

# Manoj Kumar Mondal

Email: [enlace.manoj@gmail.com](mailto:enlace.manoj@gmail.com) | Phone: [+91 8144607288](tel:+918144607288) | Portfolio: [manojmondal.vercel.app](https://manojmondal.vercel.app)

Linked in: [linkedin.com/in/manoj554](https://linkedin.com/in/manoj554) | Github: [github.com/manoj-kumar-mondal](https://github.com/manoj-kumar-mondal)

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## Technical Skills:

Programming Languages: C, C++, Python, JavaScript, C#

Platform: STM32, ARM Cortex-M, Visual Studio (MSVC, dotnet), VsCode, ARM GNU Tool Chain, GCC, MSYS2, linux

Tools: IAR Embedded Workbench, STM32CubeIDE & Programmer, Logic Analyzer, Gurux, Git, Github, Azure Devs Tools

Concepts: Firmware Upgrades, Secure Firmware Install, STM32 Trust-Zone, Real-Time Os, Core Dump Debugging

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## Experience:

**Senior Software Engineer (Capgemini Engineering):**

Oct 2023 – Present

Smart Energy Meter Development | STM32 MCU | SFI | Firmware Upgrade | Crypto | CPU

- **Developed** a system to find out the average **CPU load of the firmware** and contribute towards the **optimization of firmware** code and **reduced the CPU load by 10%**.
- Contributed to the design and implementation of the **firmware upgrade** system for meter firmware, including a reliable **recovery mechanism** to handle upgrade failures. Ensured **safe** and robust **remote firmware update** **minimizing the risk** of device bricking in field deployments.
- **Led the development** of a **Secure Firmware Installation (SFI)** process for **STM32U-series** MCUs. Designed a secure bootloader to validate **production images** via **certificate-based authentication** using **key exchange** and system title as subject. Ensured **encrypted firmware** is verified for authenticity and integrity before installation.

**Software Engineer (Capgemini Engineering):**

Aug 2022 - Sept 2023

Smart Energy Meter Development | STM32U MCU | ARM Trust-Zone | GDB | Core Dump

- Set up unit testing with **Ceedling** framework (**Unity** and **CMock**), enabled early bug detection, and improved firmware stability; authored **30% of test cases**.
  - Implemented a **custom crash dump** system in STM32 firmware **to capture core and RTOS TCB** data during system crash or fault. Enhanced and **integrated the open-source CrashDebug tool** to **support RTOS threads**, enabling faster root-cause analysis and **reducing developer debug time**.
  - Experienced with **Free RTOS** and handled some **critical scenarios** to send notifications to one task from another to perform a certain action or event.
  - Developed a **Low-Level I2C Analyzer** for **LCD** data using **Saleae** Logic Analyzer **SDK**.
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## Projects:

**Dynamic Memory Manager:**

- Designed a **custom allocator** for **RAM-constrained embedded systems** using a statically allocated buffer. Enabled safe **dynamic memory** with **my\_malloc()/my\_free()**, including **fragmentation tracking** and predictable behaviour for bare-metal and RTOS use cases. Post link: [link](#)

**Embedded Driver Development:**

- Designed and implemented **drivers** for the different peripherals like (SPI, I2C, USART) for the **STM32F4** development board by focusing on real-world applications and hands-on learning. Source link: [link](#)
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## Achievements:

- **Promoted** to **Senior Embedded Software Engineer** for outstanding **technical contributions** and **leadership** within the same embedded systems project.
  - Received 3× “WOW Awards” (Top Performer – Quarterly Internal Recognition) for **consistent excellence**, **innovation**, and **impact in areas** including secure firmware installation, crash recovery, and debugging tools enhancement.
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## Education:

**Bachelor of Technology (B. Tech) in Electrical and Electronics Engineering**

May 2022

International Institute of Information Technology, Bhubaneswar (IIIT Bh) | CGPA: 8.07