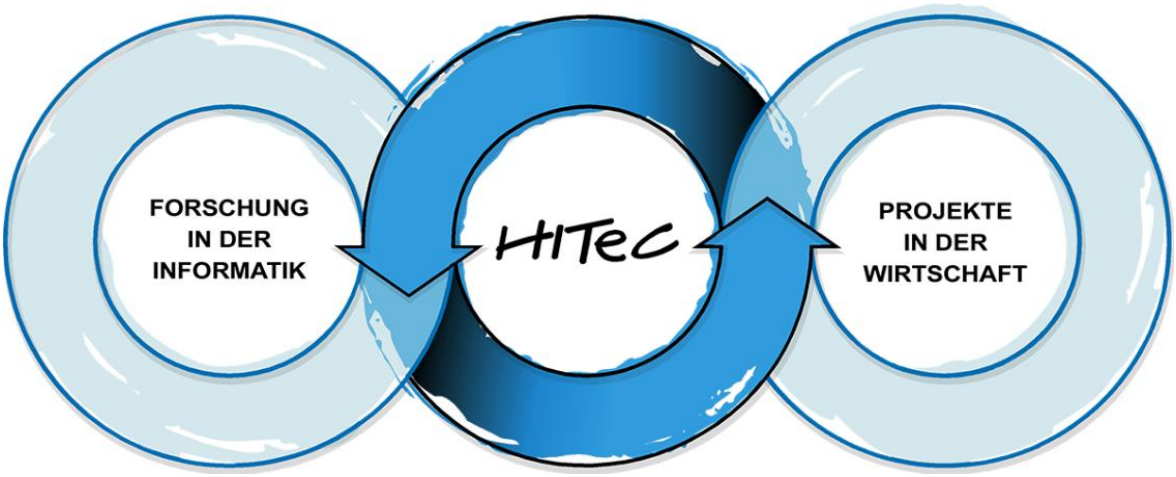
HAMBURGER INFORMATIK TECHNOLOGIE-CENTER



HITeC Annual Report 2024

HITeC e.V. – an initiative of the Department of Computer Science of the Faculty of Mathematics, Informatics, and Natural Sciences at the University of Hamburg

Universität Hamburg
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Hamburger Informatik Technologie-Center, HITeC e.V.

Hamburger Informatics Technology-Center, HITeC e.V.

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1. OVERVIEW

HITeC is the research and technology transfer center of the Department of Computer Science at the University of Hamburg. Due to its independent status, HITeC offers flexible and professional cooperation opportunities. HITeC solutions are based on the latest research results and provide advantages through innovative technologies.

HITeC is a registered, non-profit association supported by members of the Department of Computer Science at the University of Hamburg. The association is linked to the University of Hamburg by an agreement.

HITeC sees its main tasks in the field of technology transfer for the Department of Computer Science at the University of Hamburg in the:

- Conducting application-oriented research projects
- Disseminating application-oriented research results
- Holding seminars and workshops
- Arranging contacts between companies and students
- Improving practice-oriented education at the university
- Supporting start-ups from the university
- Training students, including through collaboration in cooperation projects.

In 2024, the University of Hamburg, the Hamburg Chamber of Commerce and four supporting members – companies and institutions – supported HITeC.

The number of active personal members of HITeC is more than 50 people.

The project volume of HITeC in 2024 amounted to approx. 4.6 million euros.

HITeC conducts application-oriented research in the general field of computer science and research in the field of technology transfer. In contrast to basic research, application-oriented research is concerned with scientific computer science research, the results of which can be used directly in practice. On the one hand, the results of basic research are incorporated into collaborative projects; on the other hand, however, research on applications also gives rise to new questions for basic research, which provide further inspiration for the latter. This is a method also known as action research, in which scientists go into concrete, real-life situations in order to gain insights for further basic research. And this return to basic research (which essentially takes place at university) is a very important part of application-oriented research at HITeC, in order to enrich this basic research in a completely new way so that it can later find better application-relevant results for practice. Another method used at HITeC is

design science, which looks at problem solving in real application-oriented settings through the development of artifacts such as prototypes or concepts.

Application-oriented research at HITeC thus takes up the results of basic research at the Department of Computer Science and explores their possible applications in special application projects, usually with partners.

In addition to conducting application-oriented research projects, HITeC carries out activities for the University of Hamburg (UHH) and the Department of Computer Science in particular:

- Supporting the development of technology transfer at UHH (e.g. the transfer agency) and also in other departments by participating in internal workshops and meetings.
- Participation, networking and representation of technology transfer in the field of information and communication sciences at events of actors from public administration (e.g. Urban Data Hub) and business, including the Chamber of Commerce, Chamber of Crafts, Digital Logistic Hub as well as close cooperation with other associations (e.g. the Artificial Intelligence Center e.V. (ARIC)) and universities (e.g. Helmut Schmidt University (HSU, Hafencity University (HCU), Nordakademie, University of Applied Sciences (HAW)).
- Provision of computing capacity from HITeC (e.g. GPU server for AI applications) for students at the University of Hamburg for the preparation of Bachelor's and Master's theses.

Some selected projects and activities in 2024:

- Projects in the field of cheminformatics, which examine the development of active ingredients and drugs in pharmaceutical research.
- Projects in the area of optimization and monitoring:
  - Performance monitoring for data-intensive software
  - Code optimization for memory hierarchies
- Several projects in the field of application of artificial intelligence methods:
  - Analysis of images, videos and streams for the creation of situation and action descriptions (e.g. in sports, including actions in training, traffic and landscape overflights) and the retrieval of media content,
  - new methods for explainable AI,
  - Planning systems for the stacking of goods using reinforcement learning.
- Projects in the area of platform development:
  - Co-development of a platform for the resilience of economic ecosystems,
  - Co-development of a platform for the generation of synthetic data,

    - Design of a platform for urban production and local value creation networks,
    - Coordination of a European Digital Innovation Hub, for the targeted support of small and medium-sized enterprises, start-ups and public administration,
    - Start of the development of a platform for the support of building modernization,
    - Co-development of a platform for the support of rescue forces in the event of severe weather using AI methods.
- Several projects in the field of eHumanities aimed at the dissemination, collection, presentation and long-term archiving of cultural objects, including Portal for philosophical and Hebrew terminology, matriculation portal.
- Several projects in the area of digital transformation and digital literacy:
    - Scientific support for the digital transformation of the re-registration service/electronic residence registration,
    - Exploring AI benefits in organizations and bringing them into use,
    - Long-term collaborations that develop scientific results, in particular data and findings in the areas of AI benefits in organizations and AI solutions for local public transport through collaboration with several individual partners.
- Other smaller projects:
    - with companies and research institutions from the Hamburg region and internationally,
    - with schools to teach software development methods at an early stage.
- Participation in a working group of the start-up initiatives of all Hamburg universities as well as cooperation with ahoi.digital, Innovations Kontaktstelle Hamburg (IKS), ARIC and the Hub for Computing and Data Science at the University of Hamburg (HCDS).

Publications by HITeC are listed on the university websites of the respective professors and project members. An overview of project activities can be found at https://hitec-hamburg.de.

2. HITEC PROJECTS

The following sections provide a brief overview of the projects being worked on in 2024. This is preceded by a summary of the activities in the respective project area. HITeC focuses on sub-areas of computer science with project areas that stand out due to special activities at HITeC, including in the form of cooperation projects. In addition to the projects listed, there were a large number of smaller activities that are not mentioned here.

2.1 IS – INTELLIGENT SYSTEMS PROJECT AREA

The project area “Intelligent Systems” (IS) emerged from the “Laboratory for Artificial Intelligence”, in which innovative methods of artificial intelligence have been developed and applied in cooperation with companies since its foundation in 1988. IS's work is characterized by an approach that is both scientifically sound and oriented towards practical goals. The wealth of experience ranges from expert systems, configuration and diagnosis, monitoring and event recognition to machine learning (including deep learning, reinforcement learning and clustering methods), big data, knowledge discovery, image processing (low-level and high-level techniques of image understanding) and other current topics in artificial intelligence. IS offers the preparation of studies as well as prototype developments in direct cooperation with companies. In addition, IS is often a partner in funded projects, especially in regional programs as well as in federal and EU funding programs.

Management of the Project Area

- Lothar Hotz

2.1.1 3S – Schul-Support-Service for Hamburg Schools

The Schul-Support service was a collaboration between HITeC e.V., the Department of Computer Science at the University of Hamburg, and the Hamburger Behörde für Schule und Berufsbildung (BSB), which ran until March 31, 2025. 125 schools were supported in 2024, including 11,992 Windows clients, 7,550 Apple devices and 147 servers. Around 35 staff employees worked on optimizing school IT systems and researched on innovative solutions for digital learning environments.

Key developments included software distribution via the City of Hamburg's network, the evaluation of tools and implementation of ITIL processes, as well as the development of reusable software solutions for IT administration. Additionally, standardized OS images were created to enable fast and error-free device installation.

The project was part of the applied information technology research field and focused on IT and operational security in the school environment. Its goals were to establish sustainable IT structures for Hamburg schools, ensure a standardized setup across client devices, and enable the effective use of technology in classrooms. Standardized OS images, software distribution and regular changes ensured timely updates of operating systems and educational software. At the same time, students received practical training and innovative research projects on (semi-) automated administration and maintenance were carried out with a focus on scalable IT infrastructures and security mechanisms.

Cooperation Partners

- Behörde für Schule und Berufsbildung
- Universität Hamburg
- Hochschule für Angewandte Wissenschaften

Project Management

- Wiebke Frauen

Link

- https://www.3s-hamburg.de

2.1.2 Digitalpakt

The project "Administration structure for IT end devices from the DigitalPakt" ("Administrationsstruktur für IT-Endgeräte aus dem DigitalPakt") aimed to establish a central support structure for schools and optimize the maintenance and administration of IT devices. Launched in 2020 due to the Covid-19 pandemic, the project was intended to enable digital and remote learning at Hamburg schools. The Schul-Support-Service was responsible for developing technical solutions and setting up and managing the devices at the participating schools. The scientific method of Action Design Research was applied to continuously improve the support structures. By the end of the project on December 31, 2024, a total of 121 schools with 13,704 devices had been successfully supported in setup and maintenance.

