# Badr ALKHAMISSI
## AI Researcher

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I am passionate about building sample efficient intelligent systems that can solve complex machine learning tasks and at the same time reveal insights about the inner workings of biological agents. Such systems do not only pave a way for solving long-standing societal problems but also shed light on what it means to be human.

## EDUCATION

**September 2020 – September 2019** | **Goldsmiths, University of London, MASTER OF SCIENCE, London, UK**
> MSc. in Computational Cognitive Neuroscience - Pass with Distinction.
> Thesis: Episodic Meta-Reinforcement Learning on the Two-Step and Harlow Tasks (Grade: 90%).

**June 2018 – September 2014** | **The American University in Cairo, BACHELOR OF SCIENCE, Cairo, Egypt**
> BSc. in Computer Science - Summa Cum Laude. **GPA 4.0**
> President's Cup and Mohamed El Beleidy Academic Award for class valedictorian.
> Mohammed Bin Abdulkarim A. Allehedan Award for highest performing STEM student.
> Academic Achievement Scholarship.
> Thesis: Video Search using Natural Language.

**July 2017** | **Tsinghua University, DEEP LEARNING SUMMER SCHOOL, Beijing, China**
> Thorough training in deep learning, covering many applications in Computer Vision, NLP, Knowledge Graph, Social Media Analysis, Multimodal Analysis and Robotics.
> Outstanding Performance Award in Deep Learning Summer School at Tsinghua University.

**December 2016 – August 2016** | **Stony Brook University, SEMESTER ABROAD, New York, United States**
> Best Junior Award in Stony Brook ACM Regional Qualification Contest.
> Abdallah Jum'ah Study Abroad Scholarship.

**June 2014 – September 2011** | **Manor House School, INTERNATIONAL GENERAL CERTIFICATE OF SECONDARY EDUCATION, Cairo, Egypt**
> Outstanding Cambridge Learner Award in AL Computing.

## INDUSTRIAL AND RESEARCH EXPERIENCE

**Present – March 2021** | **Research Intern, SONY AI, Tokyo, Japan (Remotely)**
> Conducting research on Meta-Reinforcement Learning.
`Meta-learning` `Reinforcement learning` `EMRL`

**September 2019 – April 2019** | **Applied Scientist, MICROSOFT ADVANCED TECHNOLOGY LAB IN CAIRO, Cairo, Egypt**
> Part of the LUIS Applied Science Team.
> Part of the Machine Teaching Innovation Group.
> Research in Cross-Lingual Model Transfer.
> Best Mentor Award.
> First Place in MS ATLC Hackathon.
`NLU` `NLP` `MT` `Keras` `Tensorflow` `PyTorch` `Python` `C#`

**March 2019 – January 2018** | **Machine Intelligence Researcher, VKANSEE, Cairo, Egypt**
> Conduct research to improve state-of-the-art algorithms in fingerprint matching, spoofing and quality analysis through deep learning.
> Optimize implementations for speed and space to suit embedded devices with restricted resources.
> Assist in data collection, labeling, and preprocessing.
> Work with and support engineers from leading mobile phone and device manufacturers to integrate Vkansee solutions into industry standard platforms.
`Computer Vision` `Few-Shot Learning` `Keras` `Tensorflow` `Python` `C++` `QT`

