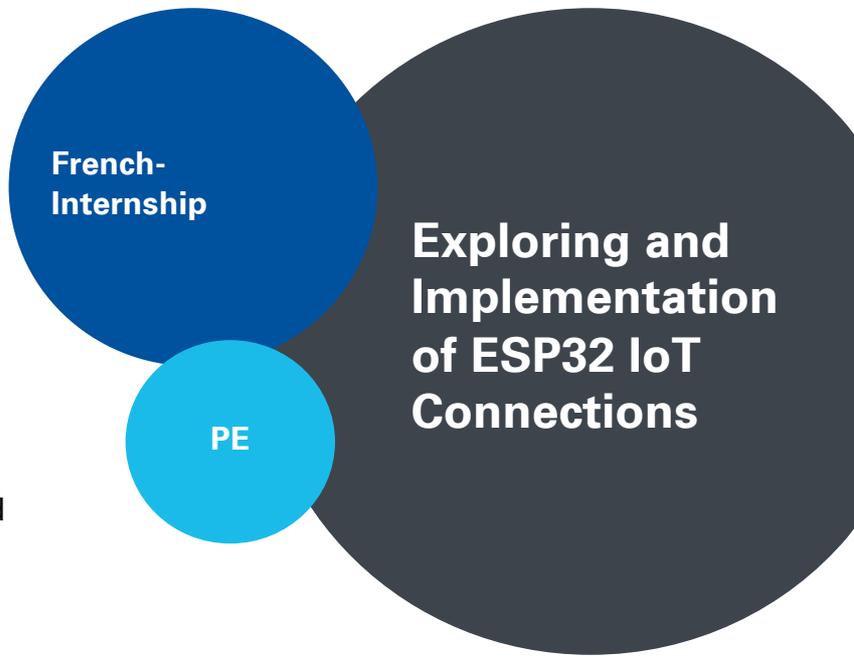# University of Stuttgart

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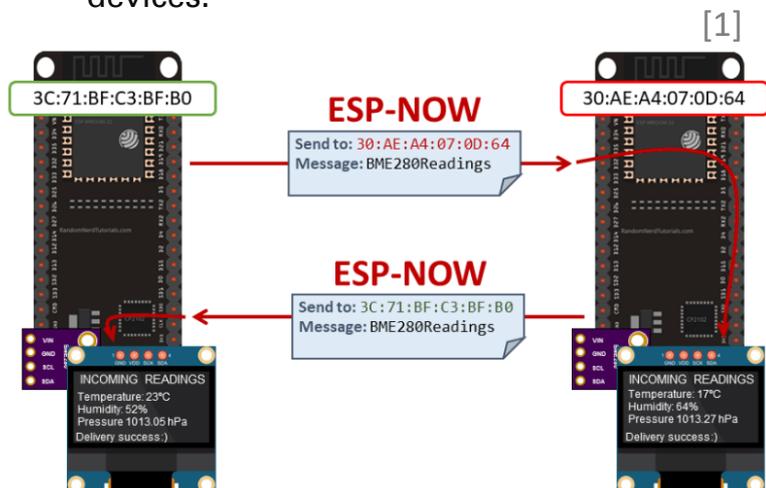# Exploring and Implementation of ESP32 IoT Connections

The ESP32 is a versatile microcontroller and WiFi/Bluetooth module developed by Espressif Systems. It features a dual-core processor, WiFi, Bluetooth, digital and analog I/O pins, and various peripherals like SPI, I2C, and UART. Commonly used in IoT, wearables, and home automation projects for wireless connectivity and microcontroller capabilities.

IoT, or the Internet of Things, encompasses networks of physical objects embedded with sensors and software, enabling them to exchange data over the internet. From household appliances to industrial machines, IoT devices enable autonomous data collection and exchange, improving efficiency and automation. For instance, smart home devices like thermostats and security cameras communicate to optimize energy usage and enhance security. IoT has the potential to revolutionize industries by enabling real-time monitoring and control of physical systems, leading to increased productivity and innovation.

Goal of this work is an implementation of wireless communication between two ESP32-based IoT devices over WiFi to transmit ADC (Analog-to-Digital Converter) values for temperature (TSEP) measurements. This offers several advantages. The ESP32's WiFi capability provides high-speed data transmission, enabling rapid exchange of ADC values for real-time temperature monitoring. This allows for quick response to temperature changes and enhances the overall efficiency of the system.

Goal: Establish a wireless connection between two IoT devices using ESP32 modules over WiFi to transmit ADC values for temperature measurements (TSEP).

1. **Research Protocols:** Explore suitable protocols like ESP-NOW for connecting multiple clients to a node efficiently.
2. **Connection Implementation:** Develop and establish the wireless connection between the IoT devices using the chosen protocol.
3. **Data Rate and Scalability**: Validate the data rates and scalability of the system to ensure efficient transmission of ADC values and accommodate potential expansion in the number of connected devices.

[1]

[1] https://randomnerdtutorials.com/esp-now-two-way-communication-esp32/