

Certificate

Mr. Sushil Kumar Ammanaghatta Shivakumar, born on July 5, 1999, in Bommasandra (India), was employed as a research assistant at the Fraunhofer Institute for Solar Energy Systems ISE in the group "Degradation Analytics & Modeling" from May 16, 2023, to October 31, 2024.

The Fraunhofer Institute for Solar Energy Systems ISE in Freiburg is the largest solar research institute in Europe. With around 1,400 employees, we work towards a sustainable, economical, secure, and socially just energy supply system based on renewable energies. We contribute through our research areas in energy generation, distribution, storage, and usage. Through outstanding research results, successful industrial projects, spin-offs, and global collaborations, we help shape the sustainable transformation of the energy system.

His responsibilities in the "Degradation Analytics & Modeling" group included:

- Coding Python modules for searching, collecting, and compiling relevant data
- Using LLMs for data extraction from collected datasets
- Preparing data for degradation modeling
- Creating reports and technical documentation of the tools used
- Evaluating improved tools and practices for data collection and usage to assess PV degradation

Mr. Ammanaghatta Shivakumar possessed extensive and versatile expertise in his area of responsibility, which he always applied in a goal-oriented and results-driven manner. He quickly grasped complex relationships and consistently developed excellent solutions. He identified fully with his tasks and was always characterized by strong commitment and exceptional initiative.

He always worked very independently, with great care and utmost precision. He was always reliable and accurate. Even under high workload, he consistently delivered excellent results.

Special mention should be made of his excellent programming skills in Python, particularly in the area of data scraping. He had an outstanding ability to understand software requirements for various tasks. Additionally, he developed a module to extract

relevant data from literature using LLMs. He also impressed with his very good English skills. Mr. Ammanaghata Shivakumar also possessed excellent presentation skills and was always able to effectively communicate his work results.

Mr. Ammanaghata Shivakumar always completed his tasks to our fullest satisfaction.

He was highly appreciated by everyone for his very friendly, cooperative, and helpful nature. His behavior towards supervisors and colleagues was always exemplary. He was always a valuable support.

The employment relationship ended as scheduled at the conclusion of the agreed contract period.

We thank Mr. Ammanaghata Shivakumar for his dedicated collaboration and wish him continued success and all the best in his future endeavors.

Fraunhofer Institute for Solar Energy Systems ISE

Freiburg, October 31, 2024

Signed,

Sina Frick

Student Personnel Coordinator

Fraunhofer Society for the Advancement of Applied Research e.V.