

Vorlesungsverzeichnis

M.Sc. Human-Computer Interaction

Sommer 2024

Stand 14.10.2024

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M.Sc. Human-Computer Interaction

Faculty Welcome for Master's Students Human-Computer Interaction

Thursday, April 4, 2024, 11 a.m., Schwanseestraße 143, room 2.16

Project fair

Thursday, April 4, 2024, 5 p.m., Steubenstraße 6, Audimax

Theses-Seminar HCI

E. Hornecker

Seminar

Di, Einzel, 08:00 - 22:00, Karl-Haußknecht-Straße 7 - Hörsaal (IT-AP), 23.07.2024 - 23.07.2024

Beschreibung

Vorträge zu aktuellen Dissertationen und Veröffentlichungen sowie laufenden Master- und Bachelorarbeiten werden im Rahmen des Seminars präsentiert und diskutiert.

Bemerkung

Für diese Veranstaltung werden keine ECTS-Punkte vergeben.

Advanced HCI

Electives

4336010 Image Analysis and Object Recognition

V. Rodehorst, M. Kaisheva

Veranst. SWS: 4

Vorlesung

Di, wöch., 15:15 - 16:45, Coudraystraße 9 A - Hörsaal 6, Lecture, ab 09.04.2024

Do, wöch., 11:00 - 12:30, Coudraystraße 9 A - Hörsaal 6, Lab class, ab 11.04.2024

Di, Einzel, 11:00 - 13:00, Steubenstraße 6, Haus F - Hörsaal K20, written Exam, 06.08.2024 - 06.08.2024

Di, Einzel, 11:00 - 13:00, Coudraystraße 9 A - Hörsaal 6, written Exam, 06.08.2024 - 06.08.2024

Beschreibung

Bildanalyse und Objekterkennung

Die Vorlesung gibt eine Einführung in die Grundlagen der Mustererkennung und Bildanalyse. Behandelt werden unter anderem die Bildverbesserung, lokale und morphologische Operatoren, Kantenerkennung, Bilddarstellung im Frequenzraum, Fourier-Transformation, Hough-Transformation, Segmentierung, Skelettierung, Objektklassifizierung und maschinelles Lernen zur visuellen Objekterkennung.

engl. Beschreibung/ Kurzkomentar

Beschreibung

After the course the students will be able to analyse mathematical models that describe dynamic behaviour, as they occur in engineering (e.g. mechanical coupling of building structures), in biology and in physics, but also in multi-agent systems in computer science, or as opinion dynamics in psychology. Based on examples from different disciplines, students learn to build simplified models that allow to answer questions on their long-term behaviour. Students will be able to apply methods of feedback design that help shape the dynamics of a given system, along with the relevant stability concepts. As several topics lend themselves for computer simulation, students of this course will develop a proficiency to both implement and analyse mathematical models using computational tools and software.

Bemerkung

Examples of complex dynamics. Models for dynamical systems in continuous and discrete time. Computer simulation. Control and Feedback. Stability, stabilization, and Lyapunov functions. Coupled systems: Disturbance or Cooperation? Networks of systems. Consensus. Synchronization.

The topics will be presented in a lecture, deepened by exercises. Some of the exercise include computer programming and simulation.

Voraussetzungen

B.Sc., knowledge in Matlab or Python

Leistungsnachweis**1 written exam**

"Complex dynamics"

120 min (100%) / **SuSe** + WiSe

301017	Mathematics for data science
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B. Rüffer, M. Schönlein

Veranst. SWS: 4

Vorlesung

Mo, wöch., 09:15 - 12:30, Coudraystraße 13 B - Seminarraum 210

Mo, wöch., 09:15 - 12:30, Coudraystraße 13 A - Hörsaal 2

Beschreibung

After the course the students will be familiar with the fundamental concepts of data science. The participants can analyse given data sets with respect to dimensionality reduction and clustering. They also know the basic structure of neural networks and support vector machines to solve classification tasks. The participants know relevant methods from linear algebra and optimization and can apply these techniques. This embraces the design of appropriate algorithms and the implementation of different numerical methods to solve the corresponding problems.

Bemerkung

Examples of complex dynamics. Models for dynamical systems in continuous and discrete time. Computer simulation. Control and Feedback. Stability, stabilization, and Lyapunov functions. Coupled systems: Disturbance or Cooperation? Networks of systems. Consensus. Synchronization.

The topics will be presented in a lecture, deepened by exercises. Some of the exercise include computer programming and simulation.

Voraussetzungen

B. Sc.; Analysis and Linear Algebra at Bachelor level, knowledge of Matlab or Python

Leistungsnachweis**1 written exam**

"Complex dynamics"

120 min (100%) / **SuSe** + WiSe**324130004 Digital Culture in Design, Media and Architecture (Part 2)****J. Willmann, M. Braun, KuG**

Veranst. SWS: 2

Wissenschaftliches Modul

Mo, wöch., 13:30 - 15:00, 15.04.2024 - 08.07.2024

Mo, wöch., 13:30 - 15:00, Steubenstraße 6, Haus F - Hörsaal K20, 10.06.2024 - 17.06.2024

Mo, Einzel, 13:00 - 15:30, Steubenstraße 6, Haus F - Hörsaal K20, 22.07.2024 - 22.07.2024

Beschreibung

Die Veranstaltung findet auf Englisch statt. Über die Sprachumschaltflagge (oben rechts) gelangen Sie zur englischsprachigen Beschreibung.

Bemerkung

Die Vorlesungen finden im Audimax statt.

Bitte beachten Sie die entsprechende Studienordnung.

418260001 Physiological Computing**J. Ehlers**

Veranst. SWS: 3

Vorlesung

Di, Einzel, 15:00 - 17:00, Marienstraße 13 C - Hörsaal A, written exam, 23.07.2024 - 23.07.2024

Di, wöch., 13:30 - 15:00, Marienstraße 13 C - Hörsaal D, Lecture (in person)

Di, wöch., Exercise (online until further notice)

Beschreibung

Physiological computing applies physiological data (like brain waves, skin conductance changes, pupil dynamics or heart rate variability) to generate user-state representations and enable computer systems to dynamically adapt to changes in cognitive and/or affective processing. By connecting the brain/body to a machine, the boundaries of the nervous system are extended which enables us to communicate with machines directly via processes that underlie our thoughts and emotions.

