

# Shakiba **Bolbolian Khah**

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## Education

### McGill University

Montreal, Canada

DOCTOR OF PHILOSOPHY IN COMPUTER SCIENCE (FAST-TRACK PROGRAM)

Sep. 2022 - Aug. 2026 (Expected)

- **CGPA:** Ongoing
- **Supervisor:** Prof. Christophe Dubach [📧](#) | Email [📧](#)

### McGill University

Montreal, Canada

MASTER OF SCIENCE IN COMPUTER SCIENCE

Sep. 2021 - Aug. 2022

- **CGPA:** 3.92/4.0
- **Supervisor:** Prof. Christophe Dubach [📧](#) | Email [📧](#)

### University of Tehran

Tehran, Iran

BACHELOR OF SCIENCE IN COMPUTER ENGINEERING

Sep. 2017 - Aug. 2021

- **Overall GPA:** 3.86/4.0 - 18.07/20.0
- **Thesis Title:** Error Prevention in Concurrent Systems Using Machine Learning Methods
- **Supervisor:** Dr. Hossein Hojjat [📧](#) | Email [📧](#)

### National Organization for Development of Exceptional Talents (Sampad) School

Semnan, Iran

HIGH SCHOOL DIPLOMA IN MATHEMATICS

Sep. 2013 - Jun. 2017

- **Overall GPA:** 4.0/4.0 - 19.91/20.0

## Honors

- 2020 **Among 15 percent** of high-ranked Computer Engineering B.Sc. students, University of Tehran.
- 2020 **Winner** of the University of Tehran M.Sc. Fellowship Award (Exempted from the graduate entrance exam).
- 2018 - 2021 **Member** of Iran's National Elites Foundation.
- 2017 **Ranked 305<sup>th</sup>** among more than 150,000 participants in Nationwide Universities Entrance Exam (B.Sc.).

## Working Experience

### Mobile Communications Laboratory at the University of Tehran

Tehran, Iran

SOFTWARE ENGINEER INTERN

Apr. 2020 - Sep. 2020

- Supervisor: **Dr. Vahid Shah-Mansouri** [📧](#) | Email Address: vmansouri@ut.ac.ir [📧](#)
- Layer 2 Testing Principles: Implementing different types of network layer 2 testing methods based on RFC2889 such as congestion control, forward pressure, maximum forwarding rate, address learning rate, with C and optimizing them to be executed on the servers.
- Raw Sockets: Learning socket programming using raw sockets.
- Multi-threading: Using multi-threading to implement tests in the Linux environment.

### University of Tehran ACM Student Chapter

Tehran, Iran

VICE CHAIR

Jun. 2019 - Sep. 2020

- Faculty Sponsor: **Dr. Ramtin Kosravi** [📧](#) | Email Address: r.khosravi@ut.ac.ir [📧](#)
- Holding various events such as Internet Programming Contest (UT ICPC), Algorithm Courses, Maze Competition, etc.
- Editor of Science and Technology Magazine of ACM Student Chapter called 'F1'.

## Skills

<b>Industry Knowledge</b>	Machine Learning, Compilers, Object-Oriented Programming(OOP), Operating Systems, Alogorithm.
<b>Programming Languages</b>	C++, C, Python, Java, HTML, CSS, Verilog, VHDL, MATLAB, R.
<b>Frameworks &amp; Libraries</b>	React.js, Bootstrap, Numpy, Pytorch, Scikit-learn, Pandas.
<b>Database</b>	MySQL.
<b>Other Technologies</b>	Git, Maven, Docker, Kubernetes, $\LaTeX$ , Mininet, Linux.
<b>Interpersonal Skills</b>	Teamworking, Teaching, Self-Learning, Problem-Solving.

## Teaching Assistance Experience

### Compiler Design - COMP 520

McGill University

Instructor: **Prof. Christophe Dubach** [📧](#) | Email Address: christophe.dubach@mcgill.ca [📧](#)

Winter 2022

- Responsibility: Teaching Assistant, Designing One Part of Course Project, Answering Students' Questions on Ed, Holding Office Hours.

## Computer Organization - ECSE 324

McGill University

Instructor: **Prof. Christophe Dubach** | Email Address: [christophe.dubach@mcgill.ca](mailto:christophe.dubach@mcgill.ca)

Fall 2021

- Responsibility: Grader.

## Discrete Mathematics

University of Tehran

Instructor: **Dr. Siamak Mohammadi** | Email Address: [smohamadi@ut.ac.ir](mailto:smohamadi@ut.ac.ir)

Spring & Fall 2020

- Responsibilities: Supervisor (Reviewing Designed Questions and Solutions, Assessing Questions' Quality), Grader.

