordings instead of explicit physical models - analogous to image based rendering. Simultaneously, we are working on the creation of a 3D model of shapes, while objects are being manipulated, including high quality surface texture. The idea is to optimally combine the agility of human object handling with fast shape and texture capture. The proposed haptic method would be an alternative to traditional separate visual and haptic modeling. Both components are to be combined not only during rendering, but also during acquisition. As to the haptic rendering, some transient effects during object contact might be simpler to reproduce via recordings.

There is no specific group of end-users. Any haptics application could benefit from the proposed approach, thus any user of haptic technology could be a potential end-user. Similarly, the 3D object modeling approach has multiple applications, and mainly where complete object models are required. The planned system will provide visual feedback about object completeness during the scanning operation.

As to the potential exploitation of the result, applications requiring a faithful reproduction of the multi-modal perception of objects are to benefit most, as in virtual and augmented reality. These in turn have multiple application domains.

Talks at which the project and/ or work accomplished within IMMERSENCE has been presented:

- Talk in Helsinki VR and industrial animations seminar at University of Art and Design (15 May 2006)

Planned attendance to conferences in order to present work accomplished within IMMERSSENCE:

- EuroHaptics
- Haptics Symposium
- WorldHaptics
- IEEE VR
- IEEE Conference on Computer Vision and Pattern Recognition
- European Conference on Computer Vision (ECCV)
- International Conference on Computer Vision (ICCV)
- 3-D Digital Imaging and Modeling (3DIM)
- International Symposium on 3D Data Processing (3DPVT)

Planned publications of results achieved within IMMERSSENCE:

- Machine Vision and Applications
- IEEE Trans. on Pattern Analysis and Machine Intelligence Int.
- Journal on Computer Vision
- ACM Journal on Computers and Cultural Heritage
- International Journal of Haptics (currently being launched)
- ACM Transactions on Applied Perception
- Other Special Issues on Haptics (CG&A, etc.)

### **3.3 LSC**

For the nearer future, the expected results are:

- A better bandwidth of the interpenetrated network conductive polymers
- Preliminary results on haptic augmented reality concepts
- Planning of contact-support for virtual avatars
- Multi-body dynamics computation with static friction
- The premises of the POP/A demonstrator through the AMELIF framework

The potential end-users of the result are PhD students, researchers, engineers in the field of VE and presence technologies as well as industries applying realistic prototyping with virtual manikins

Talks at which the project and/ or work accomplished within IMMERSSENCE has been presented:

- Invited talk at LIRMM (CNRS)
- Invited talk at SICE2006 meeting at AIST, Tsukuba, Japan

Conferences at which papers presenting work conducted within IMMERSSENCE have been submitted:

- EuroHaptics 2006
- IEEE/RSJ IROS 2006
- IEEE ROBIO 2006
- IEEE Humanoids 2006

### **3.4 MPS-T**

The results which we expect to achieve aim at the investigation of the interaction of different sensory modalities. Our research interest is to show the advantages of combined visual and haptic access in higher level tasks, the interaction of tactile and kinesthetic information, and the identification of the limits of multimodal integration mechanism in human perception as well as the deeper understanding of how spatial discrepancies affect the integration of visual and tactile signals.

The results of our research can be beneficial for developers of haptic and tactile devices, multimodal interfaces and teleoperation devices which can be used for instance for training of medical staff.

The outcome of our research might contribute to the development of multimodal virtual environments, in particular with regard to spatial alignment of multisensory scenes. Insight in the basic principles of multimodal interaction can be used to develop more efficient and effective tactile/haptic and teleoperation devices which are able to generate adequate stimulation in different virtual and real scenarios.

Talks at which the project and/ or work accomplished within IMMERSENCE has been presented:

- EUROHAPTICS 2006 Conference, Paris, France
- Human Brain Mapping Conference, 2006, Florence, Italy

Conferences at which papers presenting work conducted within IMMERSENCE have been submitted:

- Conference paper at the EUROHAPTICS 2006 Conference, Paris, France
- Poster presentation at the EUROHAPTICS 2006 Conference, Paris, France
- Poster presentation at the Annual Meeting of the Vision Science Society, 2006, Sarasota, USA
- Poster presentation at the meeting of the International Multisensory Research Forum, 2006, Dublin, Ireland
- Poster presentation at the Tuebinger Wahrnehmungskonferenz, 2006, Tuebingen, Germany

Planned attendance to conferences in order to present work accomplished within IMMERSENCE:

- EUROHAPTICS 2007
- Annual Meeting of the Vision Science Society, 2007
- International Multisensory Research Forum, 2007
- Tübinger Wahrnehmungskonferenz, 2007

Planned publications of results achieved within IMMERSENCE:

- Special issue entitled "New Directions in Touch" to appear in the Canadian Journal of Experimental Psychology
- Perception and psychophysics
- Vision Research
- Presence
- Journal of Vision
- Neuron

### **3.5 TECH**

Expected results include: 1. a preliminary correlational function of force-feedback patterns during haptic interaction, and interpretation -- haptic semantics. 2. response time when judgement of properties of objects needed to be decided: such as in deciding whether an object is extremely rough, medium rough or smooth, when the environment provides multiple visuo-haptic cues. 3. test the role of subliminal haptics -- find out whether this at all exists.