In 2024, the focus was on further developing a USB stick-based solution for data protection-compliant wiping of devices that were to be quickly passed on. Additionally, the 3S-Software-Kiosk offering for teachers was expanded to allow self-service software installation. Other tasks included adapting loaner devices for use in schools after the pandemic, further developing of the in-house Call4Help tool for direct ticket creation, and resolving technical issues with iPads (e.g., AirDrop, AirPlay, storage limitations). Remote support for iPads and troubleshooting set-up issues caused by SCEP server errors were also offered.

The project „Administrationsstruktur für IT-Endgeräte aus dem DigitalPakt" belongs to the research field of applied information technology and deals with the optimization of IT infrastructures in the school environment. The emphasis lies on developing efficient support and maintenance structures, as well as integrating data protection-compliant solutions to support digital education.

Cooperation Partners

- Behörde für Schule und Berufsbildung

- Universität Hamburg

Project Management

- Wiebke Frauen

Link

- https://www.3s-hamburg.de/

2.1.3 aiSpecTo – Intelligent inspection system

The aim of the aiSpecTo project which finished in March 2024 was to develop an intelligent inspection system for flying over production pipelines. Pipelines are considered critical infrastructure and are therefore subject to a special inspection obligation. The use of artificial intelligence (AI) and unmanned aerial vehicles (UAVs) in remote sensing can reduce costs, streamline inspections and enable dangerous situations to be identified at an early stage.

In 2024, the work of HITeC focused in particular on the following topics:

In the final months of the project, the focus was on testing, integrating and validating the overall system developed with test flight data to detect potential hazards along a pipeline.

By flying the test section alone, it was not possible to record sufficient training data for all object classes. The performance of the object detection was validated after the training data was enriched with synthetically generated image data.

The idea for the project was developed as part of the innovation network MOWAI - mobility with artificial intelligence, which is funded by the Central Innovation Program for SMEs (ZIM) of the Federal Ministry of Economics and Climate Protection (BMWK).

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Cooperation Partners

- AeroDCS GmbH
- Speenlab GmbH
- Digpro Technologies AB Schweden

Project Management

- Stephanie von Riegen

Link

- https://www.mowai.net/projekte/aispecto

2.1.4 Digital, Urban Production – Digitalization of Local Value Networks

In this project, which was completed in December 2024 a new form of local furniture production has been established in the Hamburg metropolitan region, which focuses on local production by local craftsmen of individualized, globally developed products. A platform will provide support from the product development phase through to production and delivery via an end-to-end digital value creation process.

As a cooperation partner, HITeC provided scientific implementation advice and the development of proof of concepts for the platform. Joint working sessions are held in which results and work processes are reflected upon, expert feedback is provided and advice is given on platform development.

In 2024, in addition to implementation advice, the focus was on the further development of a planner that uses the partial work steps of the local craftsmen to find all possible work plans for a product. HITeC also provided support and advice on the architecture of the overall system and on agile development methods for the platform. In addition, prototypical work was carried out on a chatbot that dealt with the topic of platform use for operators based on user stories written for platform development. Another prototype development project focused on the classification of furniture based on image and text data. This is intended to identify similar furniture in the platform in order to be able to address producers more specifically for the production of this furniture, for example.

The project is funded by the Bundeswehr Centre for Digitalization and Technology Research (DTEC.bw).

Cooperation Partners

- Helmut-Schmidt-Universität Hamburg
- Unity AG
- P&M Agentur Software und Consulting GmbH

Project Management

- Stephanie von Riegen

Link

- https://dtecbw.de/home/forschung/hsu/projekt-urbane-produktion, https://productionnextdoor.de

2.1.5 TRESOR – Trustee Platform for Secure and Privacy-Protected Collection, Storage and Mediation of Mobile Device Data

The collection of data on mobile devices and with whom it is shared by app providers, for example, is hardly comprehensible to users these days. The value of data has also increased considerably in recent years, but the data providers' control over their data has not.

Over the last three years, the TRESOR project has developed a data trust model to reconcile the conflicting interests of mobile device users and data users. This was made possible by the cryptographically secured and privacy-protecting collection of data through a data escrow app and an associated central and data-saving escrow component.

The focus of HITeC in 2024 was the further development of a governance structure for data trustees. Possible administrative templates, such as terms of use and regulations, were identified and drafted. A gamification approach was developed and integrated into the data trust app. The overall concept of Tresor was presented to potential data users in a series of interviews and further aspects for possible further developments and areas of application were identified. In addition, the overall system, backend and app were tested and evaluated in a user study with students from the University of Hamburg.

The project has been funded by the Federal Ministry of Education and Research since March 2022 as part of Digital Change in Education, Science and Research.

Cooperation Partners

- Universität Hamburg
- Umlaut Solutions GmbH now Accenture Dienstleistungen GmbH

Project Management

- Stephanie von Riegen

Link

- https://tresor-projekt.de

2.1.6 EDIH4UrbanSAVE – EDIH for Urban Interconnected Supply and Value Ecosystems Hamburg

The EDIH4UrbanSAVE project, funded by the EU and the City of Hamburg, is a European Digital Innovation Hub (EDIH) with a focus on the Hamburg metropolitan region. With the help of the EDIH, the EU wants to support small and medium-sized enterprises and

start-ups (SMEs) as well as public authorities (PSOs) in responding to digital challenges and becoming more competitive.

In 2024, the particular focus was on providing services, i.e. formats for SMEs, PSOs and start-ups. Workshops, training sessions, consultations and surveys were held on the topics of further training, "test before invest", financing and funding advice and networking. In particular, the "Use Case Development" and "Joint Proof of Concept" services from the "Test before Invest" area and training workshops on the topics of AI and cyber security were carried out at HITeC.

The year 2024 in the project was also characterized by the ongoing development of a so-called Research Computing Infrastructure (RCI). This SLURM cluster system with CPU and GPU servers is available to EDIH customers for the secure execution of computationally intensive experiments. This cluster was extended by additional nodes. In addition, an application for typical AI use cases was developed to make it easier for RCI users to get started with the experiments. Surveys were developed and conducted on the services offered.

EDIH4UrbanSAVE is funded by the EU as part of the Digital Europe program and by the Hamburgische Investitions- und Förderbank (IFB Hamburg).

Cooperation Partners

- Technische Universität Hamburg
- Hochschule für angewandte Wissenschaften
- Handwerkskammer Hamburg
- Digital Hub Logistics
- Artificial Intelligence Center Hamburg (ARIC)

Project Management

- Stephanie von Riegen

Link

- https://edih-hamburg.de

2.1.7 AKIDU – Automatic, AI-integrated scheduling for universal terminals

Through improved digitalisation and the use of AI, the research project AKIDU aims to increase the competitiveness of German seaports through significant system enhancements for the storage and handling of non-standard cargo.

During the reporting period, HITeC installed and aligned the selected cameras at the measurement station, which were provided by project partner Unikai. This was

followed by elaborate attempts to calibrate all cameras extrinsically. For that purpose, Whycon-markers up to a size of 2.5 x 2.5 metres were attached to the edges of the station. The markers should be usable from a distance of up to 10m despite the low camera resolution. Finally, large polystyrene spheres were used for calibration.

At the request of project partner Unikai, tests were also carried out with passive RFID tags to identify and locate goods on the terminal site. Although these could be read across several vehicle widths when attached to car screens, they could not be clearly localised. When applied to narrowly parked lorries, they could not even be read reliably. A concept was also developed for using RFID tags to track the movements of MAFI trailers. Furthermore semantic segmentation was performed on drone images using various AI methods.

Akidu is funded by the Federal Ministry for Digital and Transport Affairs as part of IHATEC (Innovative Port Technologies).

Cooperation Partners

- akquinet port consulting GmbH (apc)
- Unikai Lagerei- und Speditionsgesellschaft mbH

Project Management

- Rainer Herzog

Link

- https://www.innovativehafentechnologien.de/staatssekretaerin-henkel-ueberreicht-ihatec-ii-foerderbescheide/

2.1.8 KIOptiPack – AI application hub for plastic packaging - sustainable circular economy through artificial intelligence

The KIOptiPack research project aims to use AI to optimize plastic packaging with recycled content. Together with the partner project K3I-Cycling, which serves the AI-supported optimisation of the recycling of plastic packaging, the projects form the 'AI Application Hub Plastic Packaging Sustainable Circular Economy through Artificial Intelligence', in which the circular economy, which has so far only been rudimentary, is to be optimised through a more sustainable design of the plastic packaging value chain. AI methods from design and production through to reprocessing to close the loop are to be tested in specific use cases and put into practice.

In addition to organising and conducting further AI workshops for the project partners, the focus of HITeC's activities in 2024 was on further developing the requirements for

a demonstrator to showcase the recyclability of plastic packaging. True recyclability is only achieved when the recyclate from the end consumer's packaging waste can be reused to a large extent in the production of new packaging. After a number of approaches proved to be impractical, HITeC is pursuing a demonstrator approach based on a Large Language Model (LLM), which can provide useful and comprehensible answers in natural language to questions formulated in natural language by packaging producers and developers on the basis of well-founded sources.

The project is funded by the Federal Ministry of Education and Research.

Cooperation Partners

- Artificial Intelligence Center Hamburg (ARIC)
- And approx. 40 other partners (see link)

Project Management

- Rainer Herzog

Link

- https://www.ivv.fraunhofer.de/de/presseinformationen/bmbf-foerdermasssnahme-ki-anwendungshub-kunststoffverpackungen.html

2.1.9 PESHAT – Portal for Philosophical and Hebrew Terminology

Up until Spring 2016, HITeC helped transfer an existing web application for philosophical and scientific Hebrew terminology over to the content-repository application “MyCoRe”. By means of this transfer, a permanent application was created, aimed to last throughout the project term of “PESHAT in context” and beyond.

