FINAL PROGRESS REPORT

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Domain: Embedded and IoT

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I. Overview:

The primary objectives of four weeks was to gain a comprehensive understanding of the USC_TIA framework and contribute to a Embedded and IoT.

Embedded Systems:

Embedded systems are specialized computer systems designed to perform specific tasks, such as managing a home's temperature. They typically built into devices and are programmed to operate independently, with minimal human intervention. Embedded Systems are used in a wide range of applications, including consumer electronics, industrial automation, medical devices, and automotive systems.

Internet of Things (IoT):

IoT refers to the network of physical devices, vehicles, and other objects that are embedded with sensors, software, and connectivity, allowing them to collect and exchange data. IoT enables devices to communicate with each other and with the internet, creating a connected world of smart devices and systems. IoT applications include smart homes, wearable devices, and intelligent transportation systems.

II. **Achievements**:

1. USC_TIA Familiarization:
   - During this four weeks, I became acquainted with the company's details.
   - Successfully executed IoT tasks, showcasing initial proficiency.
2. Learning Embedded and IoT:
   ➔ Fundamentals of Basic electronics:
   - Basic Electronics are voltage, current, resistances, Ohm's Law, resistors, capacitors, diodes, transistors, series and parallel circuits, basic circuit analysis.

   ➔ Foundations of Embedded Systems:
   - **Microcontrollers**: Understanding the basics of microcontrollers, which are at the heart of most embedded systems. Start with popular ones like Arduino or STM32.
   - **Embedded Development Tools**: Familiarize ourself with development environments such as Arduino IDE, PlatformIO, or IDEs provided by microcontroller manufactures.

   ➔ Understanding IoT:
   - **Sensors and Actuators**: Explore different types of sensors like temperature, humidity, motion, etc and actuators like relays, motors, etc used in IoT applications.

- **Communication Protocols**: Learning about protocols such as MQTT, HTTP, UCoAP, and protocols specific to wireless communication like Bluetooth, Zigbee, and WiFi.

III. **Challenges**:

1. **Scalability**:
   - IoT networks must handle a large number of devices and data streams, requiring scalable architectures and protocols.
2. **Reliability and Real-Time Processing**:
   - Embedded systems often require real-time response and high reliability, which can be challenging to achieve in diverse operating conditions.
3. **Privacy Concerns**:
   - IoT devices collect vast amount of personal data, raising conerns about privacy protection and data ownership.

IV. **Learning Resources**:

1. Online Courses:
   - Platforms like Edunet, Upskill, and USC_TIA offer a wide range of online course on Embedded and IoT.
2. Documentation and Tutorials:
   - Upskill campus platform provide detailed documentations on their websites.

V. **Skills Learned**:

1. **Hardware Design**:
   - Understanding circuits, PCB design, and integrating sensors and actuators.
2. **Project management**:
   - Developing project management skills to plan, execute, and monitor IoT deployments, considering factors like budget, timeline, and resource allocation.

VI. **Name of the project**:

- **Temperature and Humidity Monitoring System**.