Potential end-users of the result: designers of virtual worlds, for both person to object contact, person to person contact, and collaborative manipulation and fine haptic collaboration; designers of telepresence, and telemanipulation environments.

The Potential exploitation lies in understanding perception and designing virtual technologies and sensory manipulators based on the perceptual system of the users.

Talks at which the project and/ or work accomplished within IMMERSENCE has been presented:

- The 4th VR symposium on Virtual Reality, Associated Technologies and Rehabilitation, Haifa University, June 22-25 Haifa Israel. Invited keynote: "If you touch is it really there -- the illusion of the mind's hand" Miriam Reiner
- The Neuroscience Conference -- Eilat 5th December 2005: "Haptic Perception". Miriam Reiner, David Hecht, Gady Halevy, Lariska Dikovskiy

- In addition we presented Immersence in several colloquia and departmental seminars.

Conferences at which papers presenting work conducted within IMMERSENCE have been submitted:

- Eurohaptics 2006 : Semantic inference and Facilitation of haptic perception Miriam Reiner, David Hecht, gad Halevy, Moran Furman (best paper award)

Planned attendance to conferences in order to present work accomplished within IMMERSENCE:

- Presence 2007
- Eurohaptics 2007/World Haptic Symposium 2007

Planned publications of results achieved within IMMERSENCE:

- Presence
- Cyberpsychology
- Perception & Psychophysics

### **3.6 UBIRM**

UBIRM will investigate fundamental aspects of haptic perception and visuo-haptic integration that are involved in manual tasks following scenarios defined within IMMERSENCE. Individual (PO) and collaborative (POP) manual tasks such as object displacement will be investigated with the emphasis on weight perception and integration of information exchanged between vision and touch during the task. In addition, we intend to measure physiological reactions during manipulation of real and virtual objects in order to identify emotional aspects that occur during manipulation of real and virtual objects. This research will offer insights into bridging the presence gap between reality and virtual reality.

The beneficiaries of the research will be the scientific and engineering partners within IMMERSENCE, as well as the global scientific community through publications in national and international scientific journals.

The results from UBIRM research could be exploited in two ways. First, to provide the IMMERSENCE engineering partners with valuable human data necessary to develop more convincing haptic interfaces. Second, to provide experimental data that could provoke further research by the wider scientific community.

Planned attendance to conferences in order to present work accomplished within IMMERSENCE:

- WorldHaptics 2007 (Japan)
- Eurohaptics 2008 (Madrid)

Planned publications of results achieved within IMMERSENCE:

- Perception & Psychophysics
- Experimental Brain Research

### **3.7 UPC**

The main objective of our research is to provide a reliable evaluation method based on qualitative and quantitative data collected during and after the use of multimodal interactive systems that are to be designed during the project. Pre and post event questionnaires, physiological monitoring, behavioural data and other measurement methods will be explored. Researchers in the haptic field would use an evaluation method for their devices and the interactive systems they are studying. Haptic designers and control programmers could use the Immersence solutions for testing and tuning the hardware, during design and prototyping phases.

It is too early to have submitted any papers at this time but the intention is to present work in the main conferences and journals related haptic, interactive systems and human factors.

Planned attendance to conferences in order to present work accomplished within IMMERSENCE:

- IEEE VR 2007
- VRST 2007
- Haptic Symposium
- Eurohaptics
- SIGGRAPH

Planned publications of results achieved within IMMERSENCE:

- Presence: Teleoperators and Virtual Environments
- ACM Transactions on Computer-Human Interaction
- ACM TAP
- IEEE Transaction on Robotics or on Multimedia

### **3.8 UNIFI**

UNIFI's research is oriented towards different topics:

We intend to pursue our studies in the basic mechanisms of touch, starting from the neurophysiology of skin receptors to the psychophysics of tactile perception and its functional mappings in the brain. We want to further our studies in the supramodal correlation among the cortical representations of similar stimuli (objects) through the visual and haptic perceptual channels. Methods will involve the functional imaging of the cortex area involved in the sensorimotor process of adapting grasp and manipulation of objects.

To investigate on the supramodality paradigm we will implement in tactile form a few optical illusions based on optic flow. We will perform several psychophysical tests to assess and validate this hypothesis. We will investigate also on tactile flow illusions in fMRI environments(WP2).

Using this knowledge, we will investigate the problem of the contact between operator hand and real objects and virtual models (P2O), including such features as tendinous actuation distributed and differentiated sensor apparatus, etc. and will compare these results with experiments on subjects. In this scenario we will use for example wearable sensing gloves, directly printed on fabric (WP3). In particular the glove will be used for hand posture and gesture monitoring.

