

Last updated: March 31, 2021

Original copy (in case broken): <https://mullikine.github.io/cv/>

## 1 Shane Mulligan; BSc (Computer Science)

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Platform Engineering · Prompt Engineering · Test Automation · Natural Language Processing

### 1.1 Shane Mulligan [Cover Letter]

Dear Hiring Manager,

Please consider me for this role.

I'm passionate about developing tooling and automating software development processes and applying programming language design to models of natural language. I am currently developing a new kind of programming language for running software on GPT-3.

In 2020 I contracted for FMG in Australia developing CI/CD infrastructure their vehicle autonomy team on AWS. I enjoyed creating productivity tools for the developers, working with GitLab CI and AWS EC2. I have returned to New Zealand since and been involved with my friend's project in realistic avatars (URL: <https://takaheai.github.io/>). I've also been through the Facebook interview process for a platform engineering job, so have completed this primer <https://github.com/donnemartin/system-design-primer>.

In 2019 I automated a pipeline to scale a platform for automating pull requests to GitHub. The pipeline scripts I made touched on everything from GCP, kubernetes, GitHub and AWS and utilised shell, go, python and common lisp.

In 2018 I studied Information Retrieval and Deep Learning at the University of Otago. I developed a GitHub search engine as my project.

From 2016 to 2017 I maintained CI infrastructure for Crown Equipment Corporation for their autonomous forklifts.

I really enjoy emacs, chatbots, NLP and lisp. I work entirely within a terminal environment I have been automating since 2011. I have 10+ years experience in the workforce as a linux-based software developer and tester. I can research, create quality documentation, design and automate experiments. Please take a look at my blog (<http://mullikine.github.io>) I am very capable and hard working.

Thank you for your consideration,

Shane Mulligan

## 1.2 Links

- Personal Blog: Bodacious Blog (GitHub: mullikine)
- AI Blog: TakaheAI (GitHub: Takahe)  
Ultra-realistic avatars and chatbots for the enablement of humanity.
- NLP Blog: semiosis (GitHub: semiosis)  
Semiosis is building programming languages to keep computing textual.
  - Exemplary programming language: <https://semiosis.github.io/exemplary/>
- ML Blog: infogetics (GitHub: infogetics)  
Infogetics maps software for transforming one type of information into another
- GitHub, gists, Most active GitHub users in New Zealand

## 1.3 Past CVs

This is here to communicate my background but not my direction.

- CV and written reference - 2015 - Application for C++ Development

### 1.3.1 Presentations

1. <2021-02-19 Fri> **prompt-engineering** Part 1: Building the environment <https://mullikine.github.io/posts/creating-a-playground-for-gpt-3-in-emacs/>  
**nlp gpt-3 emacs**  
This presentation is about building a programming environment for the new programming-paradigm of **prompt engineering**.
2. <2020-10-06 Tue> Creating standalone UI applications for CLI tools using emacs and docker <https://mullikine.github.io/posts/codecraft-creating-uis-for-cli-programs-with-docker-and-emacs/>
3. <2018-04-30 Mon> COSC431: The Case for Learned Index Structures <http://github.com/mullikine/cosc431-assignment-2-presentation/blob/master/presentation.org>

### 1.3.2 Relevant blog articles for Platform Engineering / DevOps

- GCP
  - Tremendous Task: Searching for code on GitHub with BigQuery and GHTorrent // Bodacious Blog
  - CodeCraft: Stacklet - Save Money on the Cloud // Bodacious Blog
- NLP
  - Generating poetry with GPT-2/
- Deployment and IaC
  - <https://mullikine.github.io/tags/iac/>
  - CodeCraft: Stacklet - Save Money on the Cloud // Bodacious Blog
  - Deployment with IaC and Octopus // Bodacious Blog/
  - Automatic, interactive handling of build files and IaC // Bodacious Blog
  - Review of 'Terraform code quality - CloudSkiff' // Bodacious Blog
  - Terraform // Bodacious Blog/

- OS-agnostic program installation with Ansible // Bodacious Blog
- Review of 'Ansible and Terraform: Better Together' // Bodacious Blog
- HashiCorp: Terraform, Vault, Vagrant, Packer // Bodacious Blog/
- Provisioning with IaC // Bodacious Blog/
- Ansible // Bodacious Blog/

- AWS

- Review of 'AWS RoboMaker - Amazon Web Services' // Bodacious Blog
- Autoscaling GitLab Runner on AWS // Bodacious Blog