The course will provide basic knowledge on the human nervous system and introduce to the concepts, theories and methods of physiological computing. We will discuss selected examples from the current research by putting special emphasis on eye-tracking and pupillometry but also on recent developments in the field of brain-computer interfaces. Given the opportunity to work in the lab, students will form small groups and learn how to collect and analyse data on gaze behaviour, pupil size changes and skin conductance.

Leistungsnachweis

Empirische Übungen und schriftliche Prüfung

422150031 Generative Software Engineering

J. Ringert

Veranst. SWS: 4

Vorlesung

Mo, Einzel, 09:00 - 11:00, Coudraystraße 13 B - Hörsaal 3, written exam, 05.08.2024 - 05.08.2024

Mi, wöch., 09:15 - 10:45, Marienstraße 13 C - Hörsaal D, Lecture

Fr, wöch., 13:30 - 15:00, Coudraystraße 13 B - Hörsaal 3, Lab class

Beschreibung

We introduce main approaches and techniques to generative software development.

- Model Driven Engineering
- Software Modeling languages for structure and behavior
 - Class Diagrams, Object Diagrams, OCL
 - Sequence Diagrams and State Machines
- Software model consistency and semantics
- Code Generation from class diagrams
- Code generation from State Machines
- Reactive Synthesis from temporal specifications
- Software Product Lines
- Domain Specific Languages
- Model Transformations

After completion students will be able to

- Contrast different modelling languages and chose based on purpose
- Analyze model consistency
- Evaluate and apply code generators
- integrate generated code in software projects
- create and analyze temporal specifications
- synthesize software from temporal specifications
- understand domain specific languages and model transformations

Bemerkung

Lecturer: Prof. Ringert

Leistungsnachweis

Homework for admission to exam

Exam weighted 100% for final mark

423150021 Deep Learning for Computer Vision

V. Rodehorst, C. Benz, J. Eick, A. Frolov, D. Tschirschwitz Veranst. SWS: 4

Integrierte Vorlesung

Fr, wöch., 15:15 - 16:45, Schwanseestraße 143 - Seminarraum 2.16, ab 05.04.2024

Fr, wöch., 17:00 - 18:30, Schwanseestraße 143 - Seminarraum 2.16, ab 05.04.2024

Mo, Einzel, 09:00 - 11:00, schriftl. Prüfung / written exam, 29.07.2024 - 29.07.2024

Beschreibung

In diesem Fortgeschrittenenkurs werden die Prinzipien, Techniken und Anwendungen des Deep Learning in der Computer Vision behandelt. Die Teilnehmer lernen, wie man neuronale Netze für die Bildklassifizierung,

Objekterkennung, semantische Segmentierung und andere Computer-Vision- Aufgaben entwickelt, trainiert und validiert. Es werden auch Techniken zur Verbesserung der Leistung von Deep-Learning-Modellen und Veranschaulichungen studiert, um Anhaltspunkte für die weitere Modellentwicklung zu erhalten. Am Ende des Kurses werden die Studierenden in der Lage sein, Deep-Learning-Techniken anzuwenden, um reale Probleme in verschiedenen Bereichen zu lösen.

Voraussetzungen

Successful completion of the course "Introduction to Machine Learning and Data Mining" or "Image Analysis and Object Recognition"

Leistungsnachweis

Erfolgreiche Teilnahme an den Laborübungen und dem Projekt mit abschließender Klausur.

Gewichtung: 50% Projekt und 50% Klausur

424150030 Advanced Topics in Software Engineering

J. Ringert

Seminar

Fr, wöch., 15:15 - 16:45, Coudraystraße 13 B - Seminarraum 210

Veranst. SWS: 2

Beschreibung

This module is a seminar worth 3 ECTS.

The module focuses on a systematic literature review:

- finding a topic from Software Engineering,
- defining research questions for a literature review, and
- reviewing Software Engineering literature to answer your research questions.

Your mark will be determined by:

- intermediate submissions of your progress,
- presentations of your findings during the semester, and
- a final seminar paper and presentation (submitted at the end of the semester).

Leistungsnachweis

Presentations during the semester

Final seminar paper

4445203 Randomized Algorithms

A. Jakoby, R. Adejoh

Vorlesung

Di, wöch., 13:30 - 15:00, Lecture, ab 09.04.2024

Mi, wöch., 09:15 - 10:45, Karl-Haußknecht-Straße 7 - Seminarraum (IT-AP) 001, lab class, ab 10.04.2024

Di, Einzel, 09:00 - 16:00, Karl-Haußknecht-Straße 7 - Hörsaal (IT-AP), mündlicher Prüfung / oral exam, 20.08.2024 - 20.08.2024

Do, Einzel, 09:00 - 16:00, Karl-Haußknecht-Straße 7 - Hörsaal (IT-AP), mündlicher Prüfung / oral exam, 22.08.2024 - 22.08.2024

Do, Einzel, 09:00 - 16:00, Karl-Haußknecht-Straße 7 - Hörsaal (IT-AP), mündlicher Prüfung / oral exam, 26.09.2024 - 26.09.2024

Veranst. SWS: 4

Beschreibung

Randomisierte Algorithmen

Für viele Probleme stellen randomisierte Algorithmen die einzigen bekannten effizienten Lösungsverfahren dar. Für manches andere Problem erhalten wir mit einem solchen Verfahren Algorithmen, die um vieles einfacher und verständlicher sind als alle bekannten deterministischen Verfahren. Es ist daher nicht verwunderlich, dass wir randomisierte Algorithmen in viele Anwendungsgebieten finden, wie z.B. in

- Datenstrukturen,
- Graphenalgorithmen,
- parallelen und verteilten Systemen,
- Online-Algorithmen,
- Zahlentheorie und
- geometrische Algorithmen.

