Lepton CCI Commands Module

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1. Overview

The `lepton_cci` module provides high-level command functions for configuring and controlling the Lepton thermal sensor via the CCI (Command and Control Interface). This module abstracts the low-level CCI protocol and provides convenient API functions.

1.1. Key Features

- Temperature reading (FPA and AUX sensors)
- AGC (Automatic Gain Control) management
- Emissivity configuration for radiometric measurements
- ROI (Region of Interest) configuration
- Scene statistics and spotmeter control
- TLinear resolution settings
- Video source and format control
- Flux linear parameters management

2. Supported Functions

2.1. Temperature Reading

- `Lepton_GetTemperature()`: Read FPA and AUX temperatures

2.2. AGC Control

- `Lepton_EnableAGC()`: Enable/disable AGC
  - When **enabled**: Provides 8-bit contrast-enhanced images
  - When **disabled**: Provides 14-bit raw radiometric data (with TLinear on radiometric sensors)

2.3. Radiometric Configuration (Lepton 3.5 only)

- `Lepton_SetEmissivity()`: Configure material emissivity (0-100%)
- `Lepton_GetFluxLinearParameters()` / `Lepton_SetFluxLinearParameters()`: Scene calibration
- `Lepton_GetTLinearResolution()` / `Lepton_SetTLinearResolution()`: Temperature resolution mode

2.4. ROI Management

- Spotmeter: `Lepton_GetSpotmeterROI()` / `Lepton_SetSpotmeterROI()`
- Scene: `Lepton_GetSceneROI()` / `Lepton_SetSceneROI()`
- AGC: `Lepton_GetAGCROI()` / `Lepton_SetAGCROI()`
- Video Focus: `Lepton_GetVideoFocusROI()` / `Lepton_SetVideoFocusROI()`

2.5. Scene Data

- `Lepton_GetSpotmeter()`: Read spotmeter statistics
- `Lepton_GetSceneStatistics()`: Read scene min/max/avg
- `Lepton_GetUptime()`: Sensor uptime in milliseconds

2.6. Video Control

- `Lepton_SetVideoFormat()`: RAW14 or RGB888
- `Lepton_SetVideoSource()`: Normal, ramp, or constant test patterns
- `Lepton_FreezeVideo()`: Freeze/unfreeze output
- `Lepton_EnableTelemetry()`: Enable/disable telemetry data

3. Implementation Details

This module wraps low-level CCI functions (see CCI Low-Level) with device state management:

- Validates device initialization
- Manages radiometric/non-radiometric modes
- Synchronizes AGC and TLinear states
- Provides error checking and logging

3.1. Example: AGC vs TLinear

```
// Non-radiometric sensors: AGC only
if (!device.Internal.isRadiometric) {
    Lepton_EnableAGC(&device, true, &status);  // Enable AGC
}

// Radiometric sensors: AGC or TLinear
if (device.Internal.isRadiometric) {
    Lepton_EnableAGC(&device, false, &status); // Disable AGC → enables TLinear
    // Now get 14-bit temperature data
}
```

4. Error Handling

All functions return `Lepton_Error_t`:

- `LEPTON_ERR_OK`: Success
- `LEPTON_ERR_INVALID_ARG`: Invalid parameters
- `LEPTON_ERR_NOT_INITIALIZED`: Device not initialized
- `LEPTON_ERR_NOT_SUPPORTED`: Feature not available (e.g., TLinear on Lepton 3.0)

5. Usage Example

```
Lepton_Result_t status;

// Read temperatures
uint16_t fpa, aux;
Lepton_GetTemperature(&device, &fpa, &aux, &status);
float fpa_celsius = Lepton_KelvinToCelsius(fpa);

// Configure for radiometric mode
Lepton_EnableAGC(&device, false, &status);        // Disable AGC
Lepton_SetEmissivity(&device, 98, &status);       // Human skin
```

```
Lepton_SetTLinearResolution(&device, TLINEAR_RES_0_1, &status);

// Set spotmeter ROI (center of image)
Lepton_ROI_t roi = {
    .Start = {.X = 70, .Y = 50},
    .End = {.X = 90, .Y = 70}
};
Lepton_SetSpotmeterROI(&device, &roi, &status);

// Read spotmeter
Lepton_Spotmeter_t spot;
Lepton_GetSpotmeter(&device, &spot, &status);
float temp = Lepton_KelvinToCelsius(spot.Value);
```

6. See Also

- CCI Low-Level - Low-level I2C protocol implementation
- Main Driver - High-level API overview

7. License

Website: https://www.kampis-elektroecke.de