Sagar Gubbi

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Technical Interests

Conversational AI, Natural language based interface for mobile UI and robots.

Education

2015–2021   **Ph.D. Electrical and Communication Engineering**,
Indian Institute Of Science, Bangalore.
GPA 8/8

2011–2013   **M.E. Electrical and Communication Engineering**,
Indian Institute Of Science, Bangalore.
GPA 7.5/8 (Rank 1)

2007–2011   **B.E. Electronics and Communication Engineering**,
Sri Jayachamarajendra College of Engineering, Mysore, India.
GPA 9.8/10 (Rank 1)

Employment

2021 – now
August

Postdoctoral Researcher,
Google Research India, Bangalore.
I worked on building a UI grounded instruction following agent for Android. The goal of the project was to build a smaller version of Assistant that not only performs actions based on voice input but also shows the user how to perform the task in the UI. These tutorials could help novice internet users to engage with the phone and the web since they may not be fluent with the UI of Android.

2021 – 2021
April   August

Consultant,
ARTPark, Bangalore.
I was involved in setting up a simulation framework for training robot controllers using reinforcement learning. I also contributed to our entry to the AVATAR X-Prize robot telepresence competition by reducing video streaming latency.

2013 – 2014
August   December

Technical Associate,
Robert Bosch Centre for Cyber-Physical Systems, Bangalore.
I was involved in the design of an ambulatory electrocardiograph for neonatal monitoring using an embedded bluetooth low energy platform. I also built an Android app that visualizes the ECG signal and implemented an adaptive filter that reduced power-line noise by 24 dB.

Publications

S. Gubbi, P. Talukdar, and S. Narayanan, "**UI Grounded Instruction Following for Android**," *Annual Conference of the Association for Computational Linguistics*, 2022 (under preparation).

S. Gubbi, R. Upadrashta, and B. Amrutur, "**Translating Natural Language Instructions to Computer Programs for Robot Manipulation**," *IEEE International Conference on Intelligent Robots and Systems*, 2021.

S. Gubbi, A. Biswas, R. Upadrashta, V. Srinivasan, P. Talukdar, and B. Amrutur, "**Spatial Reasoning from Natural Language Instructions for Robot Manipulation**," *IEEE International Conference on Robotics and Automation*, 2021.

S. Gubbi, R. Upadrashta, S Kolathaya, and B. Amrutur, "**Multi-Instance Aware Localization for End-to-End Imitation Learning**," *IEEE International Conference on Intelligent Robots and Systems*, 2020.

S. Gubbi, R. Upadrashta, S Kolathaya, and B. Amrutur, "**Teaching Robots Novel Objects by Pointing at Them**," *IEEE International Conference on Robot and Human Interactive Communication*, 2020.

S. Tirumala, S. Gubbi, K. Paigwar, A. Sagi, A. Joglekar, S. Bhatnagar, A. Ghosal, B. Amrutur, and S. Kolathaya, "**Learning Stable Manoeuvres in Quadruped Robots from Expert Demonstrations**," *IEEE International Conference on Robot and Human Interactive Communication*, 2020.

S. Gubbi*, S Kolathaya*, and B. Amrutur,"**Imitation Learning for High Precision Peg-in-Hole Tasks**," *IEEE International Conference on Control, Automation and Robotics*, 2020.

S. Gubbi and B. Amrutur, "**One-Shot Object Localization Using Learnt Visual Cues via Siamese Networks**," *IEEE International Conference on Intelligent Robots and Systems*, 2019.

S. Gubbi and B. Amrutur, "**Scene text detection for augmented reality: character bigram approach to reduce false positive rate**," *CSI Transactions on ICT*, 2018.

S. Gubbi, A. Gupta and C. S. Seelamantula, "**How much can a Gaussian smoother denoise?**," *Proceedings of the Tenth Indian Conference on Computer Vision, Graphics and Image Processing*, 2016.

S. Gubbi and B. Amrutur, "**Adaptive Pulse Width Control and Sampling for Low Power Pulse Oximetry**," *IEEE Transactions on Biomedical Circuits and Systems*, 2015.

S. Gubbi and B. Amrutur, "**All Digital Energy Sensing for Minimum Energy Tracking**," *IEEE Transactions on VLSI Systems*, 2015.

