Open PhD Call 2020

The IT University of Copenhagen encourages diversity of applicants regardless of age, gender, religious affiliation, or ethnic background to apply for the positions.

It is important that your application reflects the mission and vision of ITU which is to deliver internationally leading teaching and research that enable Denmark to become exceptionally good at creating value with IT. Furthermore, the vision of ITU is to create and share knowledge that is profound and leads to ground-breaking information technology and services for the benefit of humanity. It is expected that you aim to comply with ITU's 3 core values; Direction-finding, Forthcoming, and Accountable.

Please note that any application must always include the documents listed in the general call text. Applications without the mentioned documents will not be assessed.

Below you find project proposals for the Departments of Computer Science, Business IT, and Digital Design.

Computer Science

The Computer Science department at ITU has one or more vacant PhD positions for outstanding students. The PhD positions are within computer science including algorithms, databases, image analysis, information security, logic, machine learning, natural language processing, operating systems, optimization, programming languages, proof assistants, robotics, semantics, software engineering, type theory, verification, and more, as well as a range of its applications.

Applicants must submit a PhD project description (statement of purpose) of maximum 5 pages, and must specify member(s) of the department faculty as project supervisor. Applicants are encouraged to contact prospective supervisors beforehand. Applications must satisfy the general ITU requirements for PhDs.

Contact: Head of department **Peter Sestoft**

E-mail: sestoft@itu.dk

Phone no.: +45 7218 5083

https://en.itu.dk/research/departments/computer-science-department

In addition to open PhD project proposals the following projects are proposed by Computer Science faculty:

Robust and secure Eye Information retrieval

The eyes are rich sources of information. Robust estimation of eye information outside confined laboratory settings (in the wild) is challenging and needs further study. Solving these issues would open up for many new applications but also imply challenges on how to handle sensitive data. This PhD project is about investigating new eye and gaze models that allow development of robust and secure eye information retrieval in the wild.

The successful applicant will have a strong background and interest in mathematical modelling and programming of eye information retrieval systems. This includes a strong background in programming, image analysis, and machine learning. Knowledge in security and “privacy” is a plus.

Start date: ultimo 2020 or soon thereafter

Proposed supervisor: Dan Witzner Hansen
Contact: Dan Witzner Hansen (witzner@itu.dk)
Research Group: Machine Learning / AI

If successful, the position is planned to be fully financed by ITU

Privacy and data practices

Social media and interactive systems are increasingly pushing boundaries for sharing of private data, through self-sharing, sharing of others’ personal data and malicious data breaches, as well as accidental data leaking. New practices and regulations are slowly gaining ground but technical challenges also play a

role in terms of data management and control. GDPR is just one of the recent regulations that helps to provide better data privacy through more controlled practices. It is only plausible that the future will witness even more challenges with privacy breaches and mismanagement of personal data.

This PhD project will be addressing privacy from a human-computer interaction approach, looking at people's own approach to data privacy as well as actual privacy practices in relation to interactive systems such as internet of things and social media.

The PhD candidate is expected to investigate topics such as 1) privacy issues on social media 2) privacy issues in public sector domains such as children's health data and 3) privacy in relation to mobile digital services and internet of things. The successful candidate will have a background in, Computer Science, data science or Human-Computer Interaction with knowledge within the specific application area the candidate chooses.

Start date: September 2020

Proposed supervisor: Louise Barkhuus
Contact: Louise Barkhuus (barkhuus@itu.dk)
Research Group: Center for Information Security and Trust (CISAT)

If successful, the position is planned to be fully financed by ITU

Photorealistic Analysis and Synthesis of Face Images

Current methods learning human face structure from image examples are able to yield photorealistic face image generation of non-existing people. The methods are based on recent machine learning techniques such as the variational autoencoders (VAE) or generative adversial nets (GAN). By those methodologies, the face images are mapped into a low-dimensional latent space that can be seen as parameterisation for the faces. However, the structure of the underlying latent spaces is in large extent not understood.

The goal of the PhD project is to work with correspondence free face image analysis aiming at deep understanding of facial manifolds that could lead to decoupling of the latent space into tangible submanifolds representing meaningful entities such as viewing geometry, lighting, identity of the person, emotion, gender, and age. The project is closely connected to non-rigid structure and motion problem that aims at reconstructing a general deformable object from 2d projection images.

The potential application areas for this technology are in psychiatry, visual surveillance, and film industry. An ideal candidate has good skills in machine learning and image analysis and good knowledge in linear algebra, probability, and statistics.