In der Vorlesung *Randomisierte Algorithmen* werden wir Verfahren aus einigen dieser Gebiete und grundlegende Techniken für randomisierte Algorithmen vorstellen und analysieren.

Darüber hinaus werden grundlegende probabilistische Methoden zur Analyse von Algorithmen vorgestellt.

engl. Beschreibung/ Kurzkomentar

Randomized Algorithms

For many problems randomized algorithms are the only known efficient solution method. For some other problem we can find randomized algorithms that are much simpler and more understandable than any known deterministic method. It is therefore not surprising that we find randomized algorithms in many areas, such as in

- data structures,
- graph algorithms,
- parallel and distributed systems,
- on-line algorithms,
- number theory, and
- geometric algorithms.

In the lecture Randomized Algorithms, we will present and analyze randomized algorithms and basic methods from some of these areas. Furthermore, basic probabilistic methods for the analysis of algorithms are presented.

Bemerkung

Gebäude: Coudraystraße 11C, Seminar Raum 202

Voraussetzungen

Bsc in a relevant study field

Leistungsnachweis

oral examination

4526501 Academic English Part One

G. Atkinson

Kurs

Mi, wöch., 15:30 - 16:45, Consultations, R.218, S143 (indiv.appointments), ab 24.04.2024

Veranst. SWS:

2

Mi, wöch., 17:00 - 18:30, Schwanseestraße 143 - Seminarraum 3.09, Academic English Part I+II (alternating), ab 24.04.2024

Beschreibung

This is the first part of a two-part course which aims to improve your ability to express yourself clearly in written English and to develop a suitably coherent academic writing style. Part One concentrates mainly on structure in writing academic articles, essays and reports. We begin by examining the structure of individual paragraphs and move on to extended texts of various types (e.g. process essays, cause/effect, comparison/contrast, etc.). Particular attention is paid to connectives, i.e. transitional phrases and constructions which help you link ideas and paragraphs in a logical, systematic way.

Bemerkung

You are advised to take Part One first, although it is possible to take both parts in reverse order or concurrently (i.e. in the same semester). You may only do the latter on the authority of the course leader (Atkinson).

Voraussetzungen

Registration (compulsory)

All students must register. First time participants are required to present a B2 English Level certificate along with their email registration. All students, **including those who have already taken Academic English Part Two and those who need to repeat Academic English Part One**, must register by contacting Howard Atkinson at: howard.atkinson@uni-weimar.de.

You will be informed by email when registration opens and when the deadline is. Please do not attempt to register until you have received this Email. Registration Emails should be given the subject heading: AE I Registration.

Leistungsnachweis

continuous assessment

4526502 Academic English Part Two

G. Atkinson

Veranst. SWS: 2

Kurs

Mi, wöch., 15:30 - 16:45, Consultations, R.2.18, S143 (indiv.appointments), ab 24.04.2024

Mi, wöch., 17:00 - 18:30, Schwanseestraße 143 - Seminarraum 3.09, Academic English Part I+II alternating, ab 24.04.2024

Beschreibung

Part Two of the Academic English course concentrates on improving and refining aspects of academic writing style. It includes sections on clause and sentence structure, punctuation rules and how to incorporate quotations, statistics and footnotes into academic texts.

Bemerkung

You are advised to take Part One first, although it is possible to take both parts in reverse order or concurrently (i.e. in the same semester). You may only do the latter on the authority of the course leader (Atkinson).

Voraussetzungen

Registration (compulsory)

All students must register. First time participants are required to present a B2 English Level certificate along with their email registration. All students, **including those who have already taken Academic English Part One and those who need to repeat Academic English Part Two**, must register by contacting Howard Atkinson at: howard.atkinson@uni-weimar.de.

You will be informed by email when registration opens and when the deadline is. Please do not attempt to register until you have received this Email. Registration Emails should be given the subject heading: AE II Registration.

Leistungsnachweis

continuous assessment

Information Proc. & Pres.

418260001 Physiological Computing

J. Ehlers

Veranst. SWS: 3

Vorlesung

Di, Einzel, 15:00 - 17:00, Marienstraße 13 C - Hörsaal A, written exam, 23.07.2024 - 23.07.2024

Di, wöch., 13:30 - 15:00, Marienstraße 13 C - Hörsaal D, Lecture (in person)

Di, wöch., Exercise (online until further notice)

Beschreibung

Physiological computing applies physiological data (like brain waves, skin conductance changes, pupil dynamics or heart rate variability) to generate user-state representations and enable computer systems to dynamically adapt to changes in cognitive and/or affective processing. By connecting the brain/body to a machine, the boundaries of the nervous system are extended which enables us to communicate with machines directly via processes that underlie our thoughts and emotions.

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Leistungsnachweis

Empirische Übungen und schriftliche Prüfung

4555262 Visualisierung

B. Fröhlich, D. Kiesel, I. López García, G. Rendle, P.

Veranst. SWS: 4

Riehmann

Vorlesung

Do, wöch., 13:30 - 15:00, Schwanseestraße 143 - Seminarraum 2.16, Lecture / Lab class , ab 04.04.2024

Mo, wöch., 17:00 - 18:30, Schwanseestraße 143 - Lintpool 2.17, Lab class, ab 08.04.2024

Mo, wöch., 17:00 - 18:30, Schwanseestraße 143 - Seminarraum 2.16, Lab class, ab 08.04.2024

Fr, Einzel, 10:00 - 12:00, Coudraystraße 13 A - Hörsaal 2, written Exam, 27.09.2024 - 27.09.2024

Beschreibung

Im ersten Teil der Veranstaltung werden die wichtigsten Verfahren und Techniken aus dem Bereich der Informationsvisualisierung für folgende Datentypen vorgestellt: multi-dimensionale und hierarchische Daten, Graphen, Zeitreihen und mengenbasierte Daten. Der zweite Teil beschäftigt sich mit verschiedenen Ansätzen und Algorithmen zur Visualisierung volumetrischer und vektorieller Simulations- und Messdaten. Die Veranstaltung wird englischsprachig angeboten.