At the end of 2019, the German Research Foundation (DFG) extended for the “PESHAT in Context” project another three years after an extensive review. In collaboration with HITeC, a number of improvements and extensions were planned, especially in the area of Digital Humanities, which were implemented by the end of 2022. At the end of 2022, the "PESHAT" project was extended by the DFG for a further, final project phase, which will run until the end of 2025.

In 2024, the works of Jakob Klatzkin were integrated into the system – in parallel with the integration of the works of Gerrit Bos, which had already been completed in 2023. In this context, the system developed in 2023 for the integration of internal and external data was improved, and PESHAT was expanded to include new data from Klatzkin's works. Additionally, in 2024, PESHAT's internal data model and data structure were adapted. This now makes it possible to model the so-called lemmas –

the core component of research within the PESHAT project – in such a way that they can consist both of compositions (with other lemmas) and of cross-categorical constructions (also involving other lemmas). These complex structures can now be marked, entered, edited by the editors, and appropriately visualized for users of the website.

The HITeC staff acted as interdisciplinary mediators in close cooperation with all participating scientists, provided assistance on practical and theoretical questions of informatics and helped to promote standardized data exchange using machine-processable formats between the portals and resources.

Cooperation Partner

- Institute for Jewish Philosophy and Religion at the Universität Hamburg

Project Management

- Pascal Rost

Link

- https://www.peshat.org/

2.1.10 Hamburg Professor Catalogue (HPK) – Integration of Geodata into the HPK and Extension of the Editor Workflow

Commissioned by the Arbeitsstelle für Universitätsgeschichte (department for the history of the Universität Hamburg), this project produced a comprehensive catalog of former professors at the Universität Hamburg (HPK) and made accessible to the public via a website. The HPK covers a period from 1919 to the present day and, in addition to a multifaceted search function, also provides an efficient content management system for editors of the catalog. The application was implemented using the content repository system "MyCoRe" and was based on the professor's catalogue of the Universität Rostock.

After the website was published in January 2017, the application was taken over by the Archive of the Universität Hamburg for further editorial support and continuation. In the middle of 2020, the responsible persons of the HPK approached us to discuss a number of enhancements for the catalog. In joint work, concepts were developed on how the desired improvements and new functions could be integrated into the existing application in a technically and graphically meaningful way. As a result, this new, cooperative project emerged.

The focus of the extension of the HPK in the course of this project is the integration of standardized geodata (concretely: geo-coordinates or geo-identification numbers) into the existing data stock as well as the presentation of the same on the website. For this purpose, the workflows of the editors of the portal are to be adapted and the corresponding editor functionalities are to be extended so that the geodata relating to different stations in the life of the professors can be found and entered easily and precisely. In order to relieve the editors, standardized geodata from external sources will be automatically collected and added to the existing data stock based on the already existing location information. This data will then be used to display the stations in life of the professors in an interactive and dynamic world map specially developed for this application.

The project was started in the spring of 2021 and, in addition to the extensive maintenance work in the course of a major version update, the basic functionalities for the automatic enrichment of the existing data with standardized geo-identification numbers were implemented during the course of the year. Originally, it was planned to use the geo-identification numbers of the portal "GOV" (Place Database of the Association for Computerized Genealogy). However, in the third quarter of 2021 it was decided to work with the data of the portal Portals "Wikidata" instead. Likewise, at the end of the year 2021, a prototype for an interactive world map was implemented, in which the professors of the HPK can be displayed with the help of the geodata. The release of the new features in the HPK was completed in May 2024. Since then, HITeC has been supporting the project partners through continuous bug fixes and maintenance work.

Cooperation Partner

- Universitätsarchiv Hamburg

Project Management

- Pascal Rost

Link

- https://www.hpk.uni-hamburg.de/

2.1.11 Smart Tech-Tics – Development of a Smart Diagnostic System for Technical-tactical Analysis for Soccer Goalkeepers

The goal of the "Smart Tech-Tics" project, which is set to run until the first quarter of 2025, is to develop a novel diagnostic system for the training of football goalkeepers. This system should capture the tactical behavior of the goalkeeper in real-time

(positioning and timing) while simultaneously analyzing information on relevant movement techniques (basic position, running paths, jumping techniques) of the goalkeeper. The movement techniques of the goalkeeper should be recorded using body-worn sensors, with a combination of inertial and pressure sensors planned. The location and timing information of the ball and other field players should be calculated from a video stream using machine learning techniques that are synchronized with the sensor data. An AR and VR analysis software to be developed should provide comprehensive technical and tactical evaluations to the trainer.

In the 2024 project year, the prototype developed in 2023 for calculating the 2D and 3D coordinates of the goalkeeper, the shooters, and the ball was further improved and tested in several sessions on a sports field near HITeC in Stellingen. The hardware setup was expanded with a high-performance Wi-Fi router, tripod systems, and a portable mini-PC equipped with a powerful GPU to enable on-site execution of machine learning models. In close collaboration with all project partners, two comprehensive measurement sessions were conducted in June and December. Additionally, the estimation of the goalkeeper's knee angle was investigated using appropriate estimation techniques. Due to the insolvency of a project partner, the HITeC team took over additional tasks in the area of ball analysis, including the determination of ball speed, 3D coordinates, and shot timing.

The R&D cooperation project is funded by the "Central Innovation Program for SMEs" (ZIM) of the German Federal Ministry of Economics and Climate Protection (BMWK).

Cooperation Partners

- GeBioM Gesellschaft für Biomechanik Münster mbH
- Westfälische Wilhelms-Universität Münster
- iotis GmbH

Project Management

- Pascal Rost

Link

- https://www.portalderwirtschaft.de/pressemitteilung/366848/durch-live-analyse-zum-super-torwart.html

2.1.12 MUGI – Music and Gender on the Internet – Restoration of Multimedia Presentations

The internet portal MUGI is an online encyclopedia of the Hamburg University of Music and Performing Arts (HfMT) that has existed since 2003 and deals with research

questions in the field of musicological gender studies and makes them publicly accessible. Due to an increasing lack of maintainability, MUGI could only be hosted in a "frozen", i.e. static, state since April 2019 and was at risk of being taken offline in the near future. Over 17 years of research work would then have been lost.

In the period from 2020 to 2021, the MUGI internet portal and the existing research data were secured for the long term in collaboration with HITeC and transferred to a maintenance-friendly web framework based on the repository web framework "MyCoRe". In addition to the encyclopedia entries, which include very detailed biographies, the research results of the MUGI portal also include various multimedia presentations by different authors in various formats, some of which are no longer supported (for example "Flash" and "RealPlayer"). The preservation and partial restoration of these presentations could not be carried out during the project period at the time; instead, corresponding theoretical action plans were drawn up in which possible different preservation methods were explored and tested.

During the "MUGI – Restoration of Multimedia Presentations" project, which was launched and successfully completed in 2023, the theoretical concepts for action were put into practice and 22 of the original 23 multimedia presentations were preserved, restored and partially modernized so that they can be called up and played back or viewed and used in modern web browsers.

The restored multimedia presentations were made accessible to the public again in June 2024, after having been thoroughly reviewed and tested, among others, by the original authors.

Cooperation Partner

- HfMT Hamburg, Redaktion MUGI

Project Management

- Pascal Rost

Link

- https://mugi.hfmt-hamburg.de/

2.1.13 VeriKAS – Verification of Learning AI Applications in the Aviation Sector

The overall goal of VeriKAS is to develop proposals for certification processes of neural AI methods and to demonstrate the feasibility and usefulness of these proposals. All methods will be demonstrated using two use cases: emergency landing site selection of a drone and anomaly detection in aircraft interiors. In VeriKAS, HITeC focuses in

particular on black-box testing and collaborates with the University of Hamburg on methods to explain reinforcement learning. From early 2024, the research focus shifted towards Deep Metric Learning as a promising approach for data quality analysis and intelligent test set generation. Therefore, in 2024, both supervised and unsupervised Deep Metric Learning methods have been evaluated towards these goals. A novel clustering method CI-DBSCAN has been developed for data analysis and test set generation.

Together with all partners, work also continued on using all findings in a certification process. To this end, the necessary documents for a certification process were developed iteratively over the course of the year and at the end of the project, documents were produced for both use cases. The project was funded by the Federal Ministry of Economics and Climate Protection (BMWK) as part of the aviation research program and ended at the end of the year.

Cooperation Partners

- Center for Applied Aeronautics Research, Hamburg
- Hs2 Engineering, Ulm
- Knowledge Technology, Department of Computer Science, Universität Hamburg

Project Management

- Sven Magg

2.1.14 Digital Curri – Digital Condition Monitoring and Maintenance Recommendations for Tire Heating Presses for Economic and Ecological Optimization

In collaboration with HITeC, Harburg-Freudenberger Maschinenbau GmbH (HF Group) is carrying out a project to develop an intelligently networked monitoring and diagnostics module for the condition-based real-time monitoring of highly productive manufacturing systems in the tire industry, in order to identify and measure ecological and economic savings potential. The project aims to increase machine performance and availability, ensure quality and reduce energy consumption. The work of HITeC in this project includes research and development of AI models for the prediction of cycle times, the prediction of energy consumption, and the prediction of possible errors based on those.

In 2024, methods to generate data sets for training from the cloud system have been developed, but due to a lack of data within the system, the work shifted towards data from a different customer at the end of the year. Digital Curri is funded by the Hamburg

Investment and Development Bank (IFB Hamburg) as part of the "Program for Innovation" (PROFI).

Cooperation Partners

- Harburg-Freudenberger Maschinenbau GmbH (HF Group), Harburg

Project Management

- Sven Magg

2.1.15 EWIVIKIS – Development of an Intelligent Heat Cabin as a Tool for Measuring and Improving Vitality based on an AI Recommendation System

Since July 2022, HITeC has been working together with Clearlight Saunas Europe GmbH (Clearlight) and the Ilmenau University of Technology (TU Ilmenau) in a research capacity on the sub-project "Classification and prediction using federated machine learning" as part of the "EWIVIKIS" project.