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|---|---|
| September 2018<br>June 2018 | **Software Engineer, Microsoft Advanced Technology Lab in Cairo, Cairo, Egypt**<br>> Researching the applicability of multilingual bot-interaction through Machine Translation.<br>> Mentoring Summer Intern.<br>> Developed Node CLI tool for MS Language Generation, part of Bot-Framework tools.<br>> Collaborating with Microsoft Beijing for designing and developing core components part of MS Language Generation.<br>> Incorporate Machine Translation into MS Bot-Framework.<br>`Visual Studio` `C#` `NodeJS` `JavaScript` `TypeScript` `Python` `.NET` `MT` |
| Fall '15 & '17<br>& Spring '16 | **Undergraduate Teaching Assistant, The American University in Cairo, Cairo, Egypt**<br>> Teaching assistant for Deep Learning and Programming Fundamentals courses.<br>> Hold regular office hours to help students.<br>> Give sessions and workshops to assist students with their coursework.<br>`C++` `Python` `Tensorflow` `Keras` `SFML` |
| Winter '16<br>& Summer '15 | **Software Development Engineer Intern, Microsoft Advanced Technology Lab in Cairo, Cairo, Egypt**<br>> Supporting full-text search for MS Language Understanding Intelligent Service (LUIS) utterances.<br>> Migrating existing LUIS database from Azure to MS SQL Server and adjusting LUIS features that uses this database accordingly.<br>> Design and implement the application import/export feature on LUIS.<br>> Developing different applications (iOS, Windows Phone and an Office Extension) that utilizes LUIS.<br>`C#` `F#` `Swift` `Objective-C` `iOS` `Windows Phone` `.NET` `Visual Studio` `Xcode` |

## 📖 Publications & Conferences

### The Emergence of Episodic and Abstract Neurons in Episodic Meta-RL      Accepted at ICLR/L2L 2021
🔗 Paper    🔗 Poster    ⭘ github.com/bkhmsi/emrl-neuron-emergence

Introduces an episodic variant of the Harlow visual fixation task and use it as a test-bed to reveal two classes of neurons that emerge in the agent's working memory when trained using episodic meta-RL. Accepted at the Learning to Learn Workshop.

`First Author` `Poster Presentation` `Lightning Talk` `Python` `PyTorch` `EMRL` `Meta-RL` `RL`

### Adapting MARBERT for Improved Arabic Dialect Identification      Accepted at EACL/WANLP 2021
🔗 Paper    🔗 Demo    🔗 Poster    ⭘ github.com/mohamedgabr96/NeuralDialectDetector

In this paper, we tackle the second Nuanced Arabic Dialect Identification (NADI) shared task and succeed in achieving state-of-the-art results on all of its four subtasks. The aim is to distinguish short utterances of both Dialectical and Modern Standard Arabic at both the country-level and province-level. Accepted at WANLP 2021.

`First Author` `Oral Presentation` `Python` `PyTorch` `Arabic NLP` `NLP` `Adapters`

### Deep Diacritization: Efficient Hierarchical Recurrence for Improved Arabic Diacritization    COLING/WANLP 2020
🔗 Paper    🔗 Demo    ⭘ github.com/bkhmsi/deep-diacritization

Published in the *Proceedings of the The Fifth Arabic Natural Language Processing Workshop* - co-located with COLING'2020. The work proposes a novel architecture for automatically restoring Arabic diacritics that outperforms previous SOTA methods.

`First Author` `Oral Presentation` `Main Paper` `Python` `PyTorch` `Arabic NLP` `NLP`

### Deep Spiking Neural Networks with Resonate-and-Fire Neurons      Preprint
🔗 Paper

We explore a new Spiking Neural Network (SNN) formulation with Resonate-and-Fire neurons (RAF). The RAF-SNN proves to be more robust against noise induced at train and test time as compared to conventional machine learning models such as LSTM and CNN. It achieves as well comparable or higher performance across a range of network configurations.

`First Author` `Python` `PyTorch` `Neuroscience` `SNN`

### Program Committee Member (Reviewer)

> Reviewer in the Learning to Learn Workshop at ICLR'2021
> Junior Reviewer in the Meta-Learn Workshop at NeurIPS'2020.

### Oral Presentation

> In the Sixth Arabic Natural Language Processing Workshop at EACL'2021 (Online).
> In the Fifth Arabic Natural Language Processing Workshop at COLING'2020 (Online).

### Poster Presentation

> In the Learning to Learn Workshop at ICLR'2021.

