Lijie Yao 姚李捷 (she/her/they)

Address 1 : Bâtiment 660, Université Paris-Sud, 91405 Orsay Cedex, France
Address 2: MS680, University of Calgary, 2500 University Dr NW, Calgary, AB T2N 1N4, Canada
E-mail: yaolijie0219@gmail.com | Tel: +33 6 58 71 00 98 | Personal webpage: https://lijieyao.com
ORCID: 0000-0002-4208-5140 | Google scholar: W-fVL00AAAAJ | HAL: lijie-yao

About Me

Lijie Yao 姚李捷 is a final-year Ph.D. candidate in Human-computer Interaction at the AVIZ team, Inria Saclay, University Paris-Saclay, and CNRS, supervised by Dr. Petra Isenberg and Dr. Anastasia Bezerianos. Her Ph.D. thesis is on "Situated Visualization in Motion". Her work focused on exploring the impact of motion and spatial factors on visualizations' perception and how to design visualizations under motion in real application scenarios. She got her M.S. degree in Computer Science from University Paris-Saclay in 2020 and her M.Eng degree in Electrical and Computer Engineering from Polytech Lille in 2019. She received her B.Eng in Electronic and Information Engineering from XIDIAN University in 2018. She is now open to work.

Research Area

- **Human-Computer Interaction**: Focus on Visual Analytics & Information Visualization.

- **Situated Visualization in Motion**: Explore the impact of motion & spatial factors on visualizations' perception and how to best design and embed visualizations in motion in real application scenarios/in the physical world.

- **Mobile & Wearable Devices**: Mine users' real data needs in different using scenarios, particularly for health data and sports tracking, and develop prototypes to quickly design the visual representations and improve the perception efficiency of data displayed.

Education

09/2020 – 12/2023 **University Paris-Saclay**   Gif-sur-Yvette, France
Ph.D. - Human-computer Interaction
· Ph.D. Thesis: Situated visualization in motion
· Supervisors: Dr. Petra Isenberg and Dr. Anastasia Bezerianos

09/2019 – 09/2020 **University Paris-Saclay**   Gif-sur-Yvette, France
M.S. - Computer Science (Human-computer Interaction)
· Master Thesis: Situated visualization in motion
· Supervisors: Dr. Petra Isenberg

09/2017 – 09/2019 **Polytech Lille**   Lille, France
M.Eng - Electrical and Computer Engineering
· Master Thesis: Drone Control based on ROS *
· Supervisors: Dr. Komi Midzodzi Pekpe

08/2014 – 08/2017 **XIDIAN University**   Xi'an, China
B.Eng - Electronic and Information Engineering
· Bachelor Thesis: Wearable Device for Real-time Health Monitoring *
· Supervisors: Dr. Xavier Redon and Dr. Alexandre Boé

All content with underline in this document is clickable.
* Given links are in French, please refer to the on-campus project experience for more information in English.

Work Experiences

07/2023 – Present   <u>**University of Calgary**</u>   Calgary, Canada
Visiting Researcher
  - · Project: Situated Visualization in Motion for Mobile & Wearable Devices
  - · Team: <u>DATA X EXPERIENCE LAB</u>
  - · Supervisor: Dr. <u>Wesley Willett</u> & Dr. <u>Petra Isenberg</u>

01/2022 – 03/2023   <u>**University Paris-Saclay**</u>   Gif-sur-Yvette, France
Teaching Assistant
  - · Give part of master's lectures and tutorials: Animated visualization and motion,
    Visualization with time series data, Design and sketching, P5 tutorial, and D3 tutorial.

09/2020 – Present   <u>**Inria**</u>   Gif-sur-Yvette, France
Doctoral Researcher
  - · Team: <u>AVIZ</u>

03/2020 – 09/2020   <u>**Inria**</u>   Gif-sur-Yvette, France
Research Intern
  - · Team: <u>AVIZ</u>

03/2019 – 09/2019   <u>**Saint-Gobain**</u>   Compiègne, France
Maintenance Management Intern
  - · Independently managed and completed two diffusable projects, collected and analyzed
    data, and communicated among different cultures.