Start date: upon agreement

Proposed supervisor: Sami Brandt / Stella Graßhof
Contact: Sami Brandt (sambr@itu.dk)
Research Group: Machine Learning

If successful, the position is planned to be fully financed by ITU

Business IT

The Business IT department at ITU has one or more vacant PhD positions for outstanding students. The PhD positions are within information systems and science and technology studies, including social media analytics, IT governance, management information systems, digital innovation and new process models, digital democracy, digital change management, innovation and society, and cybersecurity, as well as business and management foundations.

Applicants must submit a PhD project description (statement of purpose) of maximum 5 pages, and must specify member(s) of the department faculty as project supervisor. Applicants are encouraged to contact prospective supervisors beforehand. Applications must satisfy the general ITU requirements for PhDs.

Contact: Head of department **Lene Pries-Heje**, or Associate Professor **Steffen Dalsgaard**

E-mail: lpries@itu.dk, sdal@itu.dk

Phone no.: +45 7218 5362, +45 7218 5251

https://en.itu.dk/research/departments/business-it-department

In addition to open PhD project proposals the following projects are proposed by Business IT faculty:

"Remember my user ID": An ethnography of digital identification in Denmark

The rapid digitalisation of the Danish state has led to the de facto mandatory use of a digital identity technology, NemID, for all citizens and residents who wish to communicate and interact with the state. As with any other kind of infrastructure, digital or otherwise, such interventions come with their own politics, and privilege some parts of society while marginalising others. Through a multi-sited ethnographic study, this project will explain the ongoing reconfiguration of subject-state relations as made visible in digital identification schemes such as NemID in Denmark.

The project seeks to trace assumptions built into infrastructures of digital identification. Starting from technologies that stabilise identities in Denmark such as the CPR number and NemID, the project investigates the consequences of adopting digital identification schemes as a mandatory mode of interacting with the state. Empirically, the project will study two sites of digital identification: everyday practice of digital identification development and management at a company that works closely with NemID or related technologies; and a volunteer-based initiative that assists individuals in their interactions with the state. The project requires fieldwork conducted at both sites, with methods including participant observation through volunteering, shadowing developers and/or other practitioners, and interviews. The project also seeks to develop visual modes of engagement as research methods inspired by video ethnography, visual sociology, and visual anthropology.

Start date: August 2020 or soon thereafter

Proposed supervisor: Baki Cakici
Contact: Baki Cakici (bakc@itu.dk)
Research Group: Technologies in Practice

If successful, the position is planned to be fully financed by ITU

Digital Labour Platforms and their implications for workers and the welfare state

This PhD project concerns labour in the era of the digital platforms. Contracting work through digital labour platforms has become a global trend in recent years. The focus will thus be on what is widely referred to as the 'sharing economy' or 'gig economy'. This phenomenon on the one hand augments the flexibilization of labour, allowing both companies and individuals to benefit from on-demand labour supply. On the other hand, the 'gig economy' alters traditional labour relations, thus posing challenges to the welfare state when dealing with classification, taxation and support measures for these -usually- self-employed workers. The project will engage with critical voices that claim that these platforms facilitate the entrance of vulnerable groups (e.g. migrants, students etc.) into the labour market, but raise concerns about the possible precariousness of such employment relations.

This research project aims to investigate how data, algorithms and complex technical solutions reconfigure this domain of the labour market, as well as its relation to the welfare state. A PhD student is sought to investigate topics such as both the sociotechnical aspects of digital labour platforms as well as the Danish digital welfare state's initiatives, which aim to regulate platform work, in order to deliberate over the risk of creating new forms of precarious employment relations.

The successful applicant will have a strong background and interest in political science, science and technology studies and qualitative methods and will have proven their potential through publishing in leading international venues for labour, flexibilization of labour, and the welfare state. The project will be carried out in close collaboration with the newly established Center for Digital Welfare at the ITU. The successful candidate will join the Technologies in Practice Research Group at the Department of Business IT.

Start date: upon agreement

Proposed supervisor: Vasilis Galis / Brit Ross Winthereik
Contact: Vasilis Galis (vgal@itu.dk)
Research Group: Technologies in Practice

If successful, the position is planned to be partly financed by ITU and partly financed by Velux

Digital Design

The Digital Design department at ITU has one or more vacant PhD positions for outstanding students. The PhD positions are within artificial intelligence and machine learning, co-design of digital services, inclusive digitization of the public sector, computer games, digital health and wellbeing, big data and critical methods to understand social media phenomena and design of good user experiences in digital products and museums.

Applicants must submit a PhD project description (statement of purpose) of maximum 5 pages, and must specify member(s) of the department faculty as project supervisor. Applicants are encouraged to contact prospective supervisors beforehand. Applications must satisfy the general ITU requirements for PhDs.