# ⌨ SELECTED PROJECTS

### EPISODIC META-RL ON THE TWO-STEP AND HARLOW TASKS
JUNE 2020 - AUGUST 2020
↗ Blog Post   ⚙ github.com/bkhmsi/Meta-RL-TwoStep-Task   ⚙ github.com/bkhmsi/Meta-RL-Harlow

MSc. Dissertation. Reproduces the results of animal behavior and artificial agents on both the Two-Step and Harlow tasks using an episodic meta-RL model that combines 3 RL systems inspired from the machine learning and neuroscience literature.

`Python` `PyTorch` `Meta-RL` `RL` `EMRL` `Neuroscience`

### VIDEO SEGMENT RETRIEVAL BY TEXT QUERIES
SEPTEMBER 2017 - MAY 2018
↗ Video   ↗ Poster   ⚙ github.com/bkhmsi/forget-me-not

Undergraduate Thesis Project. Proposes a framework for searching long untrimmed videos for segments that logically correlate with a natural language query.

`Python` `PyTorch` `Tensorflow` `Keras` `Computer Vision` `NLP`

### SKETCH INVERSION USING DEEP CONVOLUTIONAL NEURAL NETWORKS
MAY 2017
↗ Poster   ⚙ github.com/bkhmsi/sketchback

Synthesising photo-realistic images from pencil sketches of human faces and architectural drawings of buildings.

`Python` `Tensorflow` `Keras` `Computer Vision`

### KORASTAK.COM
JUNE 2016 - PRESENT
↗ korastak.com

Notes-sharing platform with the goal of democratizing the studying experience for students in Egyptian universities.

`NodeJS` `AngularJS` `Firebase` `HTML` `CSS`

# 🔤 LANGUAGES

Arabic     ●●●●●
English    ●●●●●
French     ●●○○○

# ☰ SKILLS

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|---|---|
| Proficient | Python, PyTorch, TF, Keras, C++, JS, NodeJS, C#, Java, SQL, Matlab, HTML, CSS |
| Prior Exp | Swift, Obj-C, F#, Elm, VB, PHP, Verilog, Ruby, iOS Dev, Android Dev, Windows Phone Dev, Alexa Dev, Unity, Arduino |

# 🏆 OTHER AWARDS

> First place in all four categories of the second NADI shared task. '21
> Dean's list from Fall '14 till Spring '18 - The American University in Cairo '14 - '18
> Computer Science Exemplary Student - The American University in Cairo '18
> Highest-GPA Award for Expected to Graduate - The American University in Cairo '18
> Shortlisted in Dell EMC's Graduation Project Competition - The American University in Cairo '18
> Third Place Amazon Innovation Hackathon - The American University in Cairo '18
> Highest-GPA Award for Juniors - The American University in Cairo '17
> Second Prize in Amazon Alexa Hackathon - The American University in Cairo '17
> High Achiever in CS1101 Course - The American University in Cairo '15
> Second Place in Common Reading Program Essay Contest - The American University in Cairo '14

# ✚ ACTIVITIES AND VOLUNTEERING

> Official Author of Towards Data Science.
> Volunteered in the organization of the 28th International Conference on Computational Linguistics (COLING'2020).
> Participated in giving a tutorial on multilingual embeddings at IndabaX'19 Egypt.
> Participated in several competitive programming contests including Google Hash Code, Facebook Hacker Cup and more. Qualified to ACM ECPC representing AUC, June '15 - June '18.
> Associate Head of the Computer Science and Engineering Association academics. committee at AUC, responsible for organizing academic events and workshops, Spring '17
> Co-Founded Creative Coding Cairo under FabLab Egypt. Organize monthly meet-ups for the community, Juyl '16 - Sep '17.
> Developed a Database System for Doum Cultural Foundation using MS Access VB and SQL. Managing their website and their digital presence. Volunteer in organizing some of their workshops and cultural events, Cairo, September '12 - May '16.
> Member of the academic committee in the Astronomy Club at AUC.
> Member of the CISV Egyptian delegation. Participated in organizing a summer camp in Paris, basing activities on: diversity, conflict resolution, sustainable development and human rights through experiential learning, June '15.
> A member of the children jury delegation of long and short films in Cairo International Film Festival for Children; our role was to select a winner for each prize in the film festival, '07, '08, '10.