Postdoctoral Fellow
(Scientist to integrate risk communication with AI for climate/weather forecasting)
Risk Communication-AI Integration Scientist

This Postdoctoral Fellowship is a 12-month position with a flexible start date that will commence between October 2021 and January 2022. A 1-year renewal is likely contingent upon performance and funding. The Cooperative Institute for Research in the Atmosphere (CIRA) with Colorado State University seeks to fill this fellowship to conduct collaborative research with the National Oceanic and Atmospheric Administration (NOAA) located at the Global Systems Laboratory (GSL) in Boulder, CO. The primary office for this position will be located in Boulder, CO, at a federal facility and requires the ability to pass a National Agency Check with Inquiries (NACI, federal background check) for building access. Office space is also available at the National Center for Atmospheric Research (NCAR) in Boulder, 1 or 2 days a week, to enhance communication with their risk communication team.

This position is situated within the Advanced Technology Division of GSL. ATD identifies, investigates, and develops high-performance computing methods, products, systems, and tools to support the NOAA Mission and NOAA research and operations. In particular, ATD helps the NOAA National Weather Service, other professional users, educators, and the public understand our complex Earth. National Weather Service (NWS) forecasters help protect life and property and enhance the economy by issuing forecasts (including outlooks, watches, and warnings) and providing impact-based decision support services (IDSS) to their core partners. Artificial intelligence (AI) has the potential to augment the existing suite of guidance available to forecasters, by providing new types of forecast information, generating more skillful predictions, and/or generating more computationally efficient guidance, ideally while simultaneously identifying relevant meteorological variables or physical processes at play that led the AI system to its prediction. Yet, little research has been done on how to develop AI information for forecasters that is trustworthy, trusted by forecasters, and useful to them.

The postdoctoral fellow will be working on conducting integrated research at the intersection of AI, atmospheric science, and risk communication, risk assessment, and decision-making, working with CIRA, NOAA’s Global System Laboratory (GSL), University of Oklahoma, NCAR, and University of Washington. The work will leverage related ongoing research from the NSF AI Institute for Research on Trustworthy AI in Weather, Climate, and Coastal Oceanography (AI2ES; www.ai2es.org). The goal of this project is to help develop trustworthy AI guidance for NWS forecasters and their core partners to use as they assess hazardous weather risks and make decisions to issue forecast and IDSS products. Key to developing AI guidance that is trustworthy and meaningful is the interdisciplinary expertise required to advance knowledge of how forecasters interpret, trust, and use forecast guidance, and how these processes may be contingent on AI
interpretability, explainability, and other guidance features. This work will focus on AI guidance that is being developed within AI2ES for different weather and coastal hazards (severe convective, winter, tropical cyclones, coastal flooding, coastal fog), with an emphasis on AI guidance that utilizes the weather observational and modeling capabilities housed at CIRA, NOAA GSL, OU and NCAR.

The postdoc will join the AI2ES research team to lead development of visualization and interactive user interface of AI/ML guidance in order to support the development of meaningful and trustworthy AI tools for forecasters. In doing so, the individual will report to the Principal Investigator, closely collaborating and communicating with an interdisciplinary team of AI experts, atmospheric scientists, and risk communication scientists. This team is leading fundamental and applied research on developing trustworthy AI for different weather, climate, and coastal hazards that are informed by user-oriented research about forecasters’ and their partners’ attitudes, interpretations, perceptions, and uses of AI. The proposed research to be conducted by the postdoctoral scientist will include a particular focus on visualizing uncertainty and confidence, representing the temporal evolution of AI, and facilitating interactivity of and interactions with AI models as an approach to explaining AI, to enhance the existing AI2ES efforts along these lines.

**Decision Making:**
The individual in this fellowship will execute a plan of research that resonates with the underpinning science objectives of the supporting project. The decisions they make and the approaches they take will be determined by the individual’s own scientific acumen and in consultation with the project team. Successful execution of the proposed research, i.e. supporting the deliverables mentioned in the project’s statement of work, will hinge on the definition of a scientifically-sound plan and its execution. The individual in this fellowship will conduct their research with an eye toward establishing strong partnerships with CIRA and NOAA GSL research staff, as well as all collaborating partners, and sponsors.