Contact: Head of department **Lone Malmborg**

E-mail malmborg@itu.dk

Phone no.: +45 7218 5023

https://en.itu.dk/research/departments/digital-design-department-new

In addition to open PhD project proposals the following projects are proposed by Digital Design faculty:

Machine Learning Ethics: Exploring the Possibilities of Bottom-Up Approaches

Most approaches to the ethics of Machine Learning take a top-down perspective, focusing on legal regulation, transparency, or ethical education of developers as the instruments to address the moral issues raised by Machine Learning systems.

This project explores the possibilities of bottom-up approaches to address these ethical problems. The core idea behind this project is to explore the possibility of preparing and educating machine learning systems so in their contact with humans their actions are ethically sound and accountable. This project intends to develop theories and methods that would complement already existing top-down approaches to the ethics of Machine Learning, while proposing a radical new way of thinking about the ethics of Machine Learning.

The proposed bottom-up approach to Machine Learning would focus on using the learning principles behind these systems to teach them, through iterations, different ethical positions. Building on the classic Aristotelian idea of ethics as a practice, this project wants to explore the possibilities of designing and developing Machine Learning systems that practice ethics as a preparation for their deployment into human social contexts. Possible ethical theories that can be used in training these Machine Learning systems would be applications of Virtue Ethics, just-consequentialism, preference-utilitarianism, or any variation of relational ethics of care.

This project will use simulated learning environments like videogames to train the Machine Learning systems, but it intends to go beyond the current state of the art, which is limited to crude implementations of thought experiments like trolley problem.

The goal of the project is to develop a theoretical account of bottom-up approaches to ethics and Machine Learning, while developing systems that illustrate this approach.

Potential candidates should have a background in machine learning, ethics and/or law, and should be comfortable in both theoretical and technical work.

Start date: September 2020

Proposed supervisor: Miguel Sicart / Sebastian Risi
Contact: Miguel Sicart (miguel@itu.dk)
Research Group: Center for Computer Games Research

If successful, the position is planned to be fully financed by ITU

Big Tech in the Danish online ecosystem

The PhD project will explore the position(s) of "Big Tech" in the Danish online ecology, mapping how technology companies such as Alphabet, Amazon, Google, and Microsoft provide infrastructures and tools for communication and exchanges on micro, meso, and macro levels. Denmark is one of the most digitized countries in the world, but knowledge about the underlying global cast of characters remains sparse. What role do they play in the structuring of the Danish online ecosystem?

The aim of the project is to generate empirical knowledge about 1) the extent to which the technology companies constitute essential backbones for the online ecosystem in Denmark, 2) the extent to which Danish (public and private) actors depend upon the technology of "Big Tech", 3) the structural and sociological implications of strategic collaborations with the technology companies, and/or 4) the potential and realized privacy implications of the position(s) of the technology companies.

The PhD project connects to current discussions about datafication, public digitalization, platform economy, and privacy.

Start date: upon agreement

Proposed supervisor: Aske Kammer
Contact: Aske Kammer (aska@itu.dk)
Research Group: Digital Platforms and Data

The PhD project can be conducted in collaboration with the Business IT and/or Computer Science departments (depending upon final shaping of the project).

If successful, the position is planned to be fully financed by ITU

Solving the Privacy Paradox

This PhD project explores possible solutions to the "privacy paradox" (Barnes, 2006). Over the last couple of years, and following the introduction of GDPR as well as the numerous examples of leaks and abuses of digital user data, the attention given to questions of privacy and the integrity of "data subjects" has increased. However, in spite of increased awareness, most users turn a blind eye to the vast capture and sharing of digital user data, enabling it through their everyday digital behavior.

Against this background, the aim of the project is to 1) gauge users' attitutes toward the sharing and capture of digital user data, 2) identify users' practices for accepting/blocking the sharing digital user data, and/or 3) if possible: develop and propose frameworks or concrete solutions for improving users' own control over what digital user data they share and how. The project can focus on specific demographics or groups of users.

The PhD project is about user empowerment in the digital age and about supporting the agency of the users. Furthermore, the project connects to current scholarly discussions about privacy and personal data, datatification, and platform economy.

The ideal candidate will have competencies within design and/or technical research and/or development.

Start date: upon agreement

Proposed supervisor: Aske Kammer
Contact: Aske Kammer (aska@itu.dk)
Research Group: Digital Platforms and Data

The PhD project can be conducted in collaboration with the Business IT and/or Computer Science departments (depending upon final shaping of the project).