06/2018 – 08/2018   <u>**MCC HUATIAN Engineering and Technology Corporation**</u>   Nanjing, China
Front-end Developer
  - · Implemented a website that offered user management services.

Languages

- Chinese: Native speaker
- English: Professional working proficiency (Level: C1)
- French: Professional working proficiency (Level: C1)

Publication

- **Lijie Yao,** Anastasia Bezerianos, Romain Vuillemot, Petra Isenberg. Visualization in Motion: A Research Agenda and Two Evaluations. *IEEE Transactions on Visualization and Computer Graphics ([TVCG](#))*, 2022, 28(10), pp. 3546-3562, ⟨[10.1109/TVCG.2022.3184993](#)⟩, ⟨[hal-03698837](#)⟩.

  Abstract:
  We contribute a research agenda for visualization in motion and two experiments to understand how well viewers can read data from moving visualizations. We define visualizations in motion as visual data representations that are used in contexts that exhibit relative motion between a viewer and an entire visualization. Sports analytics, video games, wearable devices, or data physicalizations are example contexts that involve different types of relative motion between a viewer and a visualization. To analyze the opportunities and challenges for designing visualization in motion, we show example scenarios and outline a first research agenda. Motivated primarily by the prevalence of and opportunities for

visualizations in sports and video games we started to investigate a small aspect of our research agenda: the impact of two important characteristics of motion—speed and trajectory on a stationary viewer's ability to read data from moving donut and bar charts. We found that increasing speed and trajectory complexity did negatively affect the accuracy of reading values from the charts and that bar charts were more negatively impacted. In practice, however, this impact was small: both charts were still read fairly accurately.

- Yvonne Jansen, Federica Bucchieri, Pierre Dragicevic, Martin Hachet, Morgane Koval, Léana Petiot, Arnaud Prouzeau, Dieter Schmalstieg, **Lijie Yao,** Petra Isenberg. Envisioning Situated Visualizations of Environmental Footprints in an Urban Environment. *In Proceeding of the IEEE conference on Visualization (IEEE VIS), Visualization for Social Good*, October 2022, Oklahoma, United States. ⟨hal-03770857⟩.

  Abstract:
  We present the results of a brainstorming exercise focused on how situated visualizations could be used to better understand the state of the environment and our personal behavioral impact on it. Specifically, we conducted a day long workshop in the French city of Bordeaux where we envisioned situated visualizations of urban environmental footprints. We explored the city and took photos and notes about possible situated visualizations of environmental footprints that could be embedded near places, people, or objects of interest. We found that our designs targeted four purposes and used four different methods that could be further explored to test situated visualizations for the protection of the environment.

- Alaul Islam*, **Lijie Yao*,** Anastasia Bezerianos, Tanja Blascheck, Tingying He, Bongshin Lee, Romain Vuillemot, Petra Isenberg.. Reflections on Visualization in Motion for Fitness Trackers. *In Proceeding of the ACM International Conference on Mobile Human-Computer Interaction (MobileHCI), New Trends in HCI and Sports,* September 2022, Vancouver, Canada. ⟨hal-03775633⟩.

  Abstract:
  In this paper, we reflect on our past work towards understanding how to design visualizations for fitness trackers that are used in motion. We have coined the term "visualization in motion" for visualizations that are used in the presence of relative motion between a viewer and the visualization. Here, we describe how visualization in motion is relevant to sports scenarios. We also provide new data on current smartwatch visualizations for sports and discuss future challenges for visualizations in motion for fitness trackers.

  * These authors contributed equally.

- Federica Bucchieri, **Lijie Yao,** Petra Isenberg. Situated Visualization in Motion for Video Games. *Posters of the EuroGraphics Conference on Visualization (EuroVis),* June 2022, Rome, Italy. ⟨10.2312/evp.20221119⟩, ⟨hal-03694019⟩.

  Abstract:
  We contribute a systematic review of situated visualizations in motion in the context of video games. Video games produce rich dynamic datasets during gameplay that are often visualized to help players succeed in a game. Often these visualizations are moving either because they are attached to moving game elements or due to camera changes. We want to understand to what extent this motion and contextual game factors impact how players can read these visualizations. In order to ground our work, we surveyed 160 visualizations in motion and their embeddings in the game world. Here, we report on our analysis and categorization of these visualizations.

