ISTRC Annual Call for Research 2021-2022 (תשפ"ב)

The Israeli Smart Transportation Research Center

Call publication: January 3, 2022

Registration note: March 1, 2022

Final submission: March 15, 2022

Background

The Israeli Smart Transportation Research Center (ISTRC) at the Technion, in collaboration with Bar-Ilan University, was jointly established in 2020 by the Smart Mobility Initiative of the Israel Prime Minister's Office and the Council for Higher Education. Our mission is to enhance research, development, and entrepreneurship in the field of smart mobility in Israel.

Smart transportation, which is interdisciplinary by nature, requires collaboration between researchers and developers from a range of fields, departments, and institutions, as well as ongoing discourse between experts and decision makers from academia and the industry.

ISTRC makes great efforts to connect between academic communities, R&D experts, and stakeholders – to initiate, promote, and leverage interdisciplinary and intersectoral research activities that will contribute to smart, efficient, and green transportation, while positioning Israel as a world leader in the field.

The ISTRC started its activity in 2020 and this is its Second Annual Call for Research. The first call was issued in 2021, following an initial call dedicated to transportation and COVID-19.

For more information, please visit the ISTRC website.

ISTRC Vision

Our vision to achieve **Zero Transportation Externalities** serves as a core value for all ISTRC activities and is comprised of the following three dimensions:

- **Zero casualties:** Generating a safe and resilient system that will optimally respond to safety and security failures, while considering all road users (e.g., mixed traffic, non-motorized and new modes of transportation, and automatic and manual vehicles); striving towards zero fatalities and serious injuries through cutting-edge technologies and mechanisms in the fields of automation and connectivity.

- **Zero delays:** Creating an efficient and equitable transportation system that ensures optimal levels of service, tailored to the mobility needs of the entire population and with no delays. The system must be based on transit-oriented development, environmentally friendly land use, and mobility as a service – optimally reflecting the inherent opportunities of motorized and non-motorized transport modes, as well as public and shared transportation, with various levels of automation.
- **Zero environmental harm:** Preventing all types of environmental externalities, including emission and noise, by developing, adopting, and conserving clean and renewable energy, while promoting sustainable transport modes and behavior.

The ISTRC collaborates with a large range of academic and research institutions in Israel to promote cutting edge research and insights and empower and develop human capital in the field.

Knowledge-gap research workshops were conducted by ISTRC's nine professional committees, in relation to all major fields in the smart transportation domain. Each committee is chaired by a senior researcher from an academic institution in Israel, and its members include experts from academia, the industry, and the public sector. Following these workshops, a list of recommended research topics was devised, as seen in Appendix A.

Objectives of this call

Our aim is to enable the joining of forces as means for developing new insights towards achieving the "**Zero Transportation Externalities**" vision, by:

- Promoting multidisciplinary research, in which diverse areas of expertise or perspectives provide added value

- Enhancing research that is collaborative, inter-institutional, or inter-sectorial (academia, the industry, the public sectors, NGOs, and international)

- Conducting theoretical and applicable research that leads to practical implementations

Research Topics

While we welcome any topic that contributes to the Zero Transportation Externalities vision, the list of themes in Appendix A represents the topics that were recommended by our professional committees.

Funding scope and duration

In total, the ISTRC will allocate up to 2,500,000 NIS for all research studies through this call.

Each research grant will be allocated up to 250,000-500,000 NIS, provided over a maximum duration of 36 months.

Eligibility criteria

- The applicant (Principal Investigator, PI) must be a faculty member in an academic institution in Israel (universities and colleges).

- A PI may have only one active ISTRC research grant at any given time. This means that he\she can only submit a new proposal as a PI, if his/her current research grant period is scheduled to end no later than September 2022.

- A researcher can be involved (either as PI or Co-PI) in maximum two projects at any given time:

    - If he/she has no active projects that continue beyond September 2022, he/she can be involved in two proposal.
    - If he/she has a project that continues beyond September 2022, he/she can submit only one proposal for this call.
    - If he/she has two projects that continue beyond September 2022, he/she is not eligible to be involved in a proposal in this call.

Application procedure

Registration notes must be submitted by **March 1st, 2022.**

The registration submission must include all of the following: topic, name of the PI and other researchers and partners, all titles, e-mail addresses, names of academic institution and department / research center, relevant research keywords, overall requested budget, and research duration.
Click here for the Registration Note.

Complete applications must be submitted by March 15, 2022, through this Easychair link.

The full application must include the following:

1. **1st page** summary**:** Research title; Name of principal investigator and institution; Names of all Co-PIs and their affiliated organizations; keywords; a short abstract (up to 200 words); research topic or topic number from Appendix A.