If successful, the position is planned to be fully financed by ITU

Playing European Identity: On European cultural history presented in (non-European) games.

Games, with their sophisticated world building and involved storytelling, often use history as their reference point and background, particularly European history. However, many of these games are created by companies based outside of Europe. The designers working on these games reference an image of historical Europe based on fiction literature, fantasy, movies and other games as much as (or more than) on actual European history. Instead of seeing a historical Europe, we play with a fictional, or perhaps even a ludic Europe.

This PhD explores this ludic Europe and its reception, to see to what degree games may influence the image of historical Europe. The PhD should explore how Europe is depicted in a chosen set of games, and how the players of these games understand Europe, as well as, for the European players, how this matches their own understanding of their identity as Europeans, and for the non-European players: what ideas and prejudices they have about European culture and history based on games.

This study will use qualitative methods to study both players and games. The ideal candidate is able to demonstrate a good knowledge of game studies, has a realistic idea about how games and game worlds can communicate ideas and shape identities, as well as a good working knowledge of traditional and digital ethnographic methods, and knowledge of textual analysis used on games.

Candidates are encouraged to submit applications outlining a three-year PhD project focused on identity formation in games, and the interplay of history and fiction in this process. Directions to take an application can include, but is not limited to:

- Romanticism and idealisation of European history.
- Europe as a fragmented arena of war.
- European struggles of class reflected in games; fiction or structure.

- Nationalist images of Europe.
- Collaborative diversity in European game structures.
- Gameplay as a bridge across language and culture barriers.
- European game subcultures based on language, geography or other in-game identity markers.

Start date: September 2020

Proposed supervisor: Torill Elvira Mortensen
Contact: Torill Elvira Mortensen (toel@itu.dk)
Research Group: Center for Computer Games Research and Culture and Technology (CulT).

If successful, the position is planned to be fully financed by ITU

Generative Machine Learning for Procedural Content Generation

Generative methods in machine learning have surged in popularity since the first inception of generative adversarial networks in 2014. Since then a number of different architectures and methods have been proposed with very successful applications especially in the area of synthetic images generation.

However, beyond the realms of image and sound processing the techniques have seen little to no experimentation, with just a handful of very recent papers investigating their application in procedural content generation.

In this PhD project, we would like to investigate how procedural machine learning methods can be further developed to support the interactive creation of game components such as NPC behaviors or levels layout.

The aim is to explore the expressive range and the controllability of such methods to empower designers, artists and content creators in general with intelligent tools.

Start date: September 2020

Proposed supervisor: Paolo Burelli
Contact: Paolo Burelli (pabu@itu.dk)
Research Group: Center for Computer Games Research

If successful, the position is planned to be fully financed by ITU

Coordinated misinformation campaigns

The diffusion of problematic information online is a recognized danger for healthy democratic processes. Contemporary social media and interconnected media ecologies make possible to orchestrate mis/disinformation campaigns with unprecedented reach and efficacy. The project, leveraging Facebook data obtained through one of the Facebook/Social Science One “Social Media and Democracy” research grant will investigate emergence, propagation and evolution of problematic information on Facebook.

Start date: upon agreement

Proposed supervisor: Luca Rossi
Contact: Luca Rossi (lucr@itu.dk)
Research Group: NERDS / Digital Platforms, Data and Society

The PhD project is conducted in collaboration with the Computer Science department and co-supervisor Michele Coscia.

If successful, the position is planned to be fully financed by ITU

Diversity and political contention in digital platforms and data

There is increasing awareness of discrimination of vulnerable populations (based on gender, race, or sexual orientation) in the gathering of and acting upon data – not only by private companies but also state institutions. While critical studies show that social movements, protest and activism can leverage new data and technologies to create social change, the (potential) role of data in critical projects remains understudied. This project is concerned with the role of digital media technologies, platforms and data for political contention, protest, activism, social movements, racism, bias and diversity. Within this broad framework, we are particularly interested in a PhD project that combines digital media data analysis with other methods (such as ethnography, interviews, surveys) to trace the political, cultural and scientific practices underlying platforms and data in the context of such questions. Doing so, this project will contribute to the undertaking of data-driven research that provides evidence to drive social change.

Start date: upon agreement

Proposed supervisor: Christina Neumayer
Contact: Christina Neumayer (chne@itu.dk)
Research Group: Digital Design

The PhD project can be conducted in collaboration with the Business IT and/or Computer Science departments at ITU (depending upon the final shaping of the project).

