Somnath Sendhil Kumar
https://hex-plex.github.io
Email : somnath.sendhilk.eee19@itbhu.ac.in
Mobile : +91-782-928-7795

Education

- **Indian Institute of Technology (BHU), Varanasi** — Varanasi, India
  Bachelors of Technology in Electrical Engineering; GPA: 9.15 — *Jul. 2019 – present*
- **Seshadripuram Pre-University College** — Bangalore, India
  class XII Seccondary Education; Percentage(best of three): 90.1% — *Jul.2017 – Jul. 2019*

Experience

- **Indian Institute of Science** — Bangalore, India
  Summer Research Internship Under Dr. Shishir N Kolathaya, IISc. — *April 2021 - August 2021*
  - **ROS Developement and Optimal Control**: Developed the Stochlite (Quadruped Robot) ROS Package and Integrated a Model Predictive Control for the quadrupped
  - **Reinforcement Learning**: Worked on the Linear Policy based Controller Designed for the platform [link]. And Designed a Inverse Reinforcement Learning Reward for the given trajectories of foot steps
- **Indian Institute of Technology(BHU)** — Varanasi, India
  Winter Research Internship Under Dr. Pratik Chattopadyay — *Dec 2020 - March 2021*
  - **GAIT Occlusion Reconstruction**: Recontruction of Occluded Frames using Variational AutoEncoder and Bi-LSTMs
  - **Publication**: I am currently working towards publishing the work in a renonwed journal. I also have open sourced the code [here]
- **KyuKey** — Varanasi, India
  IoT, Web and App developer — *Mar 2020 - Oct 2020*
  - **IoT development**: Worked on developing Firmware for SmartLocks which are connected to the Server with Standard Authorizations Algorithms.
  - **App and Web Development**: Was in the Developing Team for the Flutter based App that controlled the lock both locally through bluetooth and via server calls. I also developed the backend in Django for the server
- **Heal** — Bangalore, India
  Apprenticeship-cum-Internship under Prof. Dr. Arbindo Gupta — *Mar 2020 - June 2020*
  - **IoT developer**: I developed an IoT solution for telemedicine platforms to monitor the physical condition. I had developed a clustering algorithm to assign master and slaves in the group of devices(ESP8266) to reduce power consumption of the system.

Projects

- **CoPilot Clone** — Natural Language Processing

  Built a working clone of Github Copilot, By using a GPT- NEO model with about 1.3 Billion parameters.[demo] Transfer learned in a few shot manner on a custom dataset generated using SEART GitHub search This model was later interfaced with nano using simple scripts and HTTP server APIs provided by python. While the model was running on our Compute Cluster we could use nano as a remote client.

- **Hand-Imitation** — Inverse Reinforcement Learning

  Learning a policy for a robotic arm to imitate a human arm given in a picture. We used reconstruction loss[link] of the masked images of the robotic and the human arms i.e., the absolute difference of the shadows of the two arms (robotic and the one to be imitated). Currently we are working on improving it in which we have implemented Inverse Reinforcement Learning to get a better reward for the problem.

- **iOTA Modular Bot** — Swarm Robotics and Hierarchical RL

  This is a modular bot platform that was intended to be a baseline for a multi-agent cooperative system. The[link] main objective was to experiment this with Hierarchical and Multi-Agent Reinforcement Learning. This is my current Research-Oriented project that I am doing under the Robotics Club, IIT BHU, Varanasi.

- **Pauci-Bot** Robotics Operating System

  Here we modelled and controlled a two wheeled robot. The main objective was to serve as a platform to experiment like the turtlebot. The code base of the robot is in ROS hence making a seemless deployment. *[link]*

- **KiloBot-MultiAgent** Multi-Agent Reinforcement Learning

  This is a simple implementation of the [paper] and based on the Swarm robot Platform "KiloBot" by Harvard University. *[link]*

Skills and Interests

- **Areas of Interests** : Reinforcement Learning, Natural Language Processing, Robot Control, Computer Vision.
- **Languages and Libraries** :
  - C++, Python, MATLAB, SQL, Java, Bash, Javascript, Kotlin, Dart
  - CMake, PyTorch, Tensorflow, OpenAI gym, OpenCV, PyBullet
- **Technologies** :
  - Robotic Operating System, Issac, Ray, Deep Learning, Machine Learning.
  - MultiAgent RL, Natural Language Processing and Generation and Graph Neural Network.
  - Linux, 3D Computer Vision, SLAM.

Course's Taken

- **Mathematics**: **MA-101** Engineering Mathematics-I(Real analysis), **MA-202** Probability and Statistics, **Linear Algebra** by MIT OpenCourseWare.
- **Machine Learning**: **Machine Learning** and **Deep Learning** by Andrew NG on Coursera, **Reinforcement Learning Specialization** by University of Alberta on Coursera.
- **Robotics**: **Modern Robotics** by NorthWestern University on Coursera, **EE211** Linear Control Systems

Achievements

- Secured a **65th rank** out of 3000 teams in the **Amazon ML Challenge 2021** with a accuracy of 63.7% (against the winning team with 70.3% accuracy). This competition was with DataSet that had 30 Million records, consisting of Text inputs of products with multi-class classification on 9000+ classes.
- Participated in **Google KickStart'21** Round D and secured a rank of **1433**.
- Secured a rank of 361 Nationwide and Qualified into Level two of **Flipkart Grid Robotics challenge** under Autonomous Indoor Drone Theme.
- Secured an All India Rank of 3421 in **JEE Advanced** Examination, This is top 0.3% of people that appeared for the national level exam.
- Presented **iOTA** project at the **Engineer's Conclave**. And also lead the team for **DRDO DGRE Vision Based Obstacle Avoidance Drone** at the InterIIT Tech meet held on March 2021 at IIT Guwahati.
- **Memberships and Fellowships** :
  - Member of Association of Computational Linguistics (ACL), Pennsylvania, United States.
  - Student Member of IEEE.
  - Tech lead at **RoBoReG** [link], A student research group in the domain of Intelligent Robotics at IIT(BHU), Varanasi.
  - Founding Member of **IG group**, A student based research group in the field of Machine learning focusing majorly on NLP and RL at IIT(BHU), Varanasi.