Kousshik Raj M

 TheLethalCode
 TheLethalCode (Codeforces)

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Education

2017-2022 **(Expected)**	B.Tech + M.Tech (Dual degree) in **Computer Science and Engineering** Indian Institute of Technology, Kharagpur	**GPA:** 9.33/10.0 (* Ongoing)
2015-2017	Higher Secondary School Certificate Examination, **CBSE** Maharishi International Residential School, Kancheepuram	**Percentage:** 96%
2015	Secondary School Certificate Examination, **CBSE** Mahatma Gandhi Centenary Vidyalaya, Trichy	**CGPA:** 10/10

Technical Skills

Programming Languages	C, C++, Python, Java, GoLang, Verilog
Libraries / Frameworks	ROS, OpenCV, Tenserflow, STL, Numpy, Flex, Bison, MIPS, REST
Databases	MySQL, SQLite
Systems / Platforms	Linux, Android, Windows, Git
Others	Bash, Latex, Solidworks

Research Experience

Feb 18 May 19	**Artificial Intelligence Team Member**	**Autonomous Ground Vehicle Research Group**

- Worked as a software stack team member, tackling the various challenges faced to model a complete autonomous vehicle capable of traversing dynamic environments.
- Worked on a novel and robust path planning algorithm taking the kinetic constraints of the bot into account for a dynamic environment supported by a high accuracy localization.
- Responsible for the ideal integration of the various modules such as vision, localisation, planning, sensor data, etc.

Projects

- **Hybrid A-Star, Path Planning Algorithm**
    - An improved, parallelized and novel implementation of the conventional Hybrid A-star global path planner using Dubins, Reeds-Shepp Path and Djikstra as heuristics while accounting for the kinetic constraints of the bot.
    - It is capable of running at a frequency of 30Hz in a moderately populated environment and can achieve better results in a sparsely populated surrounding.

- **Face Recognition, ANN Project**
    - This program identifies the direction the person in the image is facing with an accuracy of over 0.85.
    - It uses an Artificial Neural Network (ANN) with three hidden units trained using gradient descent algorithm with momentum over a training set of 500 images.
    - This program can be reused for other similar classifications such as the person's expression, name, etc. by just changing the dataset labels and the number of output classes.

- **Eklavya 6.0, Intelligent Ground Vehicle Competition (IGVC) 2018**
    - A robot capable of intelligently traversing an obstacle ridden course while being restricted to a narrow lane in a restricted environment.
    - It uses camera for the visual input, LIDAR for avoiding collisions, and other sensory inputs for controlling the position and velocity of the bot, which are implemented over the ROS Framework using various algorithms.
    - The bot took part in the **IGVC 2018** competition for autonomous vehicles and bagged the 2nd place.

- **TinyC Compiler, Compiler Design**
    - A compiler designed using the Lexical Grammar and the Phase Structure Grammar provided for TinyC (a subset of C language) according to the **International Standard ISO/IEC 9899:1999 (E)**.
    - It uses Flex as a lexical analyzer and Bison for implementing the semantic actions and finally produces a Machine Independent Code and Three Address Code for a given source program.

Technical Interests

Algorithms and Data Structures, Number Theory, Machine Learning, Reinforcement Learning, Cryptography and Networking.

Related Courses

- Programming and Data Structures (T/L)
- Algorithms and Data Structures (T/L)
- Discrete Structures
- Software Engineering (T/L)
- Formal Language Automata Theory
- Probability and Statistics
- Switching Circuits (T/L)
- Algorithms - II
- Computer Organization and Architecture (T/L)
- Compilers (T/L)
- Cryptography and Network Security
- Machine Learning
- Computer Networks (T/L) *
- Operating Systems (T/L) *
- Deep Learning *
- Principles of Programming Languages*
- Reinforcement Learning *

Achievements & Involvements

- **Projects -** I have taken up a lot of small scale projects like

  - **DigiCon**, A web application that accurately parses and mines the contents of a hand-written doctor's prescription with the help of OpenCV and advanced Optical Character Recognition(OCR) and offers it to the user in a readable fashion.

  - **KGP-RISC Processor**, a processor with an ISA similar to that of MIPS, designed in Verilog and simulated in FPGA with a BRAM module. It has a clock frequency of 1GHz and executes an average of 1 instruction every 4 clock cycles.

  - **DWA Planner**, an improved DWA local path planning algorithm implemented with a new optimization function which reduces the chances of the algorithm failing in case of encountering a local minima and improves the traversal time. It has a ROS interface.

  - **Gymkhana Sports Management System**, a graphical application software that simplifies the registration and payment process for the various sports activities hosted in Gymkhana.

  - **Artemis Arrow**, a web application for scraping various forms of entertainment like novels, songs, anime, etc and offering the user a downloadable link for the same.

  - **BrkOut**, a game developed using Python incorporating real-time physics.

  - **G_Inface**, a command line interface for Google Drive developed using the REST API, useful for syncing personal local data with Google Drive.

- **Competitive Coding -** Participated in numerous contests and solved a wide range of problems hosted in the various Competitive Coding platforms such as CodeForces, CodeChef, SPOJ, etc. I have also organized a lot of Competitive Programming contests (CodeNites) on Hackerearth in a university level.

- **Kharagpur Winter of Code -** One of the organizers of the five week long GSOC-styled Open Source Program and an active mentor of one of the projects in it. Responsible for the development and maintenance of the KWOC website.

- **Kshitij Events, Technical Fest -** Participated in various events like Source Code, Robotics, etc. and secured standings among them. The variety of events organized helps broaden one's horizon.

- **Programming Societies -** Co-founder of **CodeStash, IIT KGP** and was a Core-Team Member of societies such as **Kharagpur Open Source Societies** and **CodeClub** which help to capture, nurture and preserve the programming zeal that bubbles among the budding KGP students by organizing workshops, hackathons, fests, etc.

- **Scholastic Achievements**
  - **AIR 322 - JEE Advanced** (99.8 percentile)
  - **AIR 1784 - JEE Mains** (99.8 percentile)
  - Twice **Kishore Vaigyanic Protsahan Yojana (KVPY)** Scholar