## 1.4 Work experience

### 1.4.1 Fortescue Metals Group (contract)

**Job title** Senior Software Tester and Tooling

**Description** Software testing, CI/CD and deployment for autonomous mining vehicles.

**Job Application** Application to Fortescue Metals Group // Bodacious Blog

**Started** Jan 2020

**Ended** May 2020

| Area                      | Task                  |
|---------------------------|-----------------------|
| Point of failure analysis | FMEA                  |
| CI/CD                     | GitLab Runner, Docker |
| Tooling                   | ROS2, C++             |
| Deployment                | Shell, Octopus        |
| Platform Engineering      | EC2, Terraform        |
| Research                  | AWS RoboMaker         |

### 1.4.2 CodeLingo Ltd

**Job title** Software Engineer (contractor)

**Description** CI/CD for autonomous GitHub pull requests.

**Started** Sep 2018

**Ended** May 2019

CI/CD, Platform Engineering with kubernetes, GCP and AWS. Development in many (10+) languages. CodeLingo is a SAAS for linting and automating pull requests on GitHub using a domain-specific language.

#### 1. Examples of pull requests generated and made automatically

These pull requests were generated by the automated CodeLingo platform.

<https://gist.github.com/1860bfea2a9e1e3b3bbb96b95a11bdd0>

#### 2. Languages used

| language               | context  |
|------------------------|--|
| Golang                 | Platform Development. Tooling. Specifically, lexicons. |
| Shell                  | Deployment Pipeline                                    |
| Ruby, Python, Go       | GitHub API   |
| ElasticSearch Lucene   | Debugging  |
| BigQuery standard SQL  | GHTorrent / Bigquery for Github                        |
| JavaScript             | Unit testing   |
| emacs lisp             | Building an environment for a new language (CLQL)      |
| YAML, Go, Python, Ruby | Researching best practices and generating code         |

### 3. Highlights

- 0 to 1000 automated github pull requests over 8 months.
- Pipeline outreach scaled the platform from 10 to 300 app installs.

#### 1.4.3 Crown Equipment Corporation

**Job title** Software Engineer

**Description** CI and testing for autonomous forklifts.

**Started** Jan 2015

**Ended** Sep 2017 (2 years 8 months)

HIL (hardware-in-the-loop) testing

CI/CD

C++ application development

Python unit testing

#### 1. primary languages used

- C++ 13
- python

#### 2. Responsibilities

- HIL (hardware-in-the-loop) rigs / integration tests
- Implement driver for 3D Basler Camera

#### 3. Highlights

- Built a platform for correlating error messages with logs and code using the the Sphinx open source search engine.

#### 1.4.4 TracMap

**Job title** Software Engineer

**Description** Embedded software development for GPS navigation.

**Started** Jan 2011

**Ended** Mar 2013 (2 Years 2 months)

Embedded C++ application development. Porting Firmware.

## 1. primary languages used

- C++
- Python
- JavaScript
- PostgreSQL

## 2. Highlights

- Ported the firmware from the older TM4 head units to the then prototype TM5 headunit.

## 3. Images

- 2012: TM4 needs love
- 2019: First TM5 returns home

## 1.5 Open-source Projects

### 1.5.1 Age of Kings Trigger Studio

<http://aok.heavengames.com/blacksmith/showfile.php?fileid=12103>

The most popular Age of Empires II scenario editor. Downloaded 11,000 times since 2014. Used in making campaigns for Age of Empires II HD edition and expansions.

| Software           | Purpose             |
|--------------------|---------------------|
| IDA Pro            | Reverse engineering |
| Visual Studio 2005 | Compiling           |
| emacs/vim          | Programming         |

## 1.6 Skill set

- Natural Language Processing
- Prompt Engineering
- emacs
- Language agnostic / polyglot
- Self-management
- Continuous learning
- Automation
  - Build tools, pipelines, cloud.
- Functional Programming

## 1.7 Current projects

### 1.7.1 pen.el - Prompt engineering in emacs

Facilitates the creation, development, discovery and usage of prompts.

Prompt engineering is a new programming paradigm based on querying large Language Models such as Google's BERT and GPT-3.

- <https://github.com/semiosis/pen.el>
- Autocompleting anything with GPT-3 in emacs // Bodacious Blog

Create elisp functions based on GPT-3 prompts. Chain GPT-3 queries together using keyboard macros and functions Interactively query, generate and transform both prose and code

Use GPT-3 as a search engine within emacs.

- Search the internet
- Search documents

### 1.7.2 exemplary - An example-oriented DSL that can be used to construct and compose NLP tasks

This is an extension of `pen.el`. One uses this DSL to create more advanced prompts.