**Essential Job Duties:**

**Applied Research 60%**

- Lead development of visualization and interactive user interface, in close collaboration with AI, atmospheric science, and risk communication scientists
- Collaborate with AI and atmospheric science research teams to understand the development of trustworthy AI weather and climate guidance
- Collaborate on interview data collection to elicit attitudes, interpretations, and potential uses of AI for different expert groups (weather forecasters and their core partners) across weather/climate applications. Collaborate on analyzing data and synthesizing findings to guide development of trustworthy AI information.
- Collaborate on developing a web-based randomized experimental design to systematically manipulate prototyped AI information and assess effects on experts’ interpretations,
perceptions, and decision-making. Collaborate on virtually conducting experiments, analyzing data, and synthesizing findings to guide development of trustworthy AI information.

**Independent Research 25%**
- contribute to and lead scientific studies that serve the CIRA mission;
- develop future proposals that may lead to an independent research program.

**Collaborative Research 15%**
- Collaborate with other GSL, CIRA and other AI2ES scientists working on similar research projects.
- Prepare results for at least one publication in a peer-reviewed journal and presentations at scientific meetings and conferences, which could involve travel.

**Required Qualifications:**
- Ph.D. in a social or behavioral science, atmospheric sciences, computer science, engineering, or other relevant STEM field, completed by the time position begins;
- Experience or interest in the interactions between weather/climate information and society and/or the interactions between AI/machine learning and society;
- Demonstrated ability to work independently and as part of an interdisciplinary research team;
- Programming experience, including at least minimal experience building visualizations or graphics;
- Basic knowledge or interest in atmospheric science, physics, applied mathematics, or another physical science;
- Basic understanding of statistical or machine learning methods, demonstrated through course work or projects;
- Demonstrated curiosity, creativity and enthusiasm to learn new skills;
- Ability to communicate well, particularly across disciplinary boundaries;
- Must be legally eligible for employment in the US by start date;
- Ability to pass a National Agency Check with Inquiries (NACI, federal background check) for building access.

**Preferred Qualifications:**
- Experience in scientific programming with a high level language (e.g., Python, R, MATLAB, Javascript) and ability to learn other additional programming languages as needed;
- Advanced understanding of statistical or machine learning methods, demonstrated through course work or projects;
- Experience developing *programmatic interactive* data visualizations;
- Experience with large atmospheric, climate, or physical science data sets;
- Demonstrated experience of applying at least one machine learning or advanced statistical technique to an atmospheric-science or climate or similar problem;
● Appreciation of research designs for working with human subjects;
● Experience with social science qualitative data analysis, experimental design, survey methodology, and/or statistical analysis;
● Advanced knowledge of atmospheric sciences and/or climate;
● Knowledge of the operational weather forecasting environment (e.g., forecast tools, processes, actors)

Applications will be accepted until all positions are filled; however, to ensure full consideration applications should be submitted by midnight Monday, October 25, 2021. Apply electronically by clicking “Apply to this Job” at the following website: https://jobs.colostate.edu/postings/92912. References will not be contacted without prior notification of candidates. Please be sure to address the required and preferred qualifications in the cover letter, as relate to your professional experience.

Background Check:
Colorado State University (CSU) strives to provide a safe study, work, and living environment for its faculty, staff, volunteers and students. To support this environment and comply with applicable laws and regulations, CSU conducts background checks. The type of background check conducted varies by position and can include, but is not limited to, criminal (felony and misdemeanor) history, sex offender registry, motor vehicle history, financial history, and/or education verification. Background checks will be conducted when required by law or contract and when, in the discretion of the university, it is reasonable and prudent to do so. The office for this position will be in Boulder, CO in a federal facility and will require the ability to pass a National Agency Check with Inquiries (NACI, federal background check) for building access.

Commitment to Diversity and Inclusion:
Reflecting departmental and institutional values, candidates are expected to have the ability to advance the Department's commitment to diversity and inclusion.