In den Übungen werden eine Auswahl der in den Vorlesungen vorgestellten Visualisierungsansätze umgesetzt, getestet und evaluiert. Die abschließende Übungsaufgabe ermöglicht es Ihnen, ein eigenes Visualisierungsprojekt zu entwerfen, implementieren, evaluieren und präsentieren.

Voraussetzungen

Programmierkenntnisse sowie gute Kenntnisse von Algorithmen und Datenstrukturen sind erforderlich, z.B. nachgewiesen durch den erfolgreichen Abschluss der entsprechenden Lehrveranstaltungen des Bachelor-Studiengangs Medieninformatik.

In den Laborveranstaltungen werden JavaScript- und grundlegende GLSL-Programmierung eingesetzt. Grundkenntnisse der Computergrafik sind hilfreich, z.B. erworben durch die Vorlesung Computergrafik im Bachelor-Studiengang Medieninformatik.

Leistungsnachweis

Vorlesungsbegleitende, bewertete Übungen, mündliche oder schriftliche Prüfung und ein abschließendes Projekt.

Participation in lab classes (graded), oral exam and a final project.

Mobile HCI

Projects

424110001 Building an Observatory for Web Search Engines

B. Stein, M. Wiegmann

Projekt

Beschreibung

The quality and utility of the results you get from web search engines such as Google is concerning.

Many websites in the results have repetitive, wordy, uninformative, and highly commercialized content. With generative AI, we see the possibility that the synthetic web in which machines produce content for other machines will take over the human web.

We want to monitor the situation by building a tool: the search engine observatory. The tool will regularly scrape multiple search engines, measure the quality of the results, and display the results across time.

Students will learn how search engines work, define queries to monitor selected genres of websites (product reviews, recipes, tutorials, news, tech blogs, ...), measure the degree of generated content, commercialization, and search engine optimization, and render the results in an interactive web application.

Bemerkung

3. Lehrperson: Janek Bevendorff

Zeit und Ort werden zu Projektbörse bekannt gegeben!

Leistungsnachweis

Abschlusspräsentation und Ausarbeitung

424110003 Digital Dreams: Bauhaus Gamesfabrik

C. Wüthrich, W. Kissel, G. Pandolfo

Veranst. SWS: 10

Projekt

Mi, wöch., 13:30 - 15:30, Raum 205, Marienstr. 7b, ab 10.04.2024

Beschreibung

Herzlich willkommen bei Digital Dreams | Bauhaus Gamesfabrik, einem spannenden interdisziplinären Projekt, das die Fakultäten Kunst & Gestaltung und Medien an unserer Universität zusammenbringt. In diesem innovativen Projekt arbeiten Studierende unterschiedlicher Fachrichtungen in interdisziplinären Gruppen zusammen, um die dynamische Welt der Spieleentwicklung zu erkunden.

An der Schnittstelle von Kunst und Technologie dient Digital Dreams | Bauhaus Gamesfabrik als Spielwiese für Kreativität und Innovation. Studierende der Fakultät Kunst & Gestaltung bringen ihre Expertise in visueller Ästhetik, Erzählkunst und Konzeption ein, während diejenigen der Fakultät Medien ihre Fähigkeiten in Programmierung, Animation und interaktiven Medien einbringen.

In diesem gemeinschaftlichen Unterfangen werden interdisziplinäre Gruppen gebildet, die einen reichen Ideen- und Perspektivenaustausch fördern. Inspiriert vom Pioniergeist der Bauhaus-Bewegung, wo Kunst und Technologie zusammenkamen, um das moderne Design zu prägen, begeben sich unsere Studierenden auf eine Reise, um immersive und fesselnde Spielerlebnisse zu gestalten.

Im Laufe des Projekts vertiefen sich die Studierenden in verschiedene Aspekte der Spieleentwicklung, von der Ideenfindung und Prototypenerstellung bis hin zur Produktion und Präsentation. Unter der Anleitung eines erfahrenen Mentors beider Fakultäten lernen sie, die Komplexität interdisziplinärer Teamarbeit zu bewältigen und ihre einzigartigen Stärken zu nutzen, um Herausforderungen zu meistern und ihre kreative Vision zu verwirklichen.

Digital Dreams | Bauhaus Gamesfabrik ist mehr als nur ein Kurs; es ist eine transformative Erfahrung, die Studierenden ermöglicht, die Grenzen des traditionellen Spieldesigns zu überschreiten. Indem sie die Zusammenarbeit fördern und den Geist des Experimentierens annehmen, sind unsere Studierenden bereit, die nächste Generation visionärer Spieleentwickler zu werden und die Zukunft interaktiver Unterhaltung mitzugestalten.

Begleiten Sie uns auf dieser aufregenden Reise, auf der digitale Träume Wirklichkeit werden, und lassen Sie uns gemeinsam die Zukunft des Spielens an der Schnittstelle von Kunst und Technologie gestalten.

Bemerkung

Ort und Zeit werden zur Projektbörse bekanntgegeben.

Voraussetzungen

Studierende der Medieninformatik sollten Programmierkenntnisse mitbringen.

Studierende der Medienwissenschaft ein grundlegendes Interesse für Storytelling / Game Design

Leistungsnachweis

Abschlusspräsentation, fertiges Spiel.

424110004 Diving deep into Retrieval Augmented Generation

B. Stein, T. Gollub, M. Gohsen, M. Wiegmann

Projekt

Beschreibung

Retrieval Augmented Generation (RAG) with agents is currently one of the hottest topics in generative AI.

The basic idea of RAG is to connect large language models with search technology. The search technologies are used to retrieve information that is relevant for a given conversation, which can then be exploited by a large language model when generating a natural language response. Though the idea is straight forward, many decisions have to be made when it comes to its implementation.

For research on RAG, it is hence critical to be able to measure the performance of a RAG system. In the project, we study the state-of-the-art in RAG evaluation, deploy RAG systems with different settings to our GPU-cluster, and compare their performance on various benchmark datasets and with respect to their user experience.

