

# Rajaswa R. Patil

☎ (+91) 9834623198 | ✉ patilrajaswa@gmail.com | 🏠 rajaswa.github.io | 📷 rajaswa | 🌐 rajaswa-patil | 🎓 Rajaswa R. Patil

## Education

### Birla Institute of Technology and Science, Pilani (Goa Campus)

Goa, India

B.E. (HONS.) IN ELECTRICAL & ELECTRONICS ENGINEERING

Aug 2017 - Jun 2021

- **Cumulative GPA:** 8.26/10.00
- **Bachelor's Thesis :** Computational Modelling for Coherence in Spoken Discourse
- **Academic Projects:** [1] Psycholinguistic models of Spoken Word Processing; [2] Data-driven models of Indian Maritime Trade
- **Study in Advanced Topics:** [1] Computational Neuroscience; [2] Meta Learning

## Experience

### TCS Research

Remote, India

PRE-DOCTORAL RESEARCH FELLOW

Jul. 2021 - Jun. 2023

- Working on the broad research topic: "Program Synthesis from Natural Language"
- **Co-advised By:** Dr. Gautam Shroff and Dr. Lovekesh Vig

### Cognizer Inc.

Bengaluru, India

DATA SCIENCE INTERN (REMOTE)

Apr. 2021 - Jun. 2021

- Developing a REST API for an automatic question-answer generation pipeline for parsed natural language text documents
- Working on question generation with text-to-text transformer models, grammar correction APIs, and text simplification models
- **Employer:** Cognizer.ai

### Language Cycles Group, Max Planck Institute for Human Cognitive & Brain Sciences

Leipzig, Germany

RESEARCH INTERN (REMOTE)

Apr. 2021 - Jun. 2021

- Currently, working on chunking a natural speech corpus with combinatory categorial grammar (CCG) and dependency grammar
- Performing chunking with human-like incremental language processing with left-branching CCG parsing
- Working on aligning Hindi speech audios to their transcriptions, to be used for psycholinguistic experiments
- **Supervised By:** Dr. Lars Meyer (Language Cycles Group, MPI HCBS)

### MIDAS Lab (IIIT Delhi)

Delhi, India

RESEARCH ASSISTANT

Dec. 2019 - Jun. 2021

- Worked on modelling information structure & coherence in spontaneous spoken discourses
- Mentored undergrads on projects related to modelling various aspects of ESL speakers' speech, like fluency, discourse content & coherence
- Contributed towards building a speech scoring system for ESL speakers (under a collaboration with Second Language Testing, Inc.)
- **Supervised By:** Prof. Rajiv Ratn Shah (Dept. of CSE & HCD, IIIT Delhi)

### Cognitive Neuroscience Lab (BITS Goa)

Goa, India

RESEARCH ASSISTANT

Aug. 2019 - May. 2021

- Leading projects on Syntactic processing for Indic languages, Mental Lexicon Development and EEG-based brain imagery
- Designed and implemented an experiment for EEG data collection (6 subjects with 200 trials each) to inspect the role of low-level visual representations (BA-18 & BA-19) in spoken word processing. Used Sequential and Generative Deep Learning models with the collected data
- Worked on modelling causal reasoning in natural language texts with multi-head self-attention based deep neural-network models
- **Supervised By:** Prof. Veeky Baths (Dept. of Biological Sciences, BITS Pilani Goa Campus)

### NCETIS, Indian Institute of Technology Bombay

Mumbai, India

SUMMER INTERN

May. 2019 - Jul. 2019

- Implemented various models for aspect-based sentiment analysis in open-domain texts
- Built a pipeline for data-domain independent opinion-mining in natural language texts
- Built various text-based utilities for entity resolution, topic extraction, theme extraction and lexicon-based sentiment polarity extraction
- **Supervised By:** Prof. Ganesh Ramakrishnan (Dept. of CSE, IIT Bombay)

### Central Drug Research Institute (CSIR-CDRI)

Lucknow, India

REMOTE INTERN

Jan. 2019 - Mar. 2019

- Studied & summarized various machine learning based approaches for Brain Machine Interface
- Built a web scraper for monitoring the web-based Indian news coverage on various diseases
- Analysed the scraped news-articles data with topic modeling & graph-based text ranking algorithms
- **Supervised By:** Dr. Sukant Khurana (Neuroscientist, CSIR-CDRI)

## Publications

### Using Diachronic Distributed Word Representations as Models of Lexical Development in Children\*

Manuscript\*

[PDF]

2021

Arijit Gupta\*, **Rajaswa Patil\***, Veeky Baths

### Vyākaraṇa: A Colorless Green Benchmark for Syntactic Evaluation in Indic Languages

ACL-IJCNLP 2021 (SRW)

[PDF] [DATASET]

2021

**Rajaswa Patil\***, Jasleen Dhillon, Siddhant Mahurkar, Saumitra Kulkarni, Manav Malhotra, Veeky Baths

### Towards Modelling Coherence in Spoken Discourse\*

Under Review\*

[PDF] [DATASET]

2021

**Rajaswa Patil\***, Yaman Kumar\*, Rajiv Ratn Shah, Mika Hama, Roger Zimmermann

### BPGC at SemEval-2020 Task 11: Propaganda Detection in News Articles with Multi-Granularity Knowledge Sharing and Linguistic Features based Ensemble Learning

SemEval @ COLING

[PDF] [CODE] [DATASET]

2020

**Rajaswa Patil\***, Somesh Singh\*, Swati Agarwal

### CNRL at SemEval-2020 Task 5: Modelling Causal Reasoning in Language with Multi-Head Self-Attention Weights based Counterfactual Detection