2. **Research Proposal**: Background, goals, methodology, research plan, cooperation with industrial company/public sector/international institution (highly recommended – see point 4 below), including the role of the non-academic partner and the impact of the research on the "zero transport externalities" vision.

Research proposals must be written in English, Times New Roman 12-point font size, 1.5 line spacing, not exceeding 12 pages in total. This page limit does not include references, which can appear in additional pages as needed.

3. **Short CV of all researchers:** CVs must be written in English, Times New Roman 12-point font size, 1.5 line spacing, not exceeding 3 pages per CV.

4. **Collaborations are highly recommended**: with at least one non-academic partner from the industry /public sector / NGO as well as with an additional academic institution /international collaboration. Any intended collaboration should be specified in the submission and agreed-upon by all relevant parties involved, in writing. Such collaboration memorandum, should include agreements as for the knowledge contribution, shared budget, expected IP and the ownership thereof and any related matters. The collaboration memorandum, should be provided together with the research proposal. Collaboration with Non-academic partners should also emphasize any relevant provision made by such partners (i.e. data / infrastructure / consultancy / equipment etc).

5. **Budget plan**
   - The planned budget of 250,000-500,000 NIS must be allocated in line with the research and proposed timeframe.

   - The grant funding cannot be used for paying the salaries of faculty members or researchers in an overseas' institution.

   - In case of collaboration with non-academic partners, specification of any budgets that are to be transferred between the receiver of the grant and the non-academic partner must be specified in the original submission, including funding provided by the non-academic partner.

   - The budget plan must include institutional overhead and VAT if required (i.e., these must be included in the maximum grant amount mentioned above.)

   - The detailed budget must be aligned with the ISTRC Budget Policy specified in Appendix B.

6. **Additional grant requests/approvals for a similar topic**: in this case, a detailed statement must be submitted specifying the differences between the proposal submitted for this call and the status of the other similar proposals.

7. **Approval and signatures:** Applications must be signed by the PI's affiliated Research Authority before being submitted by **March 15, 2022.**

Submissions must include all these above-mentioned items. Incomplete applications or applications received after the deadline will not be reviewed.

Following the submission of an application, the PI may be asked to provide additional details and clarifications regarding the proposed during the evaluation stage of the application.

Proposal assessment

Eligible proposals will be reviewed by a Review Committee established by ISTRC, comprised of at least five faculty members from at least five different institutes in Israel. Each proposal will be assessed by two-three experts from Israel or abroad, at the discretion of the Assessment Committee.

Assessment criteria:

1. **Relevance** to smart transportation research infrastructure, contributes to the ISTRC's vision of "Zero Transportation Externalities" – This is a threshold criterion.

2. **Innovation**, the extent to which the proposed research advances state-of-the-art concepts and/or demonstrates creativity, originality, or potentially transformative concepts.

3. **Overall quality** that clearly presents the clarity and pertinence of the objectives, soundness, and credibility of the proposed methodology.

4. **Collaborative research** for delivering added value to smart transportation through interdisciplinary / inter-institutional / international / inter-sectoral collaborations. Meaningful types of collaborations are an advantage.

5. **Meaningful potential impact level** on the smart transportation domain, from both an academic and a practical point-of-view, including technology transfer; holds the potential for achieving further funding from additional sources (such as Horizon).

6. **Feasibility** of the proposal implementation plan, including infrastructure availability and data that meets the research deliverables, within the defined timeframe and budget, as per the research plan (resources / timetable / deliverables).

7. **Qualifications and experience** of the research team members, to successfully conduct the proposed research

Application Information

The information you share in the process of the application will only be used by ISTRC reviewers for the purpose of evaluation of your application.

The title of the proposed research and names of the researchers selected will be published by ISTRC.

To the extent that research proposals include unique knowledge, the applicant undertakes to protect the rights arising from it in a timely manner. ISTRC will not be responsible for this.

ISTRC is working under the terms and conditions of the Council for Higher Education Call.

ISTRC is not and shall not be liable to the content of any research proposal, to the performance of any research that has received funding from the ISTRC and for any implementation or use of the results generated in such research, either by the applicant or by any third party.

Reporting

For applicants who are approved to receive funding from the ISTRC via this call:

- A scientific report, 10-30 pages, must be submitted to ISTRC once a year, throughout the span of the sponsored research.

- The grant will be allocated to the academic institute after receiving an Expenditures Budget Report, signed by the Finance Manager of the PI's affiliated academic institute.

- ISTRC will publish the researchers' names and the topics of the research proposals who are approved for this call, as well as the final scientific report, on the ISTRC website and its related publications.

- All publications generated from the research must include an acknowledgment of the ISTRC funding (see here).

- Selected research reports will be presented by the researchers at the ISTRC workshops or conferences, if requested by ISTRC.

