Applied Measurement & Control SS2023 :ESP32 Cam water meter reader using AI on the edge

INTRODUCTION

The ESP32 water metering system is a cutting-edge smart water monitoring solution that leverages the capabilities of the ESP32 microcontroller, a highly versatile and powerful IoT platform. The aim of the system is to provide an automated and efficient method for monitoring and recording water consumption data from a water meter .With the ESP32 water metering system, this process is made much more convenient.

MATERIALS

1.ESP32 AI THINKER CAM amc:ss2023:group-f:esp32

2.ESP32 PROGRAMMER amc:ss2023:group-f:ESP32 cam

3.ESP32 Housing amc:ss2023:group-f:housing

4.UartSbee V5.0 Module amc:ss2023:group-f: uart

SOFTWARES USED

1.Arduino

2.KiCAD

3.Ultimaker Cura

4.Autodesk FUSION 360

ESP32 AI THINKER CAM

SoC (System-on-Chip):low-power microcontroller with integrated Wi-Fi and Bluetooth capabilities.

Camera Module:OV2640 camera module with 2MP (megapixels).

Memory:8MB of flash memory (for program storage) and 520KB of SRAM (for program execution and data storage).

Power Supply : 5V DC

The ESP32-CAM is a versatile and popular development board designed for Internet of Things (IoT) applications and camera-related projects. It combines the powerful ESP32 system-on-chip (SoC) with an OV2640 camera module, making it an excellent choice for projects requiring wireless connectivity and image capturing capabilities.

The core features of the ESP32-CAM project are as follows:

System-on-Chip (SoC): The project utilizes a low-power microcontroller with integrated Wi-Fi and Bluetooth capabilities. The SoC features a dual-core clock frequency of up to 240 MHz, providing sufficient processing power for IoT applications and camera functionalities.

Camera Module (OV2640): The ESP32-CAM integrates an OV2640 camera module with a resolution of

2 megapixels. This camera module allows the board to capture still images and record video, making it suitable for the smart water meter.

Memory: The ESP32-CAM comes with 8MB of flash memory for storing the program code and other data. Additionally, it has 520KB of SRAM, which is utilized for program execution and temporary data storage during operation.

Power Supply: The project requires a 5V DC power supply to operate.

To set up the project, the camera module must be properly focused, ensuring that images and videos captured are clear and of high quality. This step is essential for obtaining accurate and usable visual data.

To get the project up and running, the firmware (program) needs to be installed on both the ESP32-CAM board and a computer. The firmware is responsible for controlling the board's functionalities, including handling camera operations and establishing Wi-Fi or Bluetooth connections.

With the combined features of the SoC, camera module, and sufficient memory, the ESP32-CAM project becomes a powerful tool for building IoT applications that involve image and video capturing, processing, and wireless communication.

amc:ss2023:group-f: image

Modification Design

This a concept design for light distribution

amc:ss2023:group-f:ring light

Methods

We followed the prodecure shown on the documentation :

https://jomjol.github.io/AI-on-the-edge-device-docs/Installation/

1.intialise esp32 Cam

2.Firmware: Web Installer

3.Manual Setup with an SD Card Reader on a PC

4.Initial Startup

PROBLEMS

We encountered problems as we followed the prodecure shown on the documentation : https://jomjol.github.io/AI-on-the-edge-device-docs/Installation/ which were :

1.Web installer failed to install the firmware the first attempts.

2. ROI would crash sometimes and fail to create new analog ROIs Even if I delete the “main” list and create it again, it would not work. “Enable Analog ROI's” at the top, the save button does not become active.