

## Looking for ML & JavaScript Expert (part time):

### Labvanced funds MSc / PhD / postDoc position in fixation detection project

#### Our Background:

With Labvanced we empower cutting-edge academic and non-academic online research. One of our main goals here is to enrich remotely collected data sets (typically consisting of participant choices, reaction times and sometimes mouse movement data) with more insightful physiological data such as eye-tracking data, emotion detection, pulse / heart rate calculations, and more. Our recent publication, in the journal of *Behavior Research Methods*, compares our webcam-based eye tracking with Eyelink 1000 across various tasks. (<https://link.springer.com/article/10.3758/s13428-023-02237-8>). This work exemplifies our work with webcam-based eye-tracking and has demonstrated our excellence in this domain. And while these findings are undisputedly among the best results achieved so far for webcam-based systems, there are many more things that can be done to further improve the accuracy, reliability, and usefulness of the system.

#### Project Description:

One particular important topic, which was also addressed in the recent publication discussed above, is related to fixation detection / fixation calculations, based on raw gaze data delivered by our neural network. While a preliminary algorithm already exists in Labvanced (and is freely available online: <https://github.com/Labvanced/eye-tracking-fixation-detection>), we have already gathered data (though more might need to be collected) and also planned for a new algorithm and architecture in order to improve fixation metrics. To our understanding, this topic is of significant importance to all projects that deal with remote human-centric research. Therefore, we believe that it also constitutes a great topic for an advanced master thesis, PhD dissertation, or postDoc related research in an academic context. Hence, we are looking for an advanced master student, PhD, or postDoc, to join our team and collaborate with us in developing a more advanced fixation detection algorithm for webcam-based eye-tracking data. The project has an initial duration of 18 months, but an extension of the project period and further funding can be considered based on candidates performance and project results.

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#### Scicoverly GmbH

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**Expected Project Outcomes:**

- Write a state-of-the-art fixation detection algorithm in JavaScript that runs client-side and in real time, using the gaze data from our (gaze-prediction) neural network that is sampled asynchronously.
- Design, architect, and compare various algorithms and parameters with respect to accuracy, speed and reliability.
- Cross-compare webcam-based data sets to simultaneously recorded data sets with other systems (e.g. Eyelink 1000) to define a data driven ground-truth classification.
- Be an exceptionally fast learner in the domain of time-series (eye-tracking) analysis, and capable of quickly understanding the latest publications and approaches in the domain.
- Working with a self-motivated mindset in a remote environment. You are expected to be both skilled and motivated enough to identify important questions and next tasks independently, in order to meet the project goals.
- Demonstrate the outcome and impact of your work in weekly meetings with other team members, using good data visualizations, written summaries, and slide presentations.

**Required Qualifications:**

- We are looking for a highly motivated candidate with exceptionally strong programming skills in both JavaScript (ideally Tensorflow.js) and ML/Python.
- As the majority of code will need to be written in JavaScript, experience and proficiency in JavaScript is an absolute priority. Candidates must demonstrate previous work experience (both professional or personal projects are fine) and will be interviewed for their understanding of JavaScript and the surrounding browser/web-centric ecosystem. Please understand that candidates without any JavaScript experience will not be considered.
- Experience with machine learning applications and algorithms is similarly important, and we expect candidates to have conducted (or are currently conducting) presentable research projects with an AI/ML focus.
- The candidate must be enrolled (or employed) in a university / academic program and the university supervisor (Professor / PI) must agree to the project (e.g. as a PhD or master thesis project) and also write a letter of recommendation for the candidate.
- The candidate may have a paid position at a University / research organization that provides additional funding (this is preferred but not a strict requirement).
- Good English communication skills, strong mathematical skills, being able to quickly read and understand complex academic papers in the domain of AI/ML, and being a fast learner in general are all highly important.

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- Previous experience in the topics of (webcam-based) eye-tracking, time series analysis, clustering/classification problems is an advantage.
- Previous experience with the Labvanced platform is also an advantage.
- Having a strong remote work ethic and being able to independently think about the right / important questions and delivering answers to those is of utmost importance.

**Benefits:**

- 1500 EUR (~1600 USD) in monthly compensation for 19.5 hours of work per week within the project for 18 months (6 months probation).
- Further funding (e.g. additional 18 months to complete the PhD) might be available based on the candidates performance and project outcomes.
- Work with a small team of AI/ML and web-technology experts, and get hands-on experience how AI/ML applications can be used to deliver value in an industry (web-based) context.
- Flexible remote working environment, working hours can largely be set by the candidate.
- The candidate may use the project outcome for a publication as the first author, however all intellectual property rights remain with Labvanced (Scicoverly GmbH).

**How to apply:**

Qualified and interested candidates are invited to submit their application via email to [contact@labvanced.com](mailto:contact@labvanced.com) with the subject line 'ML/JS Application' with the following:

- An up-to-date resume
- A letter of recommendation from your academic supervisor
- Additional links and resources (Github/Gitlab profile, links to software projects you worked on, personal website, existing relevant publications, etc.), which demonstrate your proficiency in JavaScript and Python (AI/ML) in particular.

**Please note:** Depending on the amount of applications we might only be able to get back to short-listed candidates. Please note, there will be several rounds of interviews and test assignments preceding the final award of the position. More information will be provided for shortlisted candidates.

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