## Introduction to Computing Systems and Programming

University of Tehran

Instructor: **Dr. Hadi Moradi** | Email Address: [moradih@ut.ac.ir](mailto:moradih@ut.ac.ir)

Spring 2020

- Responsibilities: Quiz Designer, Laboratory TA.

## Formal Languages and Automata Theory

University of Tehran

Instructor: **Dr. Hossein Hojjat** | Email Address: [hojjat@ut.ac.ir](mailto:hojjat@ut.ac.ir)

Fall 2019 & Spring 2020

- Responsibilities: Homework Designer and Grader, Teacher at Problem-Solving Sessions.

## Programming Languages and Compiler

University of Tehran

Instructor: **Dr. Fatemeh Ghassemi** | Email Address: [fghassemi@ut.ac.ir](mailto:fghassemi@ut.ac.ir)

Fall 2019

- Responsibilities: Homework Designer and Grader, Computer Assignment Grader, Teacher at Problem-Solving Sessions.

## Engineering Probability and Statistics

University of Tehran

Instructor: **Dr. Behnam Bahrak** | Email Address: [bahrak@ut.ac.ir](mailto:bahrak@ut.ac.ir)

Fall 2019

- Responsibility: Grader.

## Digital Logic Design

University of Tehran

Instructor: **Prof. Zainalabedin Navabi** | Email Address: [navabi@ut.ac.ir](mailto:navabi@ut.ac.ir)

Spring 2019

- Responsibility: Grader.

# Course Projects

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## Artificial Intelligence

Spring 2020

- **Note:** All projects are implemented with Python in Jupyter notebook and Google Colab.
- **Neural Network from Scratch** : Implementing a neural network from scratch with ReLU as its activation function and analyzing that from different aspects.
- **Price Estimation with Regression** : Processing a dataset including spoken text data about second-hand mobile devices and their prices to estimate new entries using different Python libraries such as Numpy, Pandas, SciKit-Learn, and various techniques like the bag of words model.
- **Image Classification with Multi-layer Neural Network** : Implementing a multi-layer neural network using Pytorch library to learn the features of a dataset, including pictures of 52 different accessories types. Analyzing and adjusting various effective variables like batch size, momentum, learning rate, etc.
- **Machine Learning with SciKit-Learn Library** : Using different classifiers like decision trees, KNN, and ensemble learning methods to process a dataset of some markets' customers to estimate whether they will come back to the market or not.
- **Text Processing using Bayesian Networks** : Processing news with different techniques like the bag of words to classify their categories using Bayesian networks implemented from scratch.
- **Replacement Decoding with Genetic Algorithm** : Implementing a genetic algorithm from scratch to obtain a key of a text encoded with the replacement method and decode it.
- **Search Algorithms** : Simulating a situation like a search problem and using uninformed search methods like BFS and DFS, and A\* as an informed search method to obtain an optimal problem solution as well as comparing these methods' functionality.

## Operating Systems

Fall 2019

- **Introduction to Xv6 OS** : Getting familiar with Xv6, its execution, debugging, improving its console by adding some features, and implementing a new program to copy text data from a file to another.
- **System Calls** : Implementing new system calls in Xv6, which enables it to run commands out of the directory in which their execution file exists, sleep a process for an arbitrary period using Xv6's ticks, and obtain the current process's pid and its children and grandchildren.
- **Process Scheduling** : Implementing multilevel feedback queue scheduling (MFQ), including lottery, HRRN, and SRPF methods, as scheduling levels in Xv6.
- **Process Synchronization Mechanisms** : Adding synchronization mechanisms to Xv6 to prevent out-of-order execution of processes and use mutex more than once in recursive programs.
- **Monitors** : Simulating a transportation system and optimizing cars' routes to control air pollution using monitors.
- **Ensemble Classification** : Implementing an ensemble classifier using named and unnamed pipes.

## Programming Languages and Compilers

Spring 2019

- **Interpreter for While Language** [↗](#) : Implementing an interpreter for While language using visitor pattern accepts AST as its input and executes it, with Java in IntelliJ IDEA.
- **Toorla, Tiny Object-Oriented Readable Language** : Toorla's name shows its nature completely: an object-oriented Java-like Language that supports inheritance. Each Toorla program with .trl format includes one or more classes that have some fields and methods. Toorla has been implemented in four phases using Java in IntelliJ IDEA.
  - **Phase I, Lexer & Parser** [↗](#) : Defining Toorla's grammar with ANTLR and implementing a parser to create an abstract syntax tree (AST) of the input program.
  - **Phase II, Name Analyzer** [↗](#) : Gathering information about classes, fields, methods, local variables, and scopes of the program and finding name analysis errors like undefined variables or redefinition.
  - **Phase III, Type Analyzer** [↗](#) : Checking types of variables in the input program, finding relevant errors based on Toorla's documentation, and setting initial values for various types.
  - **Phase IV, Code Generation** [↗](#) : Converting Toorla's code to Jasmin as a middle layer. Jasmin assembler converts its codes to class files, which can be executed by JVM later.