- **Lijie Yao,** Anastasia Bezerianos, Romain Vuillemot, Petra Isenberg. Situated Visualization in Motion for Swimming. *Poster of the France National Conference on Visualization ([Journée Visu](#)),* June 2022, Bordeaux, France. ⟨hal-03700406⟩.

  Abstract:
  Competitive sports coverage increasingly includes information on athlete or team statistics and records. Sports video coverage has traditionally embedded representations of this data in fixed locations on the screen, but more recently also attached representations to athletes or other targets in motion. These publicly used representations so far have been rather simple and systematic investigations of the research space of embedded visualizations in motion are still missing. Here we report on our preliminary research in the domain of professional and amateur swimming. We analyzed how visualizations are currently added to the coverage of Olympics swimming competitions and then plan to derive a design space for embedded data representations for swimming competitions. We are currently conducting a crowdsourced survey to explore which kind of swimming-related data general audiences are interested in, in order to identify opportunities for additional visualizations to be added to swimming competition coverage.

- Federica Bucchieri, **Lijie Yao,** Petra Isenberg. Visualization in Motion in Video Games for Different Types of Data. *Poster of the France National Conference on Visualization ([Journée Visu](#)),* June 2022, Bordeaux, France. ⟨hal-03700418⟩.

  Abstract:
  We contribute an analysis of situated visualizations in motion in video games for different types of data, with a focus on quantitative and categorical data representations. Video games convey a lot of data to players, to help them succeed in the game. These visualizations frequently move across the screen due to camera changes or because the game elements themselves move. Our ultimate goal is to understand how motion factors affect visualization readability in video games and subsequently the players' performance in the game. We started our work by surveying the characteristics of how motion currently influences which kind of data representations in video games. We conducted a systematic review of 160 visualizations in motion in video games and extracted patterns and considerations regarding was what, and how visualizations currently exhibit motion factors in video games.

- **Lijie Yao**, Anastasia Bezerianos, and Petra Isenberg. Situated Visualization in Motion. *Posters of the IEEE Conference on Visualization ([IEEE VIS](#))*, October 2020, Salt Lake City, United States. ⟨hal-02946587v2⟩.

  Abstract:
  We contribute a first design space on visualizations in motion and the design of a pilot study we plan to run in the fall. Visualizations can be useful in contexts where either the observation is in motion or the whole visualization is moving at various speeds. Imagine, for example, displays attached to an athlete or animal that show data about the wearer – for example, captured from a fitness tracking band; or a visualization attached to a moving object such as a vehicle or a soccer ball. The ultimate goal of our research is to inform the design of visualizations under motion.

Awards

- 03/2023   Mitacs Globalink Research Award, MITCAS Canada

Teaching

UNIVERSITY PARIS-SACLAY

- 2022/2023   Master course: <u>Interactive Information Visualization</u>
- 2021/2022   Master course: <u>Interactive Information Visualization</u>

Supervision

- <u>Federica Bucchieri</u>, 03/2022 - 08/2022, Situated Visualization in Motion for Video Games, Master's graduation level research internship, Human-Computer Interaction, University Paris-Saclay, co-supervised with Dr. Petra Isenberg.

Service

REVIEW

- 2023 IEEE Information Visualization Conference (*<u>IEEE VIS</u>*)
- 2023 EuroGraphics Conference on Visualization (*<u>EuroVis</u>*)
- 2023 ACM Conference on Human Factors in Computing Systems (*<u>CHI</u>*)
- 2022 IEEE Information Visualization Conference (*<u>IEEE VIS</u>*)
- 2022 ACM SIG International Conference on Computer Graphics and Interactive Techniques (*<u>SIGGRAPH Asia</u>*)

STUDENT VOLUNTEER

- 2022 EuroGraphics Conference on Visualization (*<u>EuroVis</u>*)
- 2021 IEEE Information Visualization Conference (*<u>IEEE VIS</u>*)
- 2020 IEEE Information Visualization Conference (*<u>IEEE VIS</u>*)

THE FOLLOWING CONTENT IS FROM MY BACHELOR'S AND MASTERS' PERIODS.