Bemerkung

Zeit und Ort werden zu Projektbörse bekannt gegeben!

Leistungsnachweis

Abschlusspräsentation und Ausarbeitung.

424110005 Futuring Machines. Developing an AI-Bot for Fiction Co-Writing

B. Stein, M. Gohsen, K. Heinrich, J. Kiesel

Projekt

Beschreibung

Sustainable, resilient societies require a critical examination of possible futures. "Futuring Machines" is an interdisciplinary and practice-oriented project that explores the potential of large language models as thought-provoking tools for writing future scenarios.

In this student project, we are developing a web-based writing environment together with students from the Faculty of Art and Design as live testers.

You will develop various text operations that employ large language models (e.g., elaborating a scene, suggesting storylines). You can choose to focus on implementing operations or performing user testing.

The writing environment we develop will then be used in several workshops (e.g., at Futurium Berlin).

engl. Beschreibung/ Kurzkomentar

Zeit und Ort werden zu Projektbörse bekannt gegeben!

Leistungsnachweis

Abschlusspräsentation und Ausarbeitung

424110006 PKI from Scratch

S. Lucks, N. Lang, J. Leuther

Projekt

Veranst. SWS: 10

Beschreibung

A public key infrastructure (PKI) is a system which issues, distributes and validates digital certificates.

PKIs are a central component in today's digital infrastructure. For example, when you encounter a website secured by TLS (HTTPS), this site will have a digital certificate which was issued through a PKI and can therefore be trusted.

A PKI establishes a system of trust, which can also be used in closed-off environments where it facilitates the use of digital certificates for many usages like smartcards, digital signatures or many-factor authentication.

In this project, we will set up our own PKI from the ground up and explore the concepts that are utilized in such a system and how a PKI can be used to advance digitalisation.

Voraussetzungen

- Good Programming Skills
- Experience with Linux/Unix
- Cryptography knowledge not required but helpful

Leistungsnachweis

Zwischenpräsentationen, Abschlusspräsentation, Abschlussbericht

424110007 Social Engineering – das Abenteuer geht weiter!

A. Jakoby, S. Lucks, J. Ehlers, R. Adejoh, G. Pandolfo

Projekt

Beschreibung

Viele Cyber-Angriffe basieren auf Techniken des Social Engineering. Dazu gehören das Vortäuschen von Autorität, das Schreiben von Phishing-Mails, „Dumpster-Diving“ (das Durchsuchen von Abfällen nach nützlichen Informationen, die aus Leichtsinn weggeworfen wurden), usw.

Social Engineering nutzt menschliche Charakterzüge aus, zum Beispiel den Respekt für Autorität, die Bereitschaft anderen zu helfen, aber auch Leichtgläubigkeit und Faulheit. Ebenso setzt Social Engineering auf das Auslösen und Ausnutzen von menschlichen Emotionen, z.B. Furcht, Neugier, Hoffnung oder Schuldgefühle.

In dem Projekt geht es darum, Techniken des Social Engineering zunächst zu beschreiben und zu verstehen und nachfolgend ein (Computer-)spiel daraus zu entwickeln.

Der Spieler bzw. die Spielerin soll sich in eine Organisation „einhacken“. Dazu muss er oder sie nach und nach verschiedene Zugangsdaten in Erfahrung bringen und in verschiedene IT-Systeme einbrechen – natürlich unter Anwendung immer anderer Techniken des Social Engineering.

Das Spiel soll zunächst einmal als Text-Adventure gespielt werden. Bei einem erfolgreichen Projektverlauf könnte ein Folgeprojekt das Spiel zu einem graphischen Abenteuerspiel weiterentwickeln.

Leistungsnachweis

Zwischenpräsentationen, Abschlusspräsentation, Abschlussbericht

424110008 Social Risks of Large Language Models: Audits and Experiments

M. Jakesch

Projekt

Di, wöch., 09:00 - 11:00, Karl-Haußknecht-Straße 7 - Seminarraum (IT-AP) 001, ab 23.04.2024

Do, Einzel, 09:00 - 11:00, Karl-Haußknecht-Straße 7 - Seminarraum (IT-AP) 001, 16.05.2024 - 16.05.2024

Beschreibung

Our communication is increasingly intermixed with language generated by AI. Across chat, email, and social media, AI systems suggest words, complete sentences, and produce entire articles. While the development and deployment of large language models is progressing expeditiously, the social consequences are hardly known.

In this project we will discuss potential social risks posed by large language models, drawing on multidisciplinary literature from computer science, linguistics, and social sciences. We will look at approaches that critically probe machine learning systems and examine the impact technology may have on users and society.

After initial engagement with the relevant literature and tools, participants will design and execute their audit and experiment, probing a social risk of a large language model in small groups. The project concludes with writing sessions, and the expected output will be an initial draft of an investigative report or scientific paper.

engl. Beschreibung/ Kurzkomentar

Für B.Sc. I: Informatikprojekt, Medieninformatik- oder Gestaltungsprojekt, oder Data-Science-Projekt

Bemerkung

Lehrende: Jun.-Prof. Maurice Jakesch

Voraussetzungen

Basic programming knowledge is required. Prior exposure to data science tools, machine learning and experiments is useful, but not a requirement.

Most of all, participants should have a keen interest in interdisciplinary investigative work.

424110009 SPHINCS Safari: Giza Treasures and Manticore Myths

S. Lucks, N. Lang, J. Leuther
Projekt

Veranst. SWS: 10

Beschreibung

Hash-based signature algorithms are promising candidates for securing communication in the age of quantum computers. SPHINCS+ is an example of such a stateless signature algorithm that gained popularity from the recent „Post-Quantum Cryptography Standardisation Competition”.

A major downside of hash-based signature algorithms like SPHINCS+ is the size of the signature itself, which is magnitudes larger than what other algorithms provide. However, there are recent alternatives to SPHINCS+ that are being developed to reduce the downsides while still maintaining the benefits of the hash-based approach.

We will mainly (but not exclusively) focus on two such variants:

Giza and Manticore.