<https://github.com/mullikine/exemplary>

### 1.7.3 LSP Server in Clojure

I have an ongoing project which is my expansive glossary. I'm currently building an LSP server in clojure which highlights any editor with things that I know or want to incorporate into my lexicon. I use this glossary system as the scaffolding to apply NLP algorithms and to help me to learn things. This is intrinsic and present within everything I do on my computer.

Updates and demonstrations of the glossary system // Bodacious Blog

## 1.8 Education

| Degree | Field                 | Institution         | Status        |
|--------|-----------------------|---------------------|---------------|
| BSc    | Computer Science      | University of Otago | Finished 2010 |
| PGDip  | Information Retrieval | University of Otago | Started 2018  |

I have also been meticulously going through Ryan Ong's NLP 365 series, which he created as he went through his Masters and PhD.

A tour of Ryan Ong's - NLP 365 // Bodacious Blog

### 1.8.1 Highlights

- Won the COSC343 robot competition
- Completed a GitHub search engine using GHTorrent and BigQuery.

### 1.8.2 Interest papers

- Health science 1st year
- Chemistry (200 level)
- Anatomy (200 level)
- Information Retrieval (400 level)
- Neural Networks (400 level)

### 1.8.3 Books

- Read:
  - Neural Networks From Scratch (SentDex)
  - Introduction to Information Retrieval - Manning, Christopher D.
  - Language Modeling - Stanford University
  - Boolean Retrieval - Cambridge

- *Myst: The Book of Atrus* - David Wingrove, Rand Miller, and Robyn Miller
- *The Elements of Eloquence* - Forsyth, Mark
- Coherence in natural language. Data structures and applications.

- Reading:

- Search engines information retrieval in practice - Croft, W. Bruce Metzler, Donald Strohman, Trevor
- *HaskellBook* - Christopher Allen, Julie Moronuki
- 1909.05858 CTRL: A CONDITIONAL TRANSFORMER LANGUAGE MODEL FOR CONTROL-LABLE GENERATION - Salesforce
- Using Search-Logs to Improve Query Tagging - research.google.com
- 2101.03961 - switch transformers - Google Brain

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I convert my books to text so I can do NLP on them and build up my glossaries.

<https://mullikine.github.io/posts/calibredb-inside-emacs-with-text-pdfs/>

## 1.9 Volunteer work

### 1.9.1 School of Computer Science

Ongoing. Tutoring junior school and high school students.

**started** 2018

**ended** Dec 2019

#### 1. proud moments

- portfolio gallery (circa. 2018) Guided 2 high school students in building an interactive portfolio gallery for the Otago Settler's Museum.
  - Taught CSS, javascript, php.
  - Used Google Cloud NLP for transcribing spoken queries
- built a bot that can play the board game codenames (circa. 2018)
  - Taught the concept of 'word vectors'.

### 1.9.2 Experience

|                                     | Company   | Context                                 |                       |
|-------------------------------------|-----------|---|-----------------------|
| <b>Containerization</b>             | FMG       | Docker, docker compose, docker swarm    | 5 months (2020)       |
| <b>Orchestration</b>                | CodeLingo | Making tooling for K8s, EKS, minikube   | 8 months (2018, 2019) |
| <b>Software deployment, AWS</b>     | FMG       | AWS, GitLab CICD, Octopus.              | 5 months (2020)       |
| <b>GitLab CI/CD tools</b>           | FMG       | Automating Build and Deployment         | 5 months (2020)       |
| <b>AWS</b>                          | CodeLingo | Platform Automation CodeLingo           | 8 months (2018, 2019) |
| <b>GCP</b>                          | CodeLingo | Searching for github code               | 8 months (2018, 2019) |
| <b>Golang</b>                       | CodeLingo | Go application development              | 8 months (2018, 2019) |
| <b>Test automation (Hardware)</b>   | Crown     | Localisation, smoke, integration tests. | 2 years (2016, 2017)  |
| <b>Test automation (Hardware)</b>   | TracMap   | Prototype traceability matrix           | 2011                  |
| <b>C++ testing</b>                  | TracMap   | C++ application testing                 | 2011                  |
| <b>Test automation (JavaScript)</b> | TracMap   | SAAS testing                            | 2012                  |
| <b>Python testing</b>               | TracMap   | SAAS testing                            | 2013                  |
| <b>C++</b>                          | Crown     | C++ application development             | 2015, 2016            |
| <b>C++</b>                          | TracMap   | C++ application development             | 2011, 2012            |
| <b>Python testing</b>               | Crown     | Selenium, HIL                           | 2016, 2017            |
| <b>Test automation (Golang)</b>     | CodeLingo |   | 2018                  |
| <b>Point of failure analysis</b>    | Crown     | Test logs                               | 2016                  |
| <b>Web Development</b>              |           |   | 2005-2020             |