The goal of the project was the development of an intelligent thermal cabin. The use and application conditions of a new generation of heat cabins, as well as a new evaluation and prediction system to be developed, are to were also researched. Health and vital parameters are to be were recorded and measured during the heat application by means of suitable measuring sensors, considering external influences.

In 2024, before the end of the project, HITeC focused mostly on data analysis from the users study that started in 2023 and the combination of these data with the study carried out in Ilmenau under lab conditions and derived general guidelines that could be drawn from the combined data.

The “Central Innovation Program for SMEs” (ZIM) of the German Federal Ministry of Economics and Climate Protection (BMWK) funds the R&D cooperation project.

Cooperation Partners

- Clearlight Saunas Europe GmbH
- Technischen Universität Ilmenau

Project Management

- Tayfun Alpay

2.1.16 EVASST – Development of a Value Stream Simulation Tool for the Process Industry

The innovation project "Development of a Value Stream Simulation Tool for the Process Industry – EVASST" aims to create an automated, parameterized simulation model of the customer's value stream network, spanning from raw materials to goods delivery. This model, derived from real data, will allow for rapid assessment of the effects of desired or potential changes without necessitating alterations to the actual production process.

For this purpose, an image of the customer's value stream (production & logistics) is determined as a simulation model by an iterative optimization procedure of the model parameters, which can then be used by the customer for the simulation of various scenarios. The simulation model created and optimized in this way represents the customer's production network running in reality with all its behavioral characteristics. In 2024, HITeC finalized the prototype of the evolutionary optimizer that could optimally arrange production orders. Through knowledge transfer through regular discussion meetings with the partners, the partners were also able to develop a suite of optimizers for a variety of problems in this domain. The project ended successfully in 2024 and was funded by the Hamburgische Investitions- und Förderbank (IFB Hamburg) within the framework of the "Program[s] for Innovation" (PROFI).

Cooperation Partner

- Data Lighthouse GmbH, Hamburg

Project Management

- Sven Magg

2.1.17 RESCUE-MATE – Dynamic Situation Awareness and Support for Emergency Services in Complex Crisis Situations

Since October 2023, HITeC has been one of 25 partners involved in the research and development project "Dynamic Situation Awareness and Support for Emergency Services in Complex Crisis Situations (RESCUE-MATE)".

The goal of the RESCUE-MATE project is to develop an artificial intelligence (AI)-based system to effectively support emergency responders during complex crises. It aims to continuously integrate real-time data to create a dynamic situation overview, enabling emergency responders to quickly orient themselves and assess situations during emergencies. The central scenario for this project is a potential flood in Hamburg.

HITeC's sub-project, "Homogeneous Data Structures and Hybrid AI Methods for Enhancing BOS (Public Safety Authorities) Situation Awareness," focuses on the intelligent processing and preparation of various available data streams. Key research areas include data integration for social media (vocabularies/ontologies), event detection from social media and TETRA radio transcriptions, classification of sensor data, and scene interpretation from images and videos. All information should flow into a unified, dynamic situation picture.

After analyzing use cases and requirements in 2023, the main focus in 2024 was the development of prototypes. HITeC successfully developed initial AI prototypes for detecting individuals in emergency situations, particularly for the primary use case "person in water". Additionally, a master's thesis by Zeynep Seda Birinci was completed, focusing on an LLM-based approach for scene interpretation. The unique aspect of this approach was its "OpenVocabulary" interpretation of input data, recognizing objects and especially object interactions without relying on pre-trained object classes or interactions, instead leveraging LLM in natural language without prior data annotation.

The RESCUE-MATE research and development project is funded by the Federal Ministry of Education and Research (BMBF) as part of the "Research for Civil Security" program.

Cooperation Partners

- Universität Hamburg – Fachbereich Informatik
- Absolute Software GmbH
- Artificial Intelligence Center Hamburg (ARIC) e. V. (assoziiert)
- Freie und Hansestadt Hamburg – Behörde für Inneres und Sport
- Bundesanstalt Technisches Hilfswerk (THW)
- BRH/Rettungshundestaffel Hamburg und Harburg e.V (assoziiert)
- Deutsches Rotes Kreuz (assoziiert)
- Deutsche Telekom AG (assoziiert)
- DLRG LV Hamburg e.V. (assoziiert)
- EuroCommand GmbH
- Freiwillige Feuerwehr Pinneberg (assoziiert)
- HafenCity Universität Hamburg – Professur Digital City Science
- Hamburg Aviation (assoziiert)
- Hamburg Port Authority AöR
- Hanseatic Aviation Solutions GmbH
- Hochschule für Angewandte Wissenschaften Hamburg

- Innovations-Kontaktstelle (assoziiert)
- Landesbetrieb Geoinformation und Vermessung (assoziiert)
- Landesbetrieb Straßen, Brücken und Gewässer (LSBG)
- Lufthansa Industry Solutions AS GmbH (assoziiert)
- LV Hamburg e.V. (assoziiert)
- NMS new mobility solutions GmbH (assoziiert)
- Stadtreinigung Hamburg (assoziiert)
- UAM-InnoRegion-SH (assoziiert)

Project Management

- Tayfun Alpay (formerly), Daniel Speck, Ricardo Usbeck

Link

- https://www.rescue-mate.de/

2.1.18 ISEAD – Intelligent Sea Animal Detection

From 2022 to 2024, HITeC collaborated as a technology partner with the Institut für Angewandte Ökosystemforschung GmbH (IfAÖ) on the research and development project ISEAD ("Intelligent Sea Animal Detection").

ISEAD is focused on the automated detection of seabirds and marine mammals in aerial imagery and video recordings. The goal is to significantly accelerate the labor-intensive manual analysis of large image datasets typically required for environmental monitoring, particularly related to offshore wind farms, by employing artificial intelligence.

During the project duration – and particularly in 2024 – HITeC developed and trained deep-learning pipelines. Two image-based pipelines were created: one identifies objects using bounding boxes, and the other operates using segmentation methods (pixel-level accuracy). Additionally, a video-based pipeline was developed, focusing on recognizing temporal sequences and tracking objects. Contextual metadata – such as sea conditions or sun positioning - was systematically evaluated and integrated into the analysis. A particular focus was placed on significantly reducing false-negative detections, i.e., objects missing in object discovery. The developed models were integrated into a containerized reference implementation equipped with a REST API, a demo mode, and automated testing. This reference software was successfully deployed in a pilot operation at IfAÖ. Furthermore, a scalable GPU infrastructure was established, supporting continuous training workflows aimed at the ongoing improvement of the models.

ISEAD was funded by the Hamburgische Investitions- und Förderbank (IFB Hamburg) under the innovation program “KI-Flugsysteme”.

Cooperation Partner

- IfAÖ Institut für Angewandte Ökosystemforschung GmbH (www.ifaoe.de)

Project Management

- Tayfun Alpay (formerly), Daniel Speck

2.1.19 SeaSV – CSV-Based Merging and Filtering of AI Detection Results from the "ISEAD" Research Project for Aerial Marine Surveys

In 2024, HITeC worked as a technology partner alongside the IfAÖ (Institut für Angewandte Ökosystemforschung GmbH) on the SeaSV research and development project. The term "SeaSV" is a play on "CSV", referencing the CSV-based outputs of the prior ISEAD research project, and highlights the processing of CSV-based detections of seabirds and marine mammals.

SeaSV is the direct follow-up project to ISEAD. It develops Python-based tools designed to merge detection results generated by the ISEAD AI from aerial image sequences and filter them according to defined quality criteria. At the core of the project is an automated process for merging multiple individual CSV files into a single consolidated dataset per flight.

HITeC developed the script architecture, modeled console and file interfaces, and provided a reproducible Anaconda environment. The developed "track-merging" algorithm identifies and uniquely assigns objects observed across multiple images within a flight sequence. Pixel coordinates from individual images are converted into global coordinates corresponding to the overall survey. A subsequent plausibility check filters out detections, such as those appearing in fewer than N consecutive images or covering an insufficiently large image area. All functionalities are secured with unit and integration tests. An additional AI processes and stores visual characteristics of each detected object to enhance object recognition rates during tracking and track merging.

The project was commissioned and commercially partnered by the IfAÖ (Institut für Angewandte Ökosystemforschung GmbH).

Cooperation Partner

- IfAÖ Institut für Angewandte Ökosystemforschung GmbH (www.ifaoe.de)

Project Management

- Daniel Speck

2.1.20 AuRo – Autonomous Wheelchair with Maneuvering and Navigation Assistance Based on Robotics Research

The AuRo project was launched in the fourth quarter of 2024 and aims to support (severely) disabled individuals in their daily lives through the development of an autonomous wheelchair. This initiative includes the technical implementation of specific use cases, such as autonomously passing through narrow spaces (e.g., doors), similar to the autonomous parking assistance systems used in motor vehicles. The implementation utilizes sensors, robotic control, and simulation technologies to develop intelligent control software.

Additionally, the project aims to develop a potential business model, including identifying a target customer base, devising potential patents, and formulating possible marketing strategies.

The concept behind the AuRo project is led by Jan-Peter Börnsen, a partner associated with HITeC, who has lived with high-level paraplegia since his youth. He conceived the core idea of the project and, together with his team, carried out preliminary work in the areas of wheelchair control and simulation. He will closely collaborate with HITeC during the project to define requirements, drive technological development, and perform validations. Mr. Börnsen also contributes a valuable network of contacts within the wheelchair manufacturing and assistive technology industries.

Since the project began in late 2024, the use cases to be addressed have been formalized, the required hardware specified, an appropriate electric wheelchair prepared, and the implementation of the necessary software for these use cases has already begun. This includes modern collision and obstacle detection, voice control, odometry, and ground plane estimation/removal. Among other things, Lidar and Time-of-Flight (ToF) sensors are being used to generate three-dimensional point clouds, which are processed using classical (algorithmic) methods. The use of modern AI-based methods is in preparation, including the application of reinforcement learning and object detection/classification using R-CNNs.