In this project, you will work with experts on this subject to get to know some of these alternatives. Your task is to implement prototypes of these algorithms and analyse them regarding some of their benefits or downsides.

Bemerkung

The time and place will be announced at the project fair!

Voraussetzungen

Introduction to Modern Cryptography (or equivalent)

Excellent Programming Skills

Leistungsnachweis

Zwischenpräsentationen, Abschlusspräsentation, Abschlussbericht.

424110010 Data driven Objects

E. Hornecker, H. Waldschütz

Projekt

Beschreibung

If we think of data representations, we normally only think of visualisations. But what if data moved off the screen, with 3D physical shape and materiality, into the world, so we could touch it, hold it in our hands, feel it – or navigate the data by moving around it? And what if it could move and change shape to reflect updates and in response to user interactions?

Physical representations of data have existed for thousands of years. Initially emerging from the arts, 'data physicalisation' is increasingly investigated in Information Visualisation and HCI, pushed by recent advances in digital fabrication and mechanical actuation. Physicalisations have the potential for novel and creative designs as well as changing our relation to data. Their design can utilize digital and material a LEDs to traditional

crafts materials, where the choice of material influences meaning and experience. Most work in this area has created static representations – but for dynamic data series and interactive feedback, we need flexible, shape-changing or moving representations.

Following a Research through Design (RtD) approach, we will work in small groups (mixing technical and design students) to develop dynamic data physicalisations, e.g. using motor-based actuation for shape-change. We will engage with the literature in this field of research, investigate options for creating dynamic physicalisations, develop ideas/concepts and prototype them, and implement one of our ideas. Finally, we will do a small user study of our data representations.

Students from the different degree programs will have different emphasis in tasks in this project:

- *HCI Master* students will engage both with technology and design aspects. They will take part in creative conceptualization, focusing on user interaction and experience, and will devise and run a small user study of the final design.
- *Informatik Bachelor* students will focus on technical aspects, in particular actuation technologies and control, the software side of data query/interaction, and potentially, detection of user input.
- *Product Design* and *Media-Architecture* students will engage in creative-artistic conceptualization and focus on physical-material design and construction and will collaborate on designing the user interaction.

This course is perfect for students who would like to be challenged to find problems, who enjoy individual and (multi-disciplinary) group-work, and to come up with their own concepts. Students will focus on research topics such as "qualitative data representations", "data physicalisations", "affordances", "shape-changing interfaces", and "ambient/peripheral interfaces".

We encourage students to participate that have a high interest in prototyping with hardware (e.g., Arduino), working with materials (e.g., wood or silicone), or using traditional fabrication techniques (e.g., origami-folding). The project is most suited for students who want 18 ECTS

Voraussetzungen

Participants should have an interest in working with and tinkering with physical materials, ideally some prior experience with Arduino and electronics. They should be interested in developing novel interactive devices and interaction techniques and in exploring novel ways of representing data and making it interactive. All participants should enjoy working in an interdisciplinary group, want to be creative, build prototypes, and be able to converse in English.

- Informatik (B.Sc.) technical ability, interest in learning Arduino, electronics, and in particular controlling motors and/or other actuators, interest in creative work.
- M.Sc. HCI: interest in creative design and interaction with data; willingness to think 'out of the box'; Interest in working with actuated objects, physical design; ability to contribute to conceptual work; willingness to learn and do: interaction design, physical design methods and electronics, human-data interaction, evaluation methods.
- Product Design (PD): Creativity, practical experience with design of interactive products/objects, physical construction (e.g. 3D- printing, laser-cutting, woodwork, metalwork etc.), ideally some prior experience with electronics and Arduino or with mechanics (moving parts). Media-Architecture (MA): Creativity, practical experience with physical construction (e.g. 3D-printing, laser-cutting, woodwork etc.), ideally some prior experience with electronics and Arduino
- PD and MA: Please apply until 03.04.2024 by E-Mail with Hannes.waldschuetz@uni-weimar.de and eva.hornecker@uni-weimar.de (please include a description of your prior experience in relevant areas, with examples of prior work if applicable)!

(We plan to attend the project fair PD to present the project.)

Leistungsnachweis

Active participation and interim presentations, practical problem-based work (both individual and in groups), and a project-based (scientific) report.

424110013 Hand(y) Movements: Defining Cognitive Load Through Smartphone Accelerometer Sensors (CoLA)

J. Ehlers

Projekt

Veranst. SWS:

10

Beschreibung

Exploring non-invasive ways to determine the level of mental processing is essential for human-computer applications as an all too low/high cognitive load is likely to cause human errors in critical tasks.

The present project aims to investigate a yet unexplored way to quantify the extent of cognitive load via smartphone accelerometer sensors in a controlled lab study. Students will be asked to implement a simple App that allows to vary the amount of load in two established cognitive tasks and that collects data on individual hand movement patterns. Results need to be analysed and documented in a lab report.

Bemerkung

Zeit und Ort werden zu Projektbörse bekannt gegeben!

The time and place will be announced at the project fair!

Voraussetzungen

Experiences in App programming as well as knowledge of experimental methods are beneficial

Leistungsnachweis

1) Implement an App that allows to vary the task load in two cognitive load assignments

- 2) Find a way to derive hand movement patterns from smartphone accelerometer sensors
- 3) Design an empirical study in order to correlate the shivering of the hand with different levels of cognitive load
- 4) Analyse and document your findings in a lab report

424110014 VR Groovy

B. Fröhlich, E. Hornecker, A. Lammert, R. Koningsbruggen, L. Simon
Projekt

Veranst. SWS: 20

Beschreibung

Oftentimes, groups of friends live all over Germany, couples are in long-distance relationships, or grandparents live far away from their grandchildren. While it is possible to spend time together in video conferences, this is perceived as a shared experience only to a limited extent. Social virtual reality offers more extensive possibilities for this. But how can interaction that conveys social closeness be further improved in virtual space?

Although social VR allows for shared experiences, such experiences are often limited by not providing precise temporal synchronisation. As a result, activities such as singing, dancing or virtual games can be perceived as non-synchronous experiences and users can literally feel out of sync.