## Evidence

| Area  | Evidence from my blog   |
|---|---|
| Using OpenAI in my development  | openai // Bodacious Blog  |
| Language Server Protocol  | Creating an LSP mode for racket // Bodacious Blog   |
| Language Development  | An example-oriented DSL that can be used for NLP tasks.   |
| Templates and Diagrams  | Templating mermaid diagrams // Bodacious Blog   |
| Code Generation   | Translating Haskell to Clojure with GPT-3 // Bodacious Blog   |
| ChatBot / GPT-2, GPT-3  | TakaheAI An operating system based on GPT-3 // Bodacious Blog   |
| Natural language processing   | Suggesting words with KeyBERT and pytextrank spaCy in emacs   |
| Automating terminal applications  | Automating rat, a powerful productivity tool // Bodacious Blog  |
| Build tool automation   | Automating build systems for many languages   |
| Polyglot programming  | Languages supported by my development environment   |
| Scripting / pipelines / automation  | Reading YouTube rather than watching it   |
| Building terminal user interfaces   | Complex Dwarf Fortress macros with tcl/expect, emacs and tmux   |
| Building debugging tools  | tooling TensorFlow Debugger (tfdbg) and emacs DAP mode for emacs  |
| Metaprogramming   | Practical macros in Racket C++ template metaprogramming with Racket   |
| Preprocessing   | Filtering text streams  |
| Algorithms  | The Illustrated Transformer <a href="https://mullikine.github.io/glossary.html">https://mullikine.github.io/glossary.html</a> |
| Information retrieval   | Tremendous Task: Searching for code on GitHub with BigQuery and GHTor   |
| Documentation   | Graphviz and Hugo Entropy, Cross-Entropy and KL-Divergence  |
| Web development   | The Semantic Web and Ontology   |
| Deep learning   | The Illustrated Transformer   |
| Continuous Integration  | <a href="http://codelingo.io">http://codelingo.io</a> Overview of modern Continuous Integration tools                         |
| Functional programming  | GHCI and Haskell code intermixed in babel   |
| Telco / Microservices / Kubernetes  | telco github GCP  |
| Bayes   | (WIP) Probabilistic programming with problog  |
| Building editing environment  | Browsing sqlite3 databases with edbi for emacs  |
| Research / learning   | Review of 'Language Engineering; Harnessing the Power of Language (2004)'   |
| Code refactoring and linting  | CodeQL by GitHub and Semmle CodeLingo vs Linters  |
| I am always learning:   |   |
| <a href="https://mullikine.github.io/glossary.html">https://mullikine.github.io/glossary.html</a> |   |



### 1.9.3 Programming languages

I support many languages in my environment.

<https://mullikine.github.io/posts/emacs-languages-supported/>

#### Language strengths

| Language                 | Work Experience | Language        | Work Experience |
|--------------------------|-----------------|-----------------|-----------------|
| Python                   | yes             | scheme / racket |                 |
| Clojure                  | yes             | problog         | yes             |
| Shell (POSIX, bash, zsh) | yes             | Perl            | yes             |
| c                        | yes             | PerlRE and PCRE | yes             |
| c++ (98)                 | yes             | sed             | yes             |
| c++ (13)                 | yes             | awk             | yes             |
| SQL (BigQuery)           | yes             | JavaScript      | yes             |
| Go                       | yes             | Java            | yes             |
| Haskell                  |                 | JQ              | yes             |
| Common Lisp              |                 | GraphViz        | yes             |
| TCL (expect)             | yes             | Latex           | yes             |
| emacs lisp               | yes             | VimScript       | yes             |
| Rosie RPL                |                 | Prolog          |                 |
| Cloud-Native Language    | Work Experience |                 |                 |
| CLQL                     | yes             |                 |                 |
| CodeQL (GitHub / LGTM)   |                 |                 |                 |

### 1.10 Citizenship

- Australia  
Eligible for an E-3 visa in the USA.
- New Zealand

### 1.11 References

#### 1.11.1 Dr Zhiyi Huang

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### **1.13 Personality**

**Mediator (INFP)** Retrospective on my personality // Bodacious Blog

### **1.14 Colophon**

If there are missing pages or the formatting is off, you can find an original here:

**Online version:** <https://mullikine.github.io/cv/>

**PDF version:** <https://mullikine.github.io/ox-hugo/cv-newest.pdf>

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