H. Rao, D. Saxena, S. Kumar, S. Gubbi, B. Amrutur, P. Mony, P. Thankchan, K. Shankar, S. Rao and S. R. Bhat, "**Low power remote neonatal temperature monitoring device**," *BIODEVICES, 7th International Conference on Biomedical Electronics and Systems*, 2014.

Skills

ML	Neural network models using Keras, PyTorch
Web	Built webapps in Go, Python (Django)
Mobile	Wrote Android and iOS apps in Java, Swift
Gaming	Made indie games in C without game engine
Embedded	Worked on MSP430, ARM Cortex-M, CC2540 (BLE) in C and designed boards using KiCAD
Chips	Taped out SoC on UMC 130nm with components written in Verilog

Portfolio
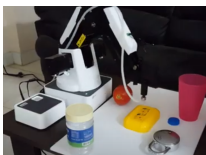
Translating natural language instructions to program code for robot manipulation
A machine translation model generates a Python function which queries the scene by accessing the output of the object detector and controls the robot to accomplish the specified task.
`https://www.youtube.com/watch?v=usCvsDIgWOM`

Spatial reasoning from natural language instructions for robot manipulation
https://www.youtube.com/watch?v=bfmDC-zoCFc

Teaching robots novel objects by pointing with a finger
https://www.youtube.com/watch?v=bJ5HKllhqLg

Learning to sort objects from a single video demonstration
https://www.youtube.com/watch?v=6-uIeCNkCeY

Orange Forum
Orange Forum is an open-source easy to deploy forum written in Go that has minimal dependencies and uses very little javascript.
https://github.com/s-gv/orangeforum
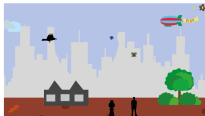
Kage
Kage is a 2D infinite running game where you play as a crow. It is written in C without a game engine using OpenGL ES. Emscripten is used to compile the C source to Javascript for the HTML version. The Android NDK is used for the mobile version.
https://github.com/s-gv/kage

Bheemboy
Bheemboy is a webapp written using Django (Python) for managing course registrations at academic institutions. This was developed for use at IISc.
https://github.com/s-gv/bheemboy

libtextscanner
libtextscaner is a neural scene text detection module written in C without any dependencies. CardCap is a sample app that uses the library and detects numbers on a credit card.
https://play.google.com/store/apps/details?id=com.libtextscanner.cardcap

Remote neonatal monitoring
Jiyo is a small device the size of a belt buckle. It monitors physiological parameters of newborns and transmits them to a smartphone using bluetooth low energy.
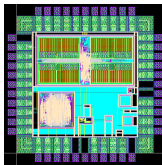
Low power mixed signal SoC for a biomedical platform
The SoC on UMC 130nm has an OpenMSP430 application processor and a hardware accelerated FIR filter. It also includes an energy minimizer that dynamically controls the voltage and frequency of the FIR filter to minimize the energy consumed.

Awards and Academic Honors

- IBM Watson Student Showcase competition, 2015 (my project on predicting if a StackOverflow question is fact/opinion based was among the top 5 cognitive apps submitted to the competition).

- Visveswaraya PhD fellowship, 2015-2020 (awarded by MeitY, Government of India to PhD students in the areas of Electronics System Design and IT enabled services).

- Indian Institute Of Science Alumni Medal for academic achievement, 2013 (awarded to the first rank holder in the M.E. Microelectronics stream).

- Winner of the Cadence Design Contest, 2013 (my design was placed first among 133 entries from 45 academic institutions across India).

- Ministry of Human Resource Development Graduate research scholarship, 2011-2013.

- B.S. Keshav Kishan Memorial Endowment Medal for academic achievement, 2011 (awarded to the first rank holder in the B.E. Electronics and Communications stream).

- All India Rank 3 in GATE 2011 (Graduate Aptitude Test for Engineering is taken by over 100,000 engineering graduates in India to get into graduate schools).
- Rank 2 in K-CET 2007 (Karnataka Common Entrance Test is taken by over 40,000 high school students in the state of Karnataka to enter professional undergraduate programs).

Selected Press

- **Times Of India** (2015): "IISc researchers devise all-digital circuits." Aparajita Ray, *Times Of India,* May 18, 2015.
- **Indian Express** (2015): "Running out of smartphone battery? A new digital circuit could fix all of that." Amitabh Sinha, *Indian Express,* June 7, 2015.
- **Education Times** (2015): "The digital sous chef." Rahat Bano, *Education Times,* Jan 19, 2015.

References

Available upon request.