SemEval @ COLING

[PDF] [CODE] [DATASET] [POSTER]

2020

**Rajaswa Patil\***, Veeky Baths

### LRG at SemEval-2020 Task 7: Assessing the Ability of BERT and Derivative Models to Perform Short-Edits based Humor Grading

SemEval @ COLING

[PDF] [CODE] [DATASET] [POSTER]

2020

Siddhant Mahurkar, **Rajaswa Patil**

### Word2Brain2Image: Visual Reconstruction from Spoken Word Representations

ACCS

[POSTER]

2019

Ajay Subramanian\*, **Rajaswa Patil\***, Veeky Baths

### Citta: A Lite Semantic Recommendation Framework for Digital Libraries

NDLI-UNESCO KEDL

[POSTER] [CODE]

2019

**Rajaswa Patil\***, Siddhant Mahurkar

## Teaching

2020-21 **Teaching Assistant**, Introduction to Cognitive Neuroscience

Elective Course

2020-21 **Teaching Assistant**, Neuroscience and AI

Reading Course

2019-20 **Instructor**, Introduction to Machine Learning & Deep Learning

Technical Course

2019-20 **Project Lead**, Applied Machine Learning (NLP Applications)

Technical Project

2019-20 **Project Mentor**, Deep Learning with PyTorch

Summer Project

## Projects

### DecepticoNLP

NLP & DL

OPEN SOURCED LIBRARY [GITHUB]

May. 2020 - Present

- DecepticoNLP is a Python library for robustness monitoring and adversarial debugging of NLP models
- DecepticoNLP has implementations of various character & word level adversarial perturbations for text

### Semantic Search Framework for Digital Libraries

NLP & IR

WEB APPLICATION [GITHUB]

Nov. 2019 - Dec. 2019

- Developed a semantic search framework for Digital Libraries with a BERT-based approach
- Built a Python-Flask based web-app for the semantic search framework

### Twitter-Bot for Disaster Management

NLP & IR

WEB APPLICATION [GITHUB]

Sept. 2018 - Oct. 2018

- Built a pipeline involving Twitter-API based Tweet Streaming, Deep Learning based text-classification & ILP based text-summarization
- Deployed the bot on Microsoft Azure cloud & tested successfully with the data from Indonesia 2018 earthquake

## Grants & Awards

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### GRANTS

2021	<b>25,000 INR</b> , Cognitive Models of Lexicon Development	CNRL, BITS Goa
2020	<b>25,000 INR</b> , Syntactic Evaluation & Processing in Indic Languages	CNRL, BITS Goa
2019	<b>20,000 INR</b> , Low-level Visual Representations of Spoken Word Processing	CNRL, BITS Goa

### AWARDS

2019	<b>Best Poster Award</b> , International Symposium on Knowledge Engineering for Digital Library Design	KEDL, IIT Delhi
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## Community

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<b>LRG</b>	Group Lead at the Student Language Research Group (LRG - BITS Goa) <a href="#">[website]</a>
<b>Kaggle</b>	Expert on the Kaggle Competitions platform <a href="#">[profile]</a>
<b>SAIDL</b>	Core Member at the Society for AI & Deep Learning (SAIDL - BITS Goa) <a href="#">[website]</a>
<b>Nirmaan</b>	Volunteer work for Employment Operations at Nirmaan NGO (2019) <a href="#">[website]</a>
<b>iBRAIN</b>	Selected for a round table panel at ERASMUS iBRAIN CCCP conference (2020) <a href="#">[website]</a>
<b>Google AI</b>	Selected to attend the AI Summer School by Google Research India (2020) <a href="#">[website]</a>
<b>Neuromatch</b>	Contributing to a tutorial on transformers at the Neuromatch DL summer school (2021), to be taught by Prof. He He, NYU <a href="#">[website]</a>
<b>SMPL</b>	Selected for the 5 <sup>th</sup> Summer School on Statistical Methods for Linguistics and Psychology (2021) <a href="#">[website]</a>

## Relevant Coursework

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<b>Machine Learning</b>	[1] Neural Networks & Fuzzy Logic; [2] Convex Optimization; [3] Probability & Statistics; [4] Meta Learning
<b>Computer Science</b>	[1] Object Oriented Programming; [2] Data Structures & Algorithms; [3] Computer Programming
<b>Psychology</b>	[1] Computational Neuroscience; [2] Cognitive Neuroscience
<b>Mathematics</b>	[1] Linear Algebra; [2] Multivariate Calculus; [3] Discrete Mathematics
<b>Electrical Sciences</b>	[1] Digital Image Processing; [2] Communication Systems; [3] Control Systems

## Research Interests

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<b>Natural Language Processing</b>	[1] Discourse & Pragmatics; [2] Conversational AI; [3] Speech Processing; [4] Multilingual NLP
<b>Cognitive Science</b>	[1] Computational Psycholinguistics; [2] Syntax & Parsing; [3] Cognitive Modeling
<b>Machine Learning</b>	[1] Meta-Learning; [2] Abstract Reasoning; [3] Compositional Generalization

## References

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### Prof. Veeky Baths

Director, Cog. Neuro. Lab  
Associate Professor  
Dept. of Biological Sciences  
BITS Pilani (Goa Campus)  
South Goa, India  
veeky@goa.bits-pilani.ac.in

### Prof. Rajiv Ratn Shah

Director, MIDAS Lab  
Assistant Professor  
Dept. of CSE & HCD  
IIIT Delhi  
New Delhi, India  
rajivrtn@iiitd.ac.in

### Dr. Lars Meyer

Research Group Leader  
Language Cycles Group, MPI  
Max Planck Institute (CBS)  
Leipzig, Germany  
lmeyer@cbs.mpg.de