Thermoeye Inc.

THERMOEYE

ThermoCam256E

Sensor Control SDK Manual

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Revision

Version	Date	Contents
0.1	SEP.12.2023	Draft
1.0	OCT.12.2023	1st Release
1.1	NOV.27.2023	Added distance parameter for Flux Parameters

목차

1. ThermoCamSDK GUI

카메라 장치의 InfiRay Tiny1-C 열화상 센서 제어에 필요한 UI를 제공합니다.

1.1. Flux Parameters

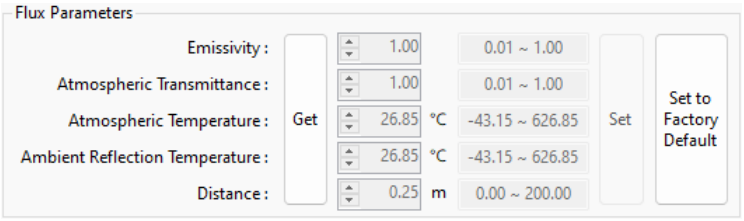

그림 1. Flux Parameters

센서에 설정된 다양한 Flux Parameters를 읽고 원하는 값으로 설정할 수 있습니다.

Get 버튼을 누르면 현재 센서에 설정된 값을 읽어와 각 Parameter별 설정창에 표시합니다.

이후 각 Parameter를 설정 가능 범위내의 값으로 변경 후 **Set** 버튼을 누르면 변경된 값이 센서에 반영됩니다.

Set to Factory Default 버튼을 누르면 센서의 공장 초기화 값으로 설정됩니다.

1.2. Flat Field Correction

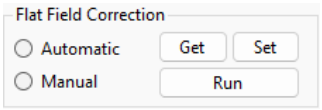

그림 2. Flat Field Correction

센서에 설정된 Flat Field Correction 모드를 읽고 변경할 수 있으며, 수동으로 Flat Field Correction 기능을 수행할 수 있습니다.

Get 버튼을 누르면 현재 센서에 설정된 값을 읽어와 Automatic / Manual 선택 버튼에 표시합니다.

Automatic 선택 후 **Set** 버튼을 누르면 Flat Field Correction 모드가 자동으로 설정되며 센서가 자동으로 보정을 수행합니다.

Manual 선택 후 **Set** 버튼을 누르면 Flat Field Correction 모드가 수동으로 설정되며, **Run** 버튼을 누를 때마다 보정을 수행합니다.

1.3. Gain Mode State

그림 3. Flat Field Correction

센서에 설정된 Gain Mode 상태를 읽고 변경할 수 있습니다.

Get 버튼을 누르면 현재 센서에 설정된 값을 읽어와 High / Low / Automatic 선택 버튼에 표시합니다.

High 선택 후 **Set** 버튼을 누르면 High Gain Mode로 설정되며 센서가 일반적인 동작으로 높은 응답성과 낮은 잡음 수치 기준을 제공합니다.

Low 선택 후 **Set** 버튼을 누르면 Low Gain Mode로 설정되며 센서가 낮은 응답성과 높은 잡은 수치 기준을 제공하지만, 더 뜨거운 장면을 보는데 필요한 장면 내 범위를 증가시킬 수 있는 이점이 있습니다.

Automatic 선택 후 **Set** 버튼을 누르면 Automatic Gain Mode로 설정되며 센서가 카메라 장면의 온도와 미리 설정된 임계 값을 기반으로 Gain Mode가 자동으로 전환됩니다.

2. ThermoCamSDK C# API

열화상 센서의 기능 제어를 위한 API를 제공합니다.

Sample project는 Microsoft Visual Studio Community 2022에서 생성되었으며, Windows .NET Framework 4.8 기준으로 구현되었습니다.

2.1. `ThermoEngine.ICameraControl` Interface

2.1.1. Definition

```
public interface ICameraControl
```

- 카메라 장치를 제어하기 위한 기능을 제공합니다
- 각 Method를 사용하기 위해서는 `ICameraControl` Interface instance 생성이 필요하며, 아래 예시와 같이 `Control` Field를 호출해야 합니다.

  ```
  mCamera.Control.GetSensorModelName();
  ```

- Methods

GetFluxParameters	Gets flux parameters of camera sensor
SetFluxParameters	Sets flux parameters of camera sensor
SetDefaultFluxParameters	Sets flux parameters of camera sensor to factory default values
GetFlatFieldCorrectionMode	Gets Flat Field Correction mode of camera sensor
SetFlatFieldCorrectionMode	Sets Flat Field Correction mode of camera sensor
RunFlatFieldCorrection	Executes Flat Field Correction of camera sensor
GetGainModeState	Gets Gain Mode state of camera sensor
SetGainModeState	Sets Gain Mode state of camera sensor

2.1.2. `GetFluxParameters` Method

```
public bool GetFluxParameters(
    out double emissivity,
    out double atmosphericTransmittance,
    out double atmosphericTemperature,
    out double ambientReflectionTemperature,
    out double distance
)
```

- Gets flux parameters of camera sensor
- Parameters

  `emissivity`: obtained ratio value for emissivity, 0.01 ~ 1

  `atmosphericTransmittance`: obtained ratio value for atmospheric transmittance,

0.01 ~ 1

`atmosphericTemperature`: obtained Celsius value for atmospheric temperature, −43.15 ~ 226.85 (high gain), −43.15 ~ 626.85 (low gain)

`ambientReflectionTemperature`: obtained Celsius value for ambient reflection temperature, −43.15 ~ 226.85 (high gain), −43.15 ~ 626.85 (low gain)

`distance`: obtained meter value for distance, 0 ~ 200

- Return Value

  True if this method gets values from device successfully; otherwise, false if an exception is raised.