If successful, the position is planned to be fully financed by ITU

Public libraries as an arena for user-driven service innovation

Public sector research demonstrates overwhelming evidence that e-government systems and services are not meeting targets for performance, effectiveness, and adoption by citizens, and a growing number of researchers agree that this is due to lack of participation from citizens in development of public e-services, like tax services, social benefit services etc. This problem is related to a *digital divide* regarding use of current e-services, marginalising user groups lacking digital skills, and it also blocks the potential in developing future services based on open public data as an emerging resource. In parallel, public libraries hold an undiscovered potential to become a partner in service innovation, with their non-commercial nature and long tradition for aiming to bridge the digital divide. The fast-growing number of maker-spaces in libraries illustrate this potential, but co-creation and user-driven innovation in libraries seldom deal with technology or development of e-services.

This PhD-project addresses these issues, exploring the potential of public libraries as facilitators for user-driven service innovation and technology exploration. The project taps into the broad range of active

library visitors and existing library activities as a resource for engaging users. Design cases can involve improving existing public e-services in collaboration with service developers, but also exploring new possibilities with e.g. open public data as a base for new service innovations and technology experiments. The main objective for the project is to explore how a facility can be set up at a public library to empower citizens to participate actively in user-driven service innovation and technology exploration. A second objective is to capture and document knowledge of best innovation practices and service solutions, as well as develop knowledge on drivers and enablers for successful digital transformation and its long-term impacts on society.

The successful applicant is expected to have a strong academic background in interaction design, service design or other fields of design, and preferably experience from co-design and prototyping technologies. Also, studies in IT-related subjects is an advantage.

Start date: Fall 2020

Proposed supervisor: Jörn Christiansson
Contact: Jörn Christiansson (jrme@itu.dk)
Research Group: Co-design

If successful, the position is planned to be fully financed by ITU

Technology innovation within municipalities

Economic constraints and fewer people who must care for more citizens in the near future stimulates municipalities to rethink how they deliver services to their citizens, like social care. Introducing novel technology is one strategy used by municipalities to provide a high quality of service also in the future. As a result, IoT, blockchains, cloud-based services, AI and robotics are all examples of technology innovations that today are introduced within these organizations, often with a top-down approach (from management and down to individual employee).

This PhD project should explore and tap the innovation potential that exists at a grass root level within a municipality by inviting municipality workers to engage in technology and service innovation through co-design. The purpose is to explore the innovation potential within municipalities and through technology, interventions and experimentation (e.g. co-designing prototype-grade interactive systems and services) map out current and future technology and service needs within organizations and explore the role innovative technology can have transforming municipalities and their services.

The successful applicant is expected to have a strong academic background in interaction design, software development or other similar fields, and preferably experiences from co-design.

Start date: Fall 2020

Proposed supervisor: Erik Grönvall
Contact: Erik Grönvall (erig@itu.dk)
Research Group: Co-design

If successful, the position is planned to be fully financed by ITU

Gaming at the extreme

The notion that digital games might cause addiction has been the topic of at times heated debates in academia and amongst lay people for quite some time. With the WHO's inclusion of Gaming Disorder and Hazardous Gaming in the draft of the new ICD-11 the debate has become even more heated. At the same time e-sports, or the professionalization of gaming, has turned into the fastest growing industry in the world. These two recent developments, more than ever before, increases the need for knowledge about the potential effects of digital games on the public in general and the players who play to extremes in particular.

We seek a PhD student to do original and high-quality work on extreme gaming, and the messy intersection of highly esteemed and highly stigmatized gaming. A successful candidate will develop their own three-year research project within this field on the basis of their own expertise.

Start date: upon agreement

Proposed supervisor: Rune K. L. Nielsen
Contact: Rune K. L. Nielsen (rkln@itu.dk)
Research Group: Center for Computer Games Research

If successful, the position is planned to be partly financed by ITU and partly financed by external resources

Hybrid experience design at the Munch Museum

In a collaboration between the Munch Museum and the IT University, we seek a PhD candidate with an interest in experience design to experiment with hybrid experiences with the museum's digital collections. The project builds on the museum's work in the GIFT project (gifting.digital), through which the museum has established a digital test lab working with three main areas: digital exhibitions, digital experiences for school children, and digital offers for mobile. The candidate will work in a practice-based approach (e.g. as research through design, action research or similar), immersed in the museum's learning, curatorial, and research teams. The project may explore a range of approaches such as playful design, affective design, mixed reality, artificial intelligence and other relevant areas in the intersection of emerging technologies, art and experience design

Start date: upon agreement

Proposed supervisor: Anders Sundnes Løvlie
Contact: Anders Sundnes Løvlie (asun@itu.dk)
Research Group: MAD Art & Design

If successful, the position is planned to be partly financed by ITU and partly financed by the Munch Museum