Cooperation Partner

- Jan-Peter Börnsen (associated)

Project Management

- Pascal Rost

2.1.21 FlameAI – Flame Detection with AI

Together with Detectomat Systems GmbH, a new type of fire sensor is to be developed. The aim of this project is to use AI within an edge device to detect fires more reliably than with conventional sensors. This project started at the end of 2024 and holds several challenges from a research perspective for HITeC: When employing IR sensors, many natural phenomena are almost indistinguishable from fire readings (e.g. sunshine through tree leaves), making the detection difficult. Also, in the end, the system must work on a small, embedded device in real time, severely constraining resources the AI system can use.

Cooperation Partner

- Detectomat Systems GmbH, Ahrensburg

Project Management

- Sven Magg

2.1.22 TURBLESS – Wind and TURBbulence sensorLESS Siting Due-diligence

Selecting the optimal place for Vertiports (drone operating sites) and flying drones safely in urban environments needs accurate wind and turbulence data. Since these data can't be easily collected, usually they are computed from 3D-models using Continuous Fluid Dynamics (CFD) calculations. But these computations are expensive, especially when high resolution is needed. Together with DM-AirTech GmbH, HITeC focuses on several approaches to alleviate these problems. One approach is to combine machine learning with CFD, to speed up calculations and save resources. Another approach is to combine real but very sparse sensor data with CFD calculations to increase the accuracy of the model. The project started the last quarter of 2024 and will be running for two years. The project is funded by the Hamburg Investment and Development Bank (IFB Hamburg) as part of the "Program[s] for Innovation" (PROFI Transfer).

Cooperation Partner

- DM-AirTech GmbH, Hamburg

Project Management

- Sven Magg

2.1.23 KIMM – AI -Supported Modernization of Rental Housing Stock

The KIMM project explores how AI-supported decision-making processes can help reduce barriers and conflicts in the energy-efficient renovation of rental housing. At the core of the research is the question of whether digital interactions – particularly in the application of the *Functional Cost Splitting* (FK) (Funktionales Kostensplitting) method – can surpass traditional consultations in terms of effectiveness and user acceptance.

Originally implemented in Excel, the FK method was reformulated as a *Constraint Satisfaction Problem* (CSP) using the constraint system Screamer in COMMON LISP. The results were equivalent to those from the Excel-based version, demonstrating that the FK model can be formally represented and solved as a CSP. This prototype served as the foundation for a further implementation in Python, which now forms the technical backbone of a planned AI-driven platform.

In addition, an experimental study compares emotional responses and consultation durations between human and AI-based advice to develop user-friendly and widely accepted interaction formats. KIMM brings together expertise from construction, computer science, artificial intelligence, tenancy law, and data protection, making an interdisciplinary contribution to the sustainable modernization of existing residential buildings.

The research work is therefore in the research areas of digital transformation, intelligent systems and human-machine interaction.

Cooperation Partners

- Forschungsstelle für Immobilienrecht (FIR), Universität Bielefeld.
- Hochschule für Angewandte Wissenschaft (HAW) Hamburg.
- Artificial Intelligence Center Hamburg (ARIC)
- HomePal

Project Management

- Daniel Speck (formerly), Ogeigha Koroyin

2.1.24 IntelMOD – Intelligent Modernization Platform Based on Functional Cost Splitting

This project is developing an intelligent, web-based platform that supports energy-efficient modernization in the housing sector while making the economic, ecological, and social impacts of different renovation scenarios transparent. It is designed for landlords, tenants, and property owners alike. The foundation of the platform is the Functional Cost Splitting method—a procedure for the fair and transparent allocation

of renovation costs, developed by Dr.-Ing. Kirsten David at the Research Center for Real Estate Law (FIR) at Bielefeld University. A built-in AI assistant guides users individually through the calculation and documentation process, tailored to the condition of the building and the legal requirements under § 559 of the German Civil Code (BGB).

During the reporting period, HITeC focused on developing a flexible backend to support the Functional Cost Splitting method. The core task was further development of the existing constraint optimization model from the KIMM project in Python using Google OR-Tools. The goal was to create an extensible model structure enabling precise and transparent cost calculations. To integrate with the platform, a RESTful API was implemented using FastAPI, allowing modular and user-friendly communication between the frontend and backend - supporting both manual inputs and automated calculations.

In addition, various approaches to ontology creation, editing, and visualization were explored. Relevant existing ontologies from the fields of construction and law were identified for potential integration into the FK system. A suitable hosting solution for collaborative ontology development was also established.

The research work is in the areas of digital transformation, intelligent systems, human-machine interaction and ontology engineering.

Cooperation Partners

- Forschungsstelle für Immobilienrecht (FIR), Universität Bielefeld.
- Hochschule für Angewandte Wissenschaft (HAW) Hamburg.
- Artificial Intelligence Center Hamburg (ARIC)

Project Management

- Daniel Speck (formerly), Ogeigha Koroyin

Link

- https://www.uni-bielefeld.de/fakultaeten/rechtswissenschaft/forschung/forschungsstellen/fir/intelmod/

2.1.25 GeDoku-KI – AI Support for Risk Assessments

GeDoku-KI is a research and development project conducted by HITeC on behalf of the Verwaltungs-Berufsgenossenschaft (VBG). Based on VBG's software GeDoku, which assists companies in creating risk assessments, the project explores the use of artificial intelligence to provide intelligent assistance within this process.

The project investigates how Large Language Models (LLMs) and semantic embeddings can be used to ease the task for users in formulating company-specific risks and selecting appropriate measures and risk catalogues. For this purpose, an AI module is being developed that seamlessly integrates into the existing GeDoku infrastructure, allowing recommendations to be validated by experts.

HITeC developed a prototype recommendation function that employs vector-based similarity searches to automatically assign free-text inputs to known risk categories. The research focus includes the evaluation and fine-tuning of German-language LLM solutions and the investigation of prompt engineering strategies aimed at reducing hallucinations and effectively leveraging existing information (Retrieval Augmented Generation (RAG) applications).

Cooperation Partner

- Verwaltungs-Berufsgenossenschaft (VBG)

Project Management

- Tayfun Alpay (formerly), Daniel Speck

2.1.26 Chatbot-supported Search for a Rule and Regulation AI

In this project, HITeC is developing a prototype of a chatbot for Jedermann Verlag to improve accessibility to data on occupational health and safety law, consisting of regulations and rules, and to increase its utility value. We are using artificial intelligence to make a large data pool of unstructured documents searchable by enabling the chatbot to answer questions about the content of the documents.

In this context, we are developing an automated pipeline that analyzes HTML documents, extracts relevant metadata and transfers pieces of text to a database. This enables a quick search for information, either through search engines or chatbots. To improve the answering of questions, we integrate a special question-answer model and optimize it with additional specialist texts in the field of occupational health and safety law so that the answers in German are even better.

After successfully testing the basic functions on a small amount of data, we are expanding the system to the entire database. In doing so, we develop additional methods to better handle different document structures, for example through targeted metadata and an extended document search. Through regular tests and continuous improvements, we ensure that the system reliably answers both general and specific questions.

To increase quality, we constantly check the results, remove errors and improve data preparation. The aim is to create a fast, precise and user-friendly platform that provides support when searching for and answering questions on the subject of occupational health and safety law.

Cooperation Partner

- Jedermann Verlag GmbH

Project Management

- Tayfun Alpay (formerly), Daniel Speck

2.1.27 Collaboration with ARIC

HITeC co-founded the Artificial Intelligence Center Hamburg e.V. (ARIC) in September 2019. ARIC's mission is to bring topics from the field of artificial intelligence to business and society. Formats such as networking events, workshops, use case identification and project initiation are developed with HITeC. In the reporting period, HITeC held internal and publicly accessible AI workshops and initiated projects with the support of ARIC.

Cooperation Partner

- Artificial Intelligence Center Hamburg e.V.

Project Management

- Lothar Hotz

2.1.28 AI Workshops

Following requests from project partners and external companies, HITeC has started to offer a series of AI workshops covering the basics of AI and specifically working with neural networks. The workshops cover a wide range of topics, from basic concepts of machine learning to hyperparameter optimization with Bayesian Optimization. After a successful start with a 3-session workshop on image processing with Convolutional Neural Networks (CNNs) and hyperparameter optimization with BOHB, a regular series of five workshops was offered. The workshops will be further improved and also offered as customized workshops for companies.

Project Management

- Sven Magg

2.2 DSL – PROJECT AREA DISTRIBUTED SYSTEMS AND LAB

The "Distributed Systems Lab" (DSL) project area is closely linked to the "Distributed Systems" research area of the Department of Computer Science at UHH; it cooperates with industrial companies that are active in the field of distributed information and communication systems and their applications. Current topics include service-oriented computing, technical support and the organization of operational procedures and processes ("business workflows") as well as the coordination of autonomous and mobile services and processes (including social media) and cloud services. On the application side, the main focus is on technologies for distributed applications (incl. blockchain, for example), cloud and edge computing as well as self-organization ("autonomous computing") or sensor-based systems such as in the area of "smart cities" and the "Internet of Things" (IoT).

Management of the project area

- Winfried Lamersdorf

Link

- https://vsis-www.informatik.uni-hamburg.de/vsys/

2.2.1 Blockchain-Projects

Previous partners for DSL activities in the field of blockchain technology included Ponton and ppi AG. Application-oriented projects were carried out in order to analyse blockchain technologies, test suitable prototype implementations and thus get to know and evaluate the respective advantages and disadvantages of this technology. For example, prototypes of blockchain applications for the insurance industry were designed and realized (together with ppi AG) or in the area of the use of blockchain technology in energy trading (together with Ponton GmbH – "Energy-" or "Gridchain").

In addition, a project funded by the Hamburgische Investitions- und Förderbank (IFB Hamburg) in the "Program for Innovation (PROFI) – PROFI Environmental Transfer Module" together with the company "Lufthansa Industrie Solutions" (LHIND), Hamburg, developed and evaluated new blockchain technologies for the use of logistics applications, including the design and prototypical implementation of an open freight exchange "Future Transport Hamburg" (FTH).