- Remarks

Parameter	Minimum	Maximum	Default	Unit
`emissivity`	0.01	1	1	
`atmosphericTransmittance`	0.01	1	1	
`atmosphericTemperature`	−43.15	226.85(high gain) 626.85(low gain)	26.85	℃
`ambientReflectionTemperature`	−43.15	226.85(high gain) 626.85(low gain)	26.85	℃
`distance`	0	200	0.25	m

2.1.3. `SetFluxParameters` Method

```
public bool SetFluxParameters(
    double emissivity,
    double atmosphericTransmittance,
    double atmosphericTemperature,
    double ambientReflectionTemperature,
    double distance
)
```

- Sets flux parameters of camera sensor

- Parameters

  `emissivity`: ratio value to be set for emissivity, 0.01 ~ 1

  `atmosphericTransmittance`: ratio value to be set for atmospheric transmittance, 0.01 ~ 1

  `atmosphericTemperature`: Celsius value to be set for atmospheric temperature, −43.15 ~ 226.85 (high gain), −43.15 ~ 626.85 (low gain)

  `ambientReflectionTemperature`: Celsius value to be set for ambient reflection temperature, −43.15 ~ 226.85 (high gain), −43.15 ~ 626.85 (low gain)

  `distance`: meter value to be set for distance, 0 ~ 200

- Return Value

  True if this method sets values to device successfully; otherwise, false if an exception is raised.

- Remarks

Parameter	Minimum	Maximum	Default	Unit
`emissivity`	0.01	1	1	
`atmosphericTransmittance`	0.01	1	1	
`atmosphericTemperature`	-43.15	226.85(high gain) 626.85(low gain)	26.85	℃
`ambientReflectionTemperature`	-43.15	226.85(high gain) 626.85(low gain)	26.85	℃
`distance`	0	200	0.25	m

2.1.4. `SetDefaultFluxParameters` Method

```
public bool SetDefaultFluxParameters(
    out double emissivity,
    out double atmosphericTransmittance,
    out double atmosphericTemperature,
    out double ambientReflectionTemperature
)
```

- Sets flux parameters of camera sensor to factory default values

- Parameters

  `emissivity`: obtained default ratio value for emissivity, 0.01 ~ 1

  `atmosphericTransmittance`: obtained default ratio value for atmospheric transmittance, 0.01 ~ 1

  `atmosphericTemperature`: obtained default Celsius value for atmospheric temperature, -43.15 ~ 226.85 (high gain), -43.15 ~ 626.85 (low gain)

  `ambientReflectionTemperature`: obtained default Celsius value for ambient reflection temperature, -43.15 ~ 226.85 (high gain), -43.15 ~ 626.85 (low gain)

  `distance`: obtained default meter value to be set for distance, 0 ~ 200

- Return Value

  True if this method sets values to device successfully; otherwise, false if an exception is raised.

- Remarks

Parameter	Minimum	Maximum	Default	Unit
`emissivity`	0.01	1	1	
`atmosphericTransmittance`	0.01	1	1	

`atmosphericTemperature`	-43.15	226.85(high gain) 626.85(low gain)	26.85	℃
`ambientReflectionTemperature`	-43.15	226.85(high gain) 626.85(low gain)	26.85	℃
`distance`	0	200	0.25	m

2.1.5. `GetFlatFieldCorrectionMode` Method

```
public int GetFlatFieldCorrectionMode()
```

- Gets Flat Field Correction mode of camera sensor
- Return Value

  0 if mode is manual or 1 if mode is automatic; otherwise, -1 if an exception is raised.

2.1.6. `SetFlatFieldCorrectionMode` Method

```
public bool SetFlatFieldCorrectionMode(int mode)
```

- Sets Flat Field Correction mode of camera sensor
- Parameters

  `mode`: Flat Field Correction mode value to be set, 0 = manual or 1 = automatic
- Return Value

  True if this method sets mode to device successfully; otherwise, false if an exception is raised.

2.1.7. `RunFlatFieldCorrection` Method

```
public bool RunFlatFieldCorrection()
```

- Executes Flat Field Correction of camera sensor
- Return Value

  True if camera sensor executes Flat Field Correction successfully; otherwise, false if an exception is raised.

2.1.8. `GetGainModeState` Method

```
public int GetGainModeState()
```

- Gets Gain Mode state of camera sensor

- Return Value

  0 if mode is high or 1 if mode is low or 2 if mode is auto; otherwise, -1 if an exception is raised.

2.1.9. `SetGainModeState` Method

```
public bool SetGainModeState(int state)
```

- Sets Gain Mode state of camera sensor
- Parameters

  `state`: Gain Mode state value to be set, 0 = high or 1 = low or 2 = auto

- Return Value

  0 if mode is high or 1 if mode is low or 2 if mode is auto; otherwise, -1 if an exception is raised.