Appendix A
Topics for the ISTRC Annual Call for Research 2021-2022

The following topics have been proposed by the ISTRC professional committee's chairs. Some topics are general, while others are more specific.
Please indicate all relevant topics in your proposed application.

Traffic Management and Control committee

1. Traffic Management and Control (TMC) strategies to optimize the performance of existing infrastructure by maximizing capacity and improving security, safety, and reliability of the transportation system (examples include arterial and network management, traffic signal management, congestion pricing, transit signal priority, real-time traveller information, etc.).

2. Development of traffic signal priority schemes for LRT (light-rail transit) and BRT (bus rapid transit) – systems being introduced in Israel.

3. Optimizing network performance with mixed-traffic volumes, including manually driven vehicles and CAVs (connected and automated vehicles).

Innovative Transportation Services Committee

4. Developing methodologies for implementing Mobility as a Service (MaaS), integrating public transport and new innovative modes (Hyper Loop, drones, etc.) for both passengers and goods.

5. Multi-modal, integrated MaaS: the investigation of a holistic transportation provision considering traditional and innovative modes in an integrative system. The aim is to provide a smooth and easy multi-model connection for all activities taking into consideration modes, parking, information, etc..).

6. City logistics / last-mile distribution: researching measures and tools for decreasing logistics' urban movements. The research scope is distribution modes (conventional, non-powered, autonomous, drones), infrastructures (storage, parking, dedicated lanes), policy, public transport, and MaaS integration.

Policy, Transportation Planning and Smart Cities committee

7. Use of policy tools to create an efficient and enabling road infrastructure system and effective enforcement system.
8. Policy models for the implementation of collaborative transportation, taking into account indicators such as: reducing the use of private vehicles, congestion, accessibility of city center to all residents, economic impact, etc.
9. Development of regulatory mechanisms for the implementation of autonomous transportation while maintaining the safety of passengers and road users.

Road User's behavior committee

10. The effects of smart mobility and emerging travel patterns on general aspects of individuals' daily routine (e.g., time allocation for travel and other activities, physical activity, health, social interactions, mental representation of travel destinations).
11. <u>The effects of smart mobility on time use</u>: Do users of automated, connected, and shared mobility travel less/more time than other users? Are there differences in time allocation or in the timing of departure/arrival? What are the effects on time allocation associated with non-travel activities?
12. <u>The effects of smart mobility on social interactions</u>: might it be the end of community as we know it? Or may it lead to the emergence of a new patterns of social interactions among users of automated, connected and shared mobility users?

Vehicles and Transport Modes committee

13. Last mile solutions.
14. Alternative energy/propulsion technologies.
15. Innovative on-vehicle integration methods/approaches, including innovative hardware approaches and associated algorithms.

Mobility Safety and Security committee

16. Using artificial intelligence to build proactive defense methodology against cyber-attacks, threats, and new vulnerabilities.
17. Using artificial intelligence to improve the connection between the smart transport usage and the diverse world of urban infrastructure and smart cities, and to examine it through many different levels to identify new problems and predict potential solutions.
18. Studying the safety challenges and technological solutions for AV systems, in their interactions with various transport environments, vulnerable road users, etc.

Big Data and Data Analytics committee

19. Applications of <u>novel</u> data mining techniques in transportation domain (preferably through a cooperation between a data scientist and a transport domain expert)
20. Identification of various "near accident" situations, based on image processing, and their association with the probability of actual accidents
21. Exploring the potential of machine learning for promoting equity in public transport, and particularly by fusing various data sources

Connectivity and Automation committee

22. Low-cost Super resolution and unified (e.g., unified camera and LiDAR sensor and Joint radar-communication) sensing for autonomous and consumer autonomy
23. AI-aware sensing: Sensors designed and optimized to provide data that is processed by AI system
24. Innovative methods for vehicles-negotiation at complex scenarios

Models and Algorithms committee

25. Distributed Algorithms for Massive Traffic Management
26. Optimization for Shared Mobility and Public Transportation

Cross-domains topics

27. Cross domain perspective to the provision of new mobility services for passengers and goods and foster their benefits for users.
28. "Just Transition" solutions to ensure the transition towards a climate-neutral economy happens in a fair way ensuring inclusive mobility and goods access for all.
29. Shifting design and development from a driver-centered to mobility-user oriented approach.

30. Any topic contributing to achieving the Vision of Zero Transportation Externalities.

Appendix B

ISTRC budget policy

מדיניות השימוש בתקציב המחקר של המרכז הישראלי למחקר בתחבורה חכמה

התנהלות המחקר

1. מענק המחקר מיועד **למחקר** שיתבצע בישראל על ידי החוקר[1] אשר אושר לו המענק.

2. המחקר יבוצע בתיאום עם רשות המחקר בו מועסק החוקר כחבר סגל.