Current Cooperation Partner

- Lufthansa Industrie Solutions (LHIND), Hamburg

Project Management

- Wolf Posdorfer

2.2.2 Smart City Projects

As part of current projects on system software support for smart cities, distributed sensor-based system components are being developed and used (prototypically) for networked applications in the field of intelligent and smart cities. Particular technical challenges include: a large amount of very different data, heterogeneous quality and security requirements as well as various possible uses ranging from commercial or administrative use of the data to direct citizen participation in both the collection and use of the data.

Such issues were the focus of the “Smart Networks for Urban Citizen Participation” (SANE) project, which was carried out as part of the City of Hamburg's “ahoi.digital” digitalization initiative together with partners from both the University and HAW Hamburg. The aim of this project was to open up new opportunities for citizen participation (citizen science/education) by enabling both institutions and individual citizens to provide, disseminate, analyze and share diverse (e.g. environmental) data in an efficient and user-friendly manner.

Technical challenges include the integration of large amounts of data from heterogeneous sensors and devices, the appropriate network-based distributed dissemination, use and analysis of information and, at the same time, ensuring security, resilience, privacy and trust for as many participants as possible. These are crucial at all levels for the acceptance and thus also for the efficient operation and application-oriented use of such a distributed information space and thus represent a unique selling point of the approach pursued here for the technical support of a “smart city”.

The project is due to be completed at the end of 2024 with the two resulting doctorates still to be completed.

Cooperation Partners

- Arbeitsgruppe „Computer Networks“ (NET) as well as „IT-Sicherheit and Sicherheitsmanagement“, FB Informatik, Universität Hamburg (Matthias Fischer et al.)
- Arbeitsgruppe „Distributed Operating Systems“ (DOS), FB Informatik, Universität Hamburg (Janick Edinger et al.)
- Arbeitsgruppe „Internet Technologies“ (inet), HAW Hamburg (Thomas Schmidt et al.)

Project Management

- Winfried Lamersdorf

Link

- https://sane.city

2.3 ITMC – PROJECT AREA IT-MANAGEMENT AND CONSULTING

The ITMC project area works in close cooperation with the corresponding department at the university, which conducts research into service systems engineering and IT management. Current focal points are the transformation of companies with AI, regulatory aspects of digital ecosystems and approaches to continuous service innovation.

Management of the project area

- Tilo Böhmann

Project area Manager

- Paul Drews

Links

- https://www.inf.uni-hamburg.de/inst/ab/itmc/home.html
- https://www.inf.uni-hamburg.de/inst/ab/itmc/research/themes.html

2.3.1 ITMC-Conference – Conference of the ITMC study program

Students on the IT Management and Consulting (ITMC) Master's degree course organize exchange formats between the IT industry, academia and students. These can be, for example, specialist lectures, workshops, panels and networking formats for students, prospective students and alumni of the ITMC degree program.

Project Management

- many students of the ITMC degree program

Link

- https://www.inf.uni-hamburg.de/de/inst/ab/itmc/studies/prospects/conference.html

2.3.2 AI-Org-Explore – Exploring AI Benefits in Organisations – Exploring (Generative) AI and Bringing it into Use in Organisations

The project “Exploring AI benefits in organizations - exploring (generative) AI and putting it to use in organizations (AI-Org-Explore)” is investigating how generative and other AI technologies can be introduced and used in organizations (public and private) to increase their benefits. The aim is to identify potentials, challenges and specific usage scenarios, actively involve employees and managers at an early stage and explore use cases as examples.

A key format here is the Prompt-a-thon®. The Prompt-a-thon® is an interactive training format based on a hack-a-thon, in which participants work collaboratively over a period of time to develop a solution to an idea or challenge. However, instead of writing code or assembling hardware independently, the Prompt-a-thon® is about using Generative AI (e.g. Copilot or ChatGPT for text & programme code, other tools with outstanding quality in specific areas such as MidJourney for images) to get answers that are used to develop a solution. It is a low-threshold offer to introduce people of all levels of expertise to Generative AI. At the same time, its diverse uses make it ideal for serving as a lightweight entry point in the context of pilots or introductions of generative AI in organisations, connecting people and ensuring shared learning. A preliminary introduction brings all participants up to a basic level and creates the necessary knowledge to categorise the use of generative AI (AI literacy). Research data is collected during the Prompt-a-thons®. These serve to analyse the use of generative AI systems in situations in which complex problems are solved. The project is thus assigned to the field of Human-AI Collaboration, especially in team settings. It focuses on the introduction and use of (generative) AI in organisations. In particular, it focuses on the active involvement of employees and managers in the development of practical usage scenarios and the responsible exploration of AI technologies. This contributes to the development of (Gen)AI literacy and in particular also examines the use of modern technologies in everyday (emotional) management.

Prompt-a-thons® can be booked on request, with prices depending on the focus of the requesting organisation.

Cooperation Partner

- Universität Hamburg

Project Management

- Tilo Böhmann, Constantin von Brackel-Schmidt, Emir Kucevic

Selection of References

- Otto Group
- Hermes
- Techniker Krankenkasse
- AMAG Group
- Lebenshilfe Hessen
- TÜV NORD
- HOCHBAHN
- Körber Stiftung
- Wilhelm.tel

- Prosoz
- BPC AG
- IHK
- Hacker School
- Hamburger Verwaltung

Link

- https://prompt-a-thon.eu/

2.4 PROJECT AREA INFORMATION SYSTEMS

The Information Systems project area at HITeC deals with topics at the interface between information technology and business administration. The focus is on topics that can be researched in an application and practice-oriented manner in the sense of design-oriented business informatics. However, a particular concern of the department is not only the implementation of application and practice-oriented research projects, but also the transfer into practice, including the spin-off of companies that transform current research results into marketable products and services. The transfer takes place via the minds involved. Topics and activities in the transfer area include

Business process management and IT support for business processes

- Productivity of services through IT
- Hybrid value creation through product-service systems
- Usability of business management systems
- Development of innovative service apps
- Standardization projects at the German Institute for Standardization

Management of the Project Area

- Markus Nüttgens

2.4.1 ITE – IT-Entrepreneurship

Together with the Hamburg Research Center for Information Systems (HARCIS) at the University of Hamburg, the IT Entrepreneurship course for Bachelor students is offered every summer semester. Topics from the field of IT-based start-up management are dealt with from multiple perspectives. The course run in the summer semester 2024 was dedicated to innovative solutions in the context of sustainability management.

Contents of the course are:

- Economic significance of start-ups for the economy and society
- Basic concepts of start-up management (start-up ABC)
- Methodological approaches to developing and implementing ideas and innovations in IT-based products and services (including design thinking)
- Critical success factors for technology-oriented and knowledge-intensive start-ups (opportunities and risks)
- Forms of financing and investment for company founders and risk/capital providers (investors, business angels, development banks, etc.)
- Process models and best practices for IT-based business start-ups and consolidation (case studies and guest lectures)

- Preparation and evaluation of business plans (business plan competition)
- Presentation of a business idea to an expert jury

This pursues the following objectives:

- Knowledge of the theoretical foundations of IT-oriented start-ups
- Knowledge of the start-up sector from a regional, national and international perspective
- Learning the basics of digital business models and innovations and their implementation in IT-based products and services
- Application of a systematic and scientifically proven procedure for founding and consolidating young IT-oriented companies
- Case study-based creation of a business plan
- Presentation of a business idea in a compact pitch

Cooperation Partners

Participants in the 2024 ITE round included representatives from the following institutions:

- Transferagentur der Universität Hamburg
- Hamburg Innovation
- Hamburger Informatik Technologie-Center e.V.
- TUTECH
- Raakwark Kaptaal
- IFB Hamburg
- Taxdoo
- eBlocker Open Source
- Gründerpersönlichkeiten aus der Metropolregion

Project Management

- Markus Nüttgens

Link

- https://www.bwl.uni-hamburg.de/harcis/03-lehre/bachelor/it-entrepreneurship.html

2.5 INDIVIDUAL PROJECTS

2.5.1 D-WISE – Digital Sociological Discourse Analysis of Knowledge: Multimodal Meaning Analysis in Grounded Theory-guided Research Processes

The BMBF-funded joint project D-WISE (2021–2024) investigated for what purposes, when and how digital humanities methods can be meaningfully integrated into qualitative discourse-analytical knowledge production. The consideration of multimodality and modeling of plurality of meaning were just as central as the epistemological reflection and further development of hermeneutic methodology. In order to address this research need, D-WISE developed new analysis methods for the use of contextualized embedding representations and a comprehensive prototypical working environment, the Digital Analysis Tool Suite (DATS), as a digital support for sociological discourse analyses (WDA).

The work in the D-WISE project was carried out in close co-creation between members of the Computer Science and Empirical Cultural Studies departments at Universität Hamburg. In 2023, the focus was on both the technical implementation and testing of the jointly developed tools in DATS and the dissemination of the knowledge gained in the respective subject areas. Another focus was on preparations for the integration of machine learning components. In future, these should enable an interactive and reciprocal process in DATS in which users interact with machine-generated suggestions. Machine learning will be continuously improved on the basis of their decisions.

DATS will be available as open source software.

Cooperation Partner

- University of Hamburg

Project Management

- Chris Biemann, Gertraud Koch

Link

- https://www.dwise.uni-hamburg.de/
- https://github.com/uhh-lt/dats

2.5.2 DaFne – Data Fusion Generator Platform

The DaFne project focuses on the synthesis of tabular data, as well as the utilization of the developed generation and evaluation algorithms on an intuitively operable platform.

For this purpose, different machine learning models for generating tabular and time-series data have been tested, and metrics for evaluating the synthetic data have been implemented.

A functional prototype was developed for the platform, and the project was successfully completed at the beginning of the year.