In this project, we will utilise different prototyping and development approaches to investigate what effects can occur when social interactions are out of sync and how the feeling of shared synchronous experiences can be increased. For this purpose, we would like to investigate, among other things, how responsive environments or avatar designs that motivate movement could be used for such purposes. Step by step, we will identify difficulties during social interactions in latency affected environments and develop concepts to foster a shared sense of synchrony, which will then be implemented and evaluated.

This course is perfect for students who would like to be challenged to find problems, who enjoy individual and (multi-disciplinary) group-work, and to come up with their own concepts. We encourage students to participate that have a high interest in working from theory, coming up with speculative concepts, and learning how to realise those concepts as an artefact.

Voraussetzungen

Interest in interaction design and different types of prototyping.

or

Solid programming / scripting experience (C#, C++, Python o.Ä.). Experience in Unity and/or with VR recommended.

All participants should enjoy working in an interdisciplinary group, want to be creative, build prototypes, and be able to converse in English.

Product Design: Please register until 03.04.2024 by sending an email to:

eva.hornecker@uni-weimar.de,

bernd.froehlich@uni-weimar.de,

laura.simon@uni-weimar.de,

anton.benjamin.lammert@uni-weimar.de

rosa.donna.van.koningsbruggen@uni-weimar.de

(please include a description of your prior experience in relevant areas or a portfolio).

424110015 Hot Topics in Computer Vision SoSe24

V. Rodehorst, C. Benz, J. Eick, A. Frolov, M. Kaisheva, D. Tschirschwitz

Projekt

Beschreibung

Die Teilnehmer werden an ein aktuelles forschungs- oder industrierelevantes Thema herangeführt. Es ist nicht beabsichtigt einen festgelegten Bereich in voller Breite zu explorieren. Stattdessen werden die Teilnehmer mit der vollen Komplexität eines begrenzten Themas konfrontiert und die Eigeninitiative gefördert. Es ermöglicht einen Einblick in die Forschungs- und Entwicklungsprojekte des Fachgebiets.

Bemerkung

Ort und Zeit werden zur Projektbörse bekanntgegeben.

Voraussetzungen

Gute Programmierkenntnisse (z.B. C/C++, MATLAB, OpenCL/CUDA)

Leistungsnachweis

Aktive Mitarbeit, Einführungsvortrag, Abschlusspräsentation, Dokumentation

424110017 Feminist Smart City: Exploring Technological Urban Futures through Speculative Design

E. Hornecker, M. Osipova

Projekt

Beschreibung

Smart Cities are a prominent trend in Urban Development globally. It is our duty as researchers and designers to ensure our designs will embody the values of equality, inclusivity and fairness. Smart Urban Technologies and Smart City concepts are both the subject and the root of challenges.

Designing futures is an interdisciplinary task with many degrees of freedom. Exploring these will be a focus of our project: how can we ensure that the Smart Cities we create will unfold for the benefit of all citizens and not for "Black Mirror" scenarios.

We will start by exploring various Urban Technologies and Smart City concepts and projects. Then, we will explore how to use speculative design to design futures and apply this method for urban challenges. We will further explore Feminist approaches to designing technological solutions (emphasizing standpoints of non-represented and marginalised user groups) and how it can be embedded in speculative methods and workshop planning. Finally, we will apply our knowledge to the design of speculative workshops on designing (and challenging) Smart City concepts from the perspective of embedded values. Our final outcome will consist of planning and executing speculative design workshops on the Smart City topic, with the outcomes analysed and summarised.

To bring in further expertise and perspectives, guest lectures and workshops are planned with invited researchers from the OFFIS research institute in Oldenburg, University of Tampere, Finland as well as other Labs in Bauhaus-Universität.

- This project is heavily research oriented, therefore, interest in academic work and experience with HCI or User-Centered Design research methods is a prerequisite for all participants.
- This project is an opportunity to learn more about urban technologies, Smart Cities, Value-Based Designed Futures and speculative design methodology. Upon successful completion you could use your results as a bridge for a thesis or Student Research publication.
- The project's active phase runs till the end of July and the expected workload is approximately 2 working days per week for 12 ECTs and 3 working days for 18 ECTs.

We encourage all students to email Margarita with your CV to check whether you qualify for the project. For students from other degrees than HCI/CS4DM this is a mandatory step for acceptance. Please feel free to reach out for more details or with any questions or clarifications to be sure that this project is a good fit for you.

margarita.osipova@uni-weimar.de

- This project is a part of "Feminist Smart Cities: Speculative Design Methodology for Creating Feminist Future for Smart Cities"

Projektnummer: 56-M-2023

Co-sponsored by Bauhaus-Universität Weimar und Frauenförderfond.

Voraussetzungen

- **Students from HCI Masters:** have successfully completed at least one of the following courses by HCI chair: "HCI Research Methods", "Ubiquitous Computing".
- **Students from CS4DM Masters:** have successfully completed at least one of the following courses by HCI chair: "HCI Introduction", "HCI Research Methods", "Ubiquitous Computing".
- **Student from Media Architecture:** in 2+ semester of the program.

Interested students from other programs can contact Margarita via email for details. Mind that you would be responsible for clarifying with your program lead how to include this project in your curriculum in terms of earned credits.

To avoid issues after the project selection algorithm, we encourage **all interested students** to write an email to Margarita to confirm eligibility for participation in the project and attach a CV and a short motivation statement.

424110018 HygieneVR: Medical Training in VR

B. Fröhlich, M. Hartmann, T. Zöppig
Projekt

Veranst. SWS: 20

Beschreibung

Virtual Reality has been used in many areas of education and training in recent years. One area where it is increasingly being used is in the training of medical students. Complex medical procedures can be represented in VR so that students can repeat and practice them repeatedly, independent of the availability of special training equipment and test patients.

In this project, we will develop a prototype in collaboration with the University Hospital of Jena, which will allow the demonstration, practice and monitoring of a hospital hygiene procedure. The aim is to carry out a study using this prototype to compare the learning success and error rates of students between a conventional training procedure and a training procedure using VR.