Another goal is to design unconventional haptic interfaces. In particular we will investigate on small-sized displays: multifinger CASR based on tactile flow principle, displays based on magnetorheological fluids, able to simulate the rheology of virtual objects by acting on both shape and softness and stimulating kinesthetic and cutaneous channels of fingerpads (WP3).

We will propose a new controlled microstimulation prototype and we will perform test on its RM compatibility. We will take into account the optimization of electrical parameters for the measurement (sensibility, voltage, frequency) and position of electrode on the hand, the design of the feedback circuit for our microstimulation device (WP3).

The obtained results could be used to achieve a basic knowledge of tactile system and finally to realize innovative haptic prototype devices, able to mimic in more realistic mode, the human perception.

The potential end-users of the results include:

- Surgeons-in-training
- Visually handicapped persons
- Medical and technological researchers

The potential end-users of final results will be various medical and technological researchers. They will use these results as starting points for further investigations in mechanism of touch and to develop innovative haptic displays e.g. in surgical training in open surgery and in minimally invasive surgery, teleoperation and aid to blind persons. A contribution study in interactions P2O-P2P could be achieved.

Talks at which the project and/ or work accomplished within IMMERSENCE has been presented:

- Invited lecture “Esplorazione funzionale del cervello nella percezione del mondo esterno: l'organizzazione sopramodale delle vie corticali “visive”, Neurologic Clinic Hospital Sant'Agostino - Estense di Modena, April 21, 2006.
- Invited lecture “Seeing With One's Hands: Supramodal Organization of the “Visual” Extrastriate Cortex” Institute of Neuroradiology, University of Zurich, Zurich, Switzerland, April 26, 2006.
- Invited lecture E. Ricciardi. “Vedere con le mani: organizzazione sopramodale della corteccia “visiva” extrastriata”. XV Clinical Physiology meeting. CNR Research Area, Pisa, May 24, 2006.

Conference at which papers presenting work conducted within IMMERSENCE have been submitted:

- E. Ricciardi, L. Sani, C. Gentili, D. Bonino, N. Vanello, J.V. Haxby, E. Seifritz, M. Guazzelli, L. Landini, A. Bicchi, F. Di Salle, P. Pietrini. Brain response to visual, tactile and auditory flow in sighted and blind individuals supports a supramodal functional organization in hMT+ complex. Presented at the 12th International Conference on Functional Mapping of Human Brain Mapping, June 11-15, 2006, Florence, Italy. Available on CD-Rom in NeuroImage, 31 (Suppl 1), 512 TH-PM.

### 3.9 UPM

The main results are focused on the development of a multi-finger haptic interface and modelling of haptic force interaction by multi-body equations. Both results are complementary, since the haptic interface reflects the forces calculated by the haptic model equations, and the equations are updated from data provided by the haptic interface.

The multi-finger haptic interface will be a powerful device for manipulating remote or virtual objects. It has been designed in order to identify the hand posture and reflect forces according to it. The goals are to obtain a device with a broad bandwidth range and as light as possible.

Potential end-users of the result: The first use of the multi-finger haptic device will be the scenarios of Immersence project. P2O and POP are the most suitable demos for using this system.

This device can also be used by researchers on haptics in order to advance in the study of haptic interactions. Gloves and exoeskeletons devices could be replaced by this new device in some applications. Main advantages will be the transparency of this new interface.

The potential exploitation is related to new applications about remote or virtual manipulation. Applications such as telerobotics, virtual reality can benefit from this new multi-finger haptic device. New haptic experience like exploration of real/virtual surfaces or collaborative manipulation can be done.

The first promotion will be done by Universidad Politécnica de Madrid. Our university organizes many exhibition events focused on promoting technologies developed in our departments. In a similar way, the Spanish government promote many actions to spread activities research: *Jornadas de puertas abiertas de la UPM (UPM open door sessions)* -*Semana de la Ciencia en Madrid (Week of Science in Madrid)* -*Jornadas de Automática de CEA-IFAC (Conference on Automatic Control by CEA-IFAC)*. Our department plays an important role in the above mentioned activities where Immersence can be properly promoted.

This project will be also presented in other international scenarios where UPM researchers usually participate, such as EURON (European Robots Network) and the LatinoAmerican Network on Automatic Control (supported by Spanish, Portuguese and many Latin-American governments)

Planned attendance to conferences in order to present work accomplished within IMMERSENCE:

Conferences on haptics, presence, robotics and control are very suitable to disseminate this work. The main dissemination activity will be the EuroHaptics 2008 which will be organized by UPM. Other conferences such as IEEE Robotics and Automation, and IEEE Intelligent Robots and Systems have some sessions where the activities research can properly shown.

Planned publications of results achieved within IMMERSSENCE:

IEEE journals on control and robotics are the well known and suitable journals for publishing this research. There are also other prestigious journals such as Presence of MIT Press or Journals of Robotics where is also planned to disseminate these results.