Cooperation Partners

- HafenCity Universität Hamburg
- Forschungszentrum L3S (Leibniz Universität Hannover)
- Technische Universität Dresden, Center for Interdisciplinary Digital Sciences (CIDS)
- Sopra Steria SE
- Ströer SE & Co. KGaA

Project Management

- Ulrike Steffens

Link

- https://platform.dafne-project.org/

2.5.3 INSIGHT – INtelligent SynthesIs and Generation of High-quality Test data

The INSIGHT project aims to generate test data for software development. It considers both rule-based techniques for early development phases and ML-based approaches for multimodal synthesis. Additionally, techniques for the intelligent reduction of test data will be explored.

In 2024, the focus was primarily on requirements analysis for different generation methods and the necessary infrastructure. Suitable data has been identified, enabling the development of prototypes in 2025.

Cooperation Partner

- AKARA Solutions GmbH

Project Management

- Ulrike Steffens

2.5.4 RoboCup-AG – Hamburg Bit-Bots

As "Hamburg Bit-Bots", the RoboCup working group has been taking part in the international RoboCup science competition since 2012. The aim of the competition is to drive forward the development of robotics. The aim is to use incremental problems within the RoboCup soccer leagues to ensure that human-like robots can operate at the level of professional soccer players by 2050. The competitions offer opportunities to exchange and compare results and provide incentives for further development. The Hamburg Bit-Bots compete in the Humanoid Kid-Sized League.

They have qualified for the World Championship every year since 2012. The team has also taken part in several GermanOpen in Magdeburg and several IranOpen in Tehran.

Due to the pandemic, the world championship was held via simulation this year. The team achieved third place. The team even took first place in the simulated BrazilOpen tournament.

In addition to its involvement in competitions and science, the team has also become one of the university's figureheads and typically takes part in many public events such as the Day of Knowledge. Due to the pandemic, however, these have unfortunately been canceled this year.

Since 2015, members of the working group have successfully published twelve scientific papers. The fact that the working group is a real “forge of scientists” is also demonstrated by the fact that eight former members are now employed at a university, five of them at the University of Hamburg.

The research focus of the group is on the integration of many complex subsystems in humanoid robotics.

Cooperation Partner

- RoboCup AG „Hamburg Bit-Bots"

Project Management

- Jasper Güldenstein

Link

- https://bit-bots.de/

2.5.5 M-Lab 2024/2025 (Transfer in Teaching)

In the M-Lab learning and innovation project, Bachelor and Master students have the opportunity to develop real, innovative smartphone apps and services in small teams

(max. 5 members) for real customers from industry (practice partners) under deadline pressure and using the latest technologies. Students experience software engineering techniques and methods first hand. In addition, students gain valuable experience in teamwork, project management and communication with customers.

HITeC supports the implementation of the course with a special focus on knowledge and technology transfer. This ensures practical relevance, practical support for the student team and the transferability of the project results.

Cooperation Partners (Practice Partners)

- European XFEL
- Beer Hands
- Hamburger Informatik Technologie-Center
- Transferagentur der Universität Hamburg (UHH)
- VERISE

Project Management

- Walid Maalej, Lothar Hotz

Link

- M-Lab website: https://mast.informatik.uni-hamburg.de/mlab/
- Youtube playlist / Trailer: https://www.youtube.com/playlist?list=PLhVzhgTBKDOBzliTY9qBO_g3t5xIitX-E

2.5.6 CoyPu – Cognitive Economy Intelligence – Platform for the Resilience of Economic Ecosystems

The project "Cognitive Economy Intelligence – Platform for Resilience of Economic Ecosystems" – CoyPu started in June 2021 and ended in November 2024. It is funded in the "Innovation Competition Artificial Intelligence Intelligenz (BMWK)".

The CoyPu project addresses the complex economic challenges in crisis situations with an intelligent platform for integrating, structuring, networking, analyzing and evaluating heterogeneous data from economic value networks.

HITeC's field of activity is the research and development of synergies between knowledge graphs and machine learning methods (hybrid AI). The focus is on natural language processing, especially in the area of event extraction.

In 2024, HITeC successfully completed the project in collaboration with the consortium partners. The regular project duration ended in May 2024, by which time the AI modules developed by HITeC for event deduplication and automatic knowledge

extraction as well as the work on a question-answering module and the CoyPu ontology had been successfully completed. The project extension until November 2024 applied for and approved by the consortium was used by HITeC to further improve developed methods for automatically transferring relational or other structured data into knowledge graphs. In particular, HITeC helped to set up the "Resilience Mesh" during this period - a merger of three projects from the same call for funding to develop a joint data platform.

Cooperation Partners

- Institut für Angewandte Informatik e.V. (INFAI)
- Forschungszentrum L3S, Leibniz Universität Hannover (L3S)
- Leibniz Informationszentrum Technik und Naturwissenschaften (TIB)
- Deutsches Institut für Wirtschaftsforschung (DIW)
- eccenca GmbH
- DATEV eG
- Implisense GmbH
- Siemens AG
- Infineon Technologies AG
- Selbstregulierung Informationswirtschaft e.V. (SRIW)

Project Management

- Ricardo Usbeck

Link

- https://www.coypu.org/

2.5.7 WiBUmo – Scientific Monitoring of the Implementation of the Online Service "Online Re-registration"

The Free and Hanseatic City of Hamburg (FHH) – Senate Chancellery is continuing the eWA – electronic residence registration project in 2024 as part of the implementation of the Online Access Act (OZG).
The goal is to provide a nationwide digital registration process that enables citizens to update their place of residence online while simultaneously updating the address on their ID card via the NFC interface of a smartphone or a card reader.

Key developments in 2024 include the expansion of the target group to include family households, as well as the continued push for a nationwide rollout across Germany. As a result, the online service is now available to a significantly broader user base in 12 federal states and supports the ongoing digitalization of municipal registration processes.

The technical implementation is based on secure authentication using the electronic ID (eID), along with the use of the AusweisApp2 and a dedicated writing service to update the address on the ID document. This makes eWA a key component in the broader adoption of the eID within digital public services.

The HITeC research institute continues to provide scientific support to the project, with a focus on digital transformation and strategic software development – particularly in collaboration with diverse administrative stakeholders across organizational boundaries.

The research work is in the research areas of digital transformation and software development strategies (heterogeneous DevOps processes).

Cooperation Partners

- Amt für IT und Digitalisierung (ITD)
- Freie und Hansestadt Hamburg (FHH) – Senatskanzlei

Project Management

- Ogeigha Koroyin

Link

- https://www.wohnsitzanmeldung.gov.de/

2.5.8 SeaSchool – Software Engineering and Architecture at School

As part of the SeaSchool project, a concept is to be developed and evaluated to give students a realistic picture of the roles, tasks and skills of software engineers and software architects. Programming, which is often one of the first – even daunting – associations with computer science, is only a small area of software engineering.

The strategic goal of the project is to get more students interested in careers in the IT/MINT sector. SeaSchool addresses the social problem of the shortage of IT specialists. In particular, students who have not yet considered an IT focus due to prejudices regarding the job profile – especially female students – should also be made enthusiastic about the topic.

The core component of the concept is a cross-class workshop with students in the 9th or 10th year of secondary school. Using a real-life problem for which the development of a software system is to be planned, the students gain practical experience and are thus introduced to the methods and processes of software engineering and software architecture.

In 2024, the workshop was continuously developed and carried out in a slightly adapted format for trainees and dual students in cooperation with LBBW in Stuttgart with consistently positive feedback.

The next workshops in 2025 are already in preparation.

Cooperation Partners

- LBBW, Landesbank Baden-Württemberg
- Europaschule Aldegrever-Gymnasium Soest

Project Management

- Thomas Düllmann & Sebastian Frank

Link

- https://www.hitec-hamburg.de/seaschool/

2.5.9 Memory Hierarchy Code Optimization

Modern real-time embedded systems can be subject to strict requirements in terms of execution time, energy consumption and code size, depending on their respective application area. Dynamic memory allocation is a compiler optimization that can specifically exploit the memory hierarchy of an embedded computing system and optimize such requirements. In the past, research has focused on monocriterial dynamic memory allocation for relatively simple architectures. However, optimizing only a single target function can degrade other program properties, e.g. minimizing the worst-case execution time (WCET) can have a negative impact on the energy consumption of a program and vice versa.

Thus, this project aims at compiler-supported dynamic memory management for architectures with complex memory hierarchies in order to generate time-, energy- and code size-efficient programs.

In the final project year 3, the focus was on the further development and evaluation of the optimizations designed in the previous year. The DMA-based optimizations implemented during project year 2 were supplemented by pipeline models of the hardware architecture. These models allow precise estimation of when either the CPU or DMA controller accesses a shared memory, which then leads to longer runtimes and higher energy consumption due to bus arbitration. Thus, the overheads of the DMA-based optimizations developed so far are now precisely captured.

A systematic and comprehensive evaluation of these extended optimizations shows that the techniques developed in this project still outperform all other methods known from the literature in terms of various optimization and performance criteria.

In year 3, the successful completion of the project has been prepared by submitting and accepting scientific publications and writing a dissertation.

This project is assigned to the research area of safety-critical embedded systems and focuses on the utilization of memory hierarchies in order to balance execution time, energy consumption and code size. The project specifically addresses dynamic memory allocation.

Cooperation Partner

- NXP Semiconductors, CTO Office Hamburg

Project Management

- Heiko Falk

2.5.10 Efficient 3D Bin Packing based on Reinforcement Learning Method

Building upon previous work in online 3D bin packing using deep reinforcement learning, this year's research continued to address the challenges of real-time item placement considering the physical constraints. While conventional algorithms rely heavily on handcrafted heuristics, DRL remains a promising alternative due to its adaptability, policy generalization, and ability to incorporate sensor feedback. However, generalization across unseen item shapes, robustness to uncertainty, and safety-aware placement remain open problems in practical deployment.

In 2024, we expanded our simulation framework in Isaac Sim to include a broader variety of item types, bins, and disturbances (e.g., shifting items, noisy perception). We further enhanced our prior DRL models by integrating differentiable constraints and attention-based selection strategies, resulting in improved space utilization and reduced collision rates during placement. These improvements were validated across both randomized and structured item streams. In parallel, we built and implemented a preliminary real-world pipeline using Azure camera and a KUKA robot, bridging the sim-to-real gap and identifying new challenges in execution uncertainty.