On-campus Project Experience

12/2019 – 02/2020   **AR Game Development base on Unity**   Gif-sur-Yvette, France

- Project type: Course project - Personal project
- Introduction: This was a course project, based on Unity, implemented by C#, through Vuforia library to develop an AR game applied for mobile devices.

02/2019 – 10/2020   **Posture Interaction base on AlphaPose**   Gif-sur-Yvette, France

- Project type: Course project - Work by two
- Introduction: This course project was based on an open-source object detection library -- AlphaPose. The back end was implemented by Python, while the front end was realized by web techniques, including H5/JS/CSS/Ajax/Django. We provide the possibilities to interact with webpages by different postures in real-time. For instance, scroll a page up and down by nodding, zoom a figure in and out by stretching your thumb and index, swipe a page left and right by turning your body, and go to the next page by waving your hands.
- My work: I implemented the back end, front end and the server.

02/2019 – 10/2020 **Drone Control based on ROS**   Lille, France

- Project type: Graduation-level project - Work by two
- Introduction: This graduation-level project is based on ROS Kinetic, a specific robot operating system. We used the drone's camera and sensors to capture videos and images. We conducted image processing to detect the target object. We realized the smooth flying/pausing of the drone when tracking an object by automated closed-loop feedback.
- My work: I established the working space of ROS, configured the camera and sensors and the communication between them, processed images based on standard computer vision, and implemented the user interface.

02/2018 – 04/2018 **Wearable Device for Real-time Health Monitoring**   Lille, France

- Project type: Under graduation-level project - Work by two
- Introduction: This project was based on a microcontroller ATMega328p, a temperature sensor TLC5947, a heart rate sensor, a self-design and self-soldered PCB, and individual LED lights. We realized a wearable electrical necklace with functionality to monitor the wearer's heart rate and temperature variance. When the wearer's heart rate and/or temperature was out of the normal range, the LED lights on the necklace would switch their colors to alarm.
- My work: I designed and soldered the PCB, configured the communications between interfaces, and programmed the main functionality.

11/2015 – 10/2017 **A Virtual Machine Service based on Cloud Computing**   Xian, China

- Project type: Teamwork – 5 team members
- Introduction: We realized a campus-based cloud computing platform. Our platform provided virtual machine service to students and faculty members through online access. Our platform provided the accessibility to a virtual machine 24/24 hours and 7/7 days from different client devices (both PC and mobile ends) and through different operating systems (windows, Linux, Android, and iOS). Our platform also provided storage and computing functions.
- My work: I was the project leader. I established a private cloud based on ZStack and implemented the front-end interface.
- Award: This work was awarded to the Provincial Excellent Project in College Students Innovation and Entrepreneurship Training Program of Shaanxi.

09/2015 – 10/2015 **Tangible Interaction based on Arduino**   Xian, China

- Project type: Teamwork – 3 team members
- Introduction: We proposed interactions with computers through fruits. We connected fruits with computers with Arduino and cables. We modified the software-based music's tone and melody by different touch forces and touch positions on fruits.
- My work: I was the project leader. I took care of the configuration of communication between interfaces.
- Award: This work was awarded to the Second Prize of the 27th XingHuo Cup of XIDIAN University.

Awards

- 2018.06   "Excellent Undergraduate" award, XIDIAN University
- 2017.12   "Inspirational Award" scholarship, XIDIAN University

- 2017.12   "Diligence Award" scholarship, XIDIAN University
- 2015 – 2017   "Outstanding Student Cadre" award, XIDIAN University
- 2017.07   Provincial Excellent Project in
  College Students Innovation and Entrepreneurship Training Program, Shaanxi Province
- 2016.06   Second-class scholarship, XIDIAN University
- 2015.07   "Huashan Outstanding Student Cadre", XIDIAN University
- 2015.07   "Huashan Moral Model", XIDIAN University
- 2015.07   "Huashan Vitality Star", XIDIAN University
- 2015.12   Second prize of the 27th Xinghuo Cup, XIDIAN University
- 2015.06   Third-class scholarship, XIDIAN University
- 2015.05   "Excellent Volunteer" of the 2nd International Cultural Festival, XIDIAN University