## Computer Architecture

Spring 2019

- **Note:** All projects are implemented with Verilog in Modelsim.
- **Linear Classification** [↗](#) : Designing a datapath and controller to implement a linear classification as well as implementing the classifier using MATLAB and comparing final results.
- **Single-Cycle MIPS** [↗](#) : Implementing single-cycle MIPS architecture in a minimal system with an ALU supporting various operators.
- **Multi-Cycle MIPS** [↗](#) : Implementing multi-cycle MIPS architecture, which works based on stack providing more operators.
- **Pipeline MIPS Architecture** [↗](#) : Implementing a MIPS processor using pipeline architecture as well as determining and resolving possible hazards.
- **Pipeline ARM Architecture** [↗](#) : Implementing an ARM processor with pipeline architecture supporting hazard and forwarding unit.

## Advanced Programming

Spring 2018

- **Jeek Jeek, Twitter-like Local Web Application** [↗](#) : Implementing Jeek Jeek with a special focus on object-oriented programming principles as a local web application to behave like Twitter in C++.

## Relevant Courses

<b>Fundamentals of Computer Vision</b> Instructor: <b>Prof. Kaleem Siddiqi</b> <a href="#">↗</a>	<i>Ongoing</i> Fall 2022	<b>Natural Language Processing</b> Instructor: <b>Prof. Siva Reddy</b> <a href="#">↗</a>	<i>Ongoing</i> Fall 2022
<b>High-Level Synthesis of Digital Systems</b> Instructor: <b>Prof. Christophe Dubach</b> <a href="#">↗</a>	<i>A-</i> Winter 2022	<b>Reinforcement Learning</b> Instructor: <b>Prof. Doina Precup</b> <a href="#">↗</a>	<i>A</i> Winter 2022
<b>Applied Machine Learning</b> Instructor: <b>Prof. Siamak Ravanbakhsh</b> <a href="#">↗</a>	<i>A</i> Fall 2021	<b>Principles of Computer Systems</b> Instructor: <b>Prof. Oana Balmau</b> <a href="#">↗</a>	<i>A</i> Fall 2021
<b>Artificial Intelligence</b> Instructor: <b>Dr. Hakimeh Fadaei</b> <a href="#">↗</a>	<i>20/20</i> Spring 2020	<b>Internet Engineering</b> Instructor: <b>Dr. Ehsan Khamespanah</b> <a href="#">↗</a>	<i>20/20</i> Spring 2020
<b>Algorithmic Graph Theory</b> Instructor: <b>Dr. Behnam Bahrak</b> <a href="#">↗</a>	<i>17.5/20</i> Spring 2020	<b>Database Design</b> Instructor: <b>Dr. Azadeh Shakery</b> <a href="#">↗</a>	<i>19.4/20</i> Spring 2020
<b>Operating Systems</b> Instructor: <b>Dr. Mehdi Kargahi</b> <a href="#">↗</a>	<i>19/20</i> Fall 2019	<b>Algorithm Design</b> Instructor: <b>Dr. Hamid Mahini</b> <a href="#">↗</a>	<i>18.1/20</i> Spring 2019
<b>Computer Architecture</b> Instructor: <b>Dr. Saeed Safari</b> <a href="#">↗</a>	<i>17.6/20</i> Spring 2019	<b>Programming Languages and Compiler</b> Instructor: <b>Dr. Hossein Hojjat</b> <a href="#">↗</a>	<i>19.1/20</i> Spring 2019
<b>Digital Logic Design</b> Instructor: <b>Prof. Zainalabedin Navabi</b> <a href="#">↗</a>	<i>17.4/20</i> Fall 2018	<b>Data Structures</b> Instructor: <b>Dr. Hesham Feili</b> <a href="#">↗</a>	<i>19.1/20</i> Fall 2018
<b>Engineering Probability and Statistics</b> Instructor: <b>Dr. Behnam Bahrak</b> <a href="#">↗</a>	<i>19.7/20</i> Fall 2018	<b>Advanced Programming</b> Instructor: <b>Dr. Ramtin Khosravi</b> <a href="#">↗</a>	<i>17.25/20</i> Spring 2018

## Languages

**English** : Fluent (IELTS Score - Overall: 7.5 | R: 8.5 | L: 8 | S: 7 | W: 7)

**Persian** : Native