At the beginning of the project we will get an overview of related work in the field of medical training in VR and develop concepts for the prototype. We want to answer the following questions: What interaction techniques are

appropriate in the given context? How can the correct execution of the processes be monitored and supported? How can students and teachers collaborate?

In the course of the project, you will gain further skills in developing interaction designs for VR applications, realizing them using Unity and have the opportunity to develop and implement your own concepts. The results of the project will then be used to conduct a study with medical students.

Voraussetzungen

Solid software programming / scripting experience (C#, C++, Python o.Ä.)

Experience in Unity recommended.

Interest in Interaction Design and Studies.

424110019 An AV pipeline for the Linux Dome

C. Wüthrich, N.N.

Projekt

Beschreibung

In this project, we will work on the finalization of the pipeline for the new FullDome at S134, which is a Linux based Dome with a 3D soundsystem and multiple projectors controlled by software.

This semester we will need to specify and build a Vulkan or Pipewire based System allowing to pipeline output from any video processing software into the input of a different video processing hardware, in a similar way that Syphon and Spout do it in the Mac and Windows environments.

424110020 Field Takes for Immersive Dome Content

C. Wüthrich, N.N.

Projekt

Beschreibung

In this project, we will explore the real world to record environments for their projection in a Fulldome. After planning what we want to take, we will make shootings with a 360 degree camera and an ambisonics 3D microphone so that they can be projected in a Fulldome environment such as the Linux Fulldome at the Schwanseeestrasse 143 in Weimar. Focus of the project will be the definition of the workflow - both from the devices as well as from the software pipeline point of view.

The project will be interdisciplinary, with also students from the Faculty of Arts and Design.

424110021 BUWLense – AI-Powered Image-to-Image Search

D. Tschirschwitz

Projekt

Beschreibung

Image retrieval systems such as Google Lens have become indispensable for everyday tasks like traveling and shopping. In this project, students will investigate how a resource-efficient retrieval pipeline can be expanded and

further refined. A significant emphasis will be placed on enhancing the current network's performance using the full suite of machine learning tools. Additionally, the project may delve into domain-specific retrieval tasks, fine-tune a newly developed loss function, employ various techniques for embedding dimensionality reduction, extend the existing dataset for efficient training, or design a user platform to leverage the existing retrieval pipeline.

Participants in the project must have completed the course "Deep Learning for Computer Vision."

424150000 Crypto Party

S. Lucks, N. Lang, J. Leuther

Veranst. SWS: 2

Seminar

Mi, vierwöch., 12:30 - 14:00, Schwannseestraße 143 - Seminarraum 2.16, ab 17.04.2024

Beschreibung

"Eine Cryptoparty ist eine lockere, öffentliche Veranstaltung, auf der Teilnehmende z.B. lernen können, bestehende Verschlüsselungs- und Anonymisierungssoftware zu bedienen. Auf Cryptopartys geht es in erster Linie um den Abbau von Vorurteilen, wie z.B. dem, dass man ein Computerfreak sein muss, um diese spezielle Software einzusetzen. Ist die Software einmal eingerichtet, fällt sie im Alltag kaum auf, schützt die Privatsphäre aber ungemein.

Aber auch Profis können die Veranstaltung nutzen, um sich mit Gleichgesinnten auszutauschen und z.B. gegenseitiges Keysigning zu betreiben (was das ist, wird vor Ort auch nochmal erklärt ;))." (Chaos Computer Club (CCC) Mannheim)

Die Cryptoparty findet im Rahmen OpenLab Night der Summaery statt. Alle Teilnehmenden des Seminars präsentieren ein ausgewähltes Thema aus der Kryptographie, bzw eine thematisch passende Software, auf der OpenLab Night.

Die Prüfungsleistung besteht aus zwei Teilen: Einer Vorpräsentation im laufenden Semester und der Erstellung eines Posters und der eigentlichen Präsentation auf der OpenLab Night.

Voraussetzungen

- Introduction to Modern Cryptography (or equivalent)
- Students who are participating in Introdcution to Modern Cryptography in the ongoing summer term 2024 are also admitted.

Leistungsnachweis

Eigenständige Bearbeitung eines Themas, mündliche Präsentation zu einem Thema, Teilnahme an Diskussion zu den präsentierten Themen.

VR/AR

4336010 Image Analysis and Object Recognition

V. Rodehorst, M. Kaisheva

Veranst. SWS: 4

Vorlesung

Di, wöch., 15:15 - 16:45, Coudraystraße 9 A - Hörsaal 6, Lecture, ab 09.04.2024

Do, wöch., 11:00 - 12:30, Coudraystraße 9 A - Hörsaal 6, Lab class, ab 11.04.2024

Di, Einzel, 11:00 - 13:00, Steubenstraße 6, Haus F - Hörsaal K20, written Exam, 06.08.2024 - 06.08.2024

Di, Einzel, 11:00 - 13:00, Coudraystraße 9 A - Hörsaal 6, written Exam, 06.08.2024 - 06.08.2024

Beschreibung

Bildanalyse und Objekterkennung

Die Vorlesung gibt eine Einführung in die Grundlagen der Mustererkennung und Bildanalyse. Behandelt werden unter anderem die Bildverbesserung, lokale und morphologische Operatoren, Kantenerkennung, Bilddarstellung im Frequenzraum, Fourier-Transformation, Hough-Transformation, Segmentierung, Skelettierung, Objektklassifizierung und maschinelles Lernen zur visuellen Objekterkennung.

engl. Beschreibung/ Kurzkomentar

Image analysis and object recognition

The lecture gives an introduction to the basic concepts of pattern recognition and image analysis. It covers topics as image enhancement, local and morphological operators, edge detection, image representation in frequency domain, Fourier transform, Hough transform, segmentation, thinning, object categorization and machine learning for visual object recognition.

Leistungsnachweis

Erfolgreiche Bearbeitung der Übungen sowie des Miniprojekts und Klausur