3. תכנית המחקר נשפטה וזכתה על פי המתכונת שהוגשה בהצעה כולל הרכב קבוצת החוקרים. בהתאם לכך:

   - המענק ניתן לחוקר הראשי, רשום על שמו ומחייב את שיתופו במהלך כל תקופת מימון המחקר.

   - לא ניתן להקפיא את המענק או להעבירו לחוקר אחר (מכל סיבה: שבתון, חל"ת, פרישה וכד') לתקופה העולה על מחצית תקופת המחקר.

   - כל שינוי במעמד החוקר הראשי ובזכאותו להגיש או לנהל מחקרים יישלח בדואר אלקטרוני , סמוך למועד השינוי אל המרכז הישראלי למחקר בתחבורה חכמה (להלן: המרכז), (istrc@technion.ac.il)

   - חוקר ראשי היוצא לשבתון/חל"ת חייב ליידע את הנהלת המרכז על תאריכי היציאה והחזרה, ולאשר שיוכל לנהל את המחקר גם בתקופת השבתון/חל"ת. אם מסיבה כלשהי לא יוכל לנהל את המחקר בתקופה זו, עליו למנות ממלא מקום ולקבל אישור.

   - חוקר ראשי העובר ממוסד למוסד זכאי להעביר את המענק למוסד החדש. האחריות על העברת יתרות וקיזוזים חלה על שני המוסדות הנוגעים בדבר.

   - חוקרים משניים, שנכללו בהרכב קבוצת החוקרים בהצעה שהוגשה ונבחרה, מחויבים להיות שותפים במחקר (לא כולל סטודנטים). כל שינוי בהרכב קבוצת החוקרים יישלח אל המרכז בכתב ויאושר על ידיו.

4. כל שינוי בכותרת המחקר ובתוכנית המחקר יישלח אל המרכז בכתב ויאושר על ידיו.

5. המרכז רשאי להקטין את סכום המענק או להפסיק את תמיכתו במחקר במקרה של הפרת אחד מהסעיפים הנ"ל.

התקציב

1. מענק המחקר לא יכלול תשלום שכר לחברי הסגל הבכיר.

2. הסכום שהוקצה למימון המחקר מיועד עבור סעיפי התקציב שנכללו בהצעת המחקר כפי שהוגשה ואושרה.

3. כל הוצאה שאינה מוזכרת בהצעת התקציב המקורית מחייבת את אישור המרכז מראש.

4. ניתן לבצע העברת סכומים <u>בין סעיפי תקציב</u> בהיקף של עד 10% מסך התקציב. מעל 10% ההעברה מותנית באישור המרכז .

5. הוצאות נסיעה / השתתפות בכנסים –

5.1 חוקרים או אנשי צוות מחקר אינם רשאים לכלול הוצאות נסיעה/השתתפות בכנסים ו/או השתלמויות בארץ ובחו"ל.

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[1] המסמך מנוסח בלשון זכר מטעמי נוחות בלבד ומיועד לגברים ונשים גם יחד.

5.2 ניתן לכלול בהצעת התקציב נסיעות של תלמידי מחקר לתארים גבוהים ומשתלמים בתר-דוקטורים, העובדים בפרויקט וממומנים מתקציב המענק, לצורך השתתפותם בכינוסים או השתלמויות מדעיות בנושא הקשור במישרין למחקר הנדון, זאת במטרה לאפשר יצירת קשרים עתידים לצורך התפתחותם האקדמית. אין לכלול בסעיף זה נסיעות לצורך רכישת מיומנות/הכשרה בסיסית (יחד עם זאת, המרכז ממליץ לסטודנטים להגיש בקשות להשתתפות בכנסים באמצעות הקול הקורא הייעודי לכך המתפרסם פעמיים בשנה).

6. הוצאות אירוח - המענק אינו מיועד למימון הוצאות אירוח כלשהן. לרבות הוצאות נסיעה ושהייה של אורחים מחו"ל בישראל.

7. מחשבים וציוד מחשוב - במסגרת המענק יאושרו לכל היותר מחשב נייח אחד ומחשב נייד או טבלט לכל חוקר ראשי.

דוח מדעי

דוח מדעי המסכם את התקדמות המחקר יוגש עד ה-15 בספטמבר בכל שנת מחקר, בהתאם לפורמט שנשלח לחוקר.

דיווח תקציבי

דוח כספי יוגש לא יאוחר מתאריך 15.9 בכל שנת מחקר. הדיווח יכלול את מלוא ההוצאות בפועל במהלך המחקר ויהיה חתום על ידי מנהל הכספים של המוסד בו מתנהל המחקר. כל סטייה משמעותית מחלוקת התקציב המקורית תנומק בנפרד.