We plan to focus on improving robustness under uncertainty due to the sim-to-real gap. In addition, we aim to scale our solution to multi-arm coordination scenarios and incorporate human-in-the-loop feedback for industrial deployment readiness.

Cooperation Partner

- Mech-Mind Robotics GmbH

Project Management

- Jianwei Zhang

2.5.11 Emerging Trend Detector – Innovative AI Tool for Aligning Production and Development Processes with Emerging Trends in Markets with Different Dynamics

The project "Emerging Trend Detector: Innovative AI tool for aligning production and development processes with 'emerging trends' in markets with different dynamics" started in mid-2023 and is funded by the BMWK as part of the "Central Innovation Program for SMEs" program. Globalization and digitalization are leading to increased networking of different markets, which presents companies with the challenge of aligning their products and services not only with the requirements of the target market, but also with overarching market trends from different industries. Current methods such as market research analyses and keyword-based trend scouting, supported by AI tools, are already in use. However, the actual identification and derivation of influential trends remains the preserve of human specialists.

The Institute for Management and Economic Research (IMWF) is addressing this need and is planning to develop an AI-based "Emerging Trend Detector" in collaboration with HITeC. The aim of the project is to dynamically model market and trend developments on the basis of freely available communication data. This enables the early identification of market dynamics and trends so that customized product and strategy developments can be made in a timely manner.

In 2024 HITeC worked on the following tasks:

1. Development of a United Nations Environment Sustainable Goals (ESG) classifier. HITeC has received labelled data from the partner, and has provided API access to a trained classifier for this task. The partner is currently running evaluations on the API.
2. Development of a Fast-moving consumer goods (FMCG) related multi-label classifier, which the partner is using internally to develop a topic model.

Cooperation Partner

- IMWF Institut für Management- und Wirtschaftsforschung GmbH

Project Management

- Ricardo Usbeck

2.5.12 DAIS³ Mobility – Data AI-based Solutions for Smart and Sustainable Public Mobility Providers

The DAIS³ Mobility project investigates the use of Artificial Intelligence (AI) in the field of mobility, particularly in public transportation. This research is conducted within the framework of efforts to transform towards sustainable technologies, as mandated by the European Green Deal, as well as in the context of datafication and the examination and exploitation of AI opportunities. HITeC is carrying out this research, and the following research questions are particularly relevant currently:

F1. How can AI-based models predict passenger demand and ranges of electric buses in public transportation (ÖPNV)?

F2. What challenges exist in integrating AI solutions into existing and new mobility services, and how can these challenges be addressed?

F3. How do data-driven decisions influence efficiency and user satisfaction in public transportation?

In 2024, Machine Learning models were specifically trained and developed for electric buses and subway systems, which not only specified ranges but also occupancy (F1). Additionally, various Large Language Models (LLMs) and Voice-to-Text (VoT) were tested to support the collection and processing of data in the bus sector, aiming to improve subsequent processes and measures regarding, for example, traffic accidents and other incidents (F2). Regarding F3, initial prototype solutions for communication and interaction with citizens and passengers were developed, utilizing AI-based avatars to provide information about schedules, disruptions, and mobility services flexibly in natural language and text. In all three areas, the results are promising and will be further explored to enhance the reliability of prototypes and models, as well as to gain insights into their usage by the respective target groups.

Cooperation partner

- Hamburger Hochbahn AG (HOCHBAHN)
- Universität Hamburg (UHH)
- Auxiliary AI GmbH

Project Management

- Marten Borchers, Martin Semmann (HCDS) und Eva Bittner (AG WISTS)

Link

- https://urbanplanning.informatik.uni-hamburg.de/IS4UrbanPlanning/d2s2c/overview.xhtml
- https://www.hochbahn.de/de
- https://www.inf.uni-hamburg.de/inst/ab/wists/home.html
- https://www.hcds.uni-hamburg.de/

2.5.13 Holistic Speech Enhancement

The project is assigned to the research field of signal processing. More precisely, audio signals are to be denoised in this project. The assumption here is that there is a speaker whose clean speech is to be enhanced from an audio file. At the same time, interferring background noise and other artifacts are to be suppressed. The main focus of this project is the online processing of the audio signals.

Artificial intelligence (AI) and neural networks are currently being used for online speech enhancement. In particular, the generative diffusion AI approach has shown that speech enhancement algorithms have a high speech quality. One problem with these methods is the computational burden which means that online processing of audio data will prove difficult.

In 2024, the work of HITeC therefore focused in particular on the development of generative diffusion AI for speech enhancement for online processing. The “Holistic Speech Enhancement” idea is funded by the “Central Innovation Program for SMEs” (ZIM) initiative of the Federal Ministry of Economics and Climate Protection (BMWK).

Cooperation Partner

- AI|COUSTICS

Project Management

- Timo Gerkmann

Link

- https://ai-coustics.com/

2.5.14 Enhancement of the Galileo Software Package

Galileo is a software package applied in early-phase drug discovery to identify potential hit molecules for target proteins of interest. It performs searches in chemical fragment spaces on customizable scoring functions employing a genetic algorithm. A prototype of Galileo was available before the project and was extended and customized in several

directions: Instead of randomized starting populations, Galileo was enabled to work with predefined compound collections such that it can be used in an optimization setup. Furthermore, the use of fitness functions was designed to achieve maximum flexibility on the applicants side. In this way, Galileo could be integrated into an active learning workflow balancing the needs for very expensive fitness calculations, for example protein-ligand docking.

This project falls into the research area of Computational Molecular Design for Drug Discovery. More precisely, it focuses on novel techniques in cheminformatics and structure-based virtual screening of ultra-large chemical compound collections.

Cooperation Partner

- Bayer AG

2.5.15 Multimodal Human-Robot Collaboration in Dealing with Embodied AI – EmCoAI

The rapid development of generative models, especially pre-trained image-text and image-text action models, as well as diffusion-based learning strategies, opens up significant potentials for human-robot interaction. The project develops embeddings from both methodological fields to enable intuitive interactions for untrained users with autonomous robotic systems.

A first investigation evaluates the use of current pre-trained models such as OpenVLA and Octo for simple human-robot interaction tasks through voice commands. Specific language specifications for navigation tasks serve as an initial demonstration environment, considering environments across various everyday domains.

In the context of expanding to mobile manipulation tasks, robust execution continues to pose major challenges, as small deviations in the environment can lead to severe errors. For mobile grasping tasks ("Object Retrieval"), diffusion-structured reinforcement learning will be employed to improve existing offline planning methods.

Furthermore, the project will specifically utilize intuitive reinforcement through human interaction partners, leveraging multimodal perception (i.e., visual, acoustic, and text-based perception of the partner) to efficiently implement preferences and human expertise in applications.

Cooperation Partner

- Agile Robots SE

Project Management

- Jianwei Zhang

2.5.16 Representation Expenses of the Department

In enger Zusammenarbeit mit dem Fachbereich Informatik unterstützt HITeC regelmäßig wissenschaftliche Forschungs- und Lehrveranstaltungen des Fachbereichs, wie beispielsweise Kolloquien oder Klausurtagungen.

Cooperation Partner

- Department of Computer Science at the University of Hamburg

Project Management

- Professorships of the Department of Computer Science

2.5.17 Computer Science Orientation Unit

In close cooperation with the Department of Computer Science and in particular through the dedicated cooperation of many computer science students, HITeC regularly organizes the computer science orientation unit.

Cooperation Partners

- Department of Computer Science at the University of Hamburg
- Computer Science Student Council of the University of Hamburg

Project Management

- Many students from computer science

2.5.18 Business Informatics Orientation Unit

In close cooperation with the Department of Computer Science and in particular through the dedicated cooperation of many students on the Bachelor's and Master's degree courses in Information Systems and the Master's degree course in IT Management & Consulting (ITMC), HITeC regularly organizes the orientation unit for the Information Systems and ITMC degree courses.

Cooperation Partners

- Fachbereich Informatik der Universität Hamburg
- Fachschaft Wirtschaftsinformatik und ITMC der Universität Hamburg

Project Management

- Many students from the Business Informatics and ITMC degree programs

2.5.19 Hamburg Informatics Computer Museum

Since his retirement, Prof. Dr. Horst Oberquelle has set up a computer museum in the university's Department of Informatics. The museum displays an interesting selection of pioneering inventions from the beginnings of mechanical computing to desktop and pocket calculators, hardware from Konrad Zuse to mainframe computers, the development of workstation systems and home computers to large and small portable computers. Data transmission from the Morse key to teleprinters and telephones to smartphones, writing and printing from the mechanical typewriter to the laser printer and the development of storage media are also covered. Many devices are demonstrated live. A special aspect is the importance of innovation and design in Apple computers and the development of interaction technologies in mice, joysticks, trackballs and other input devices.

In addition to members of the department, the Computer Museum is also open to alumni associations, schools and the general public. Prof. Oberquelle regularly offers guided tours. In 2024, guided tours took place again with over 450 participants. With the help of a guest with a passion for technology, various old computers were again reactivated. In particular, new early works by computer art pioneer Herbert W. Franke were revived.

The museum is financed almost exclusively by donations and gifts and would like to thank HITeC for its support in acquiring interesting exhibits and materials.

The problem of a new location for the computer museum after the movement of the department into a new building is unsolved, but is intensively worked on.

Project Management

- Horst Oberquelle

Link

- https://www.inf.uni-hamburg.de/home/about/museum.html

3. OUTLOOK

HITeC is involved in research and technology transfer projects in the areas of digitalization of urban tasks, digital transformation in business and society, secure distributed systems and the application of artificial intelligence methods in business. This is intended to bundle current and future projects in this area and increase the visibility of HITeC.

In 2025, projects with research institutions, authorities and industry will continue to be carried out and driven forward. In particular, further projects are planned in the field of artificial intelligence, also in collaboration with ARIC, as well as in the area of secure, data protection-friendly system developments.