Causal Chamber®

Configuration `lt_mk2_led_matrix`

```
config version : 1.0
 chamber model : Light Tunnel Mk2

changelog
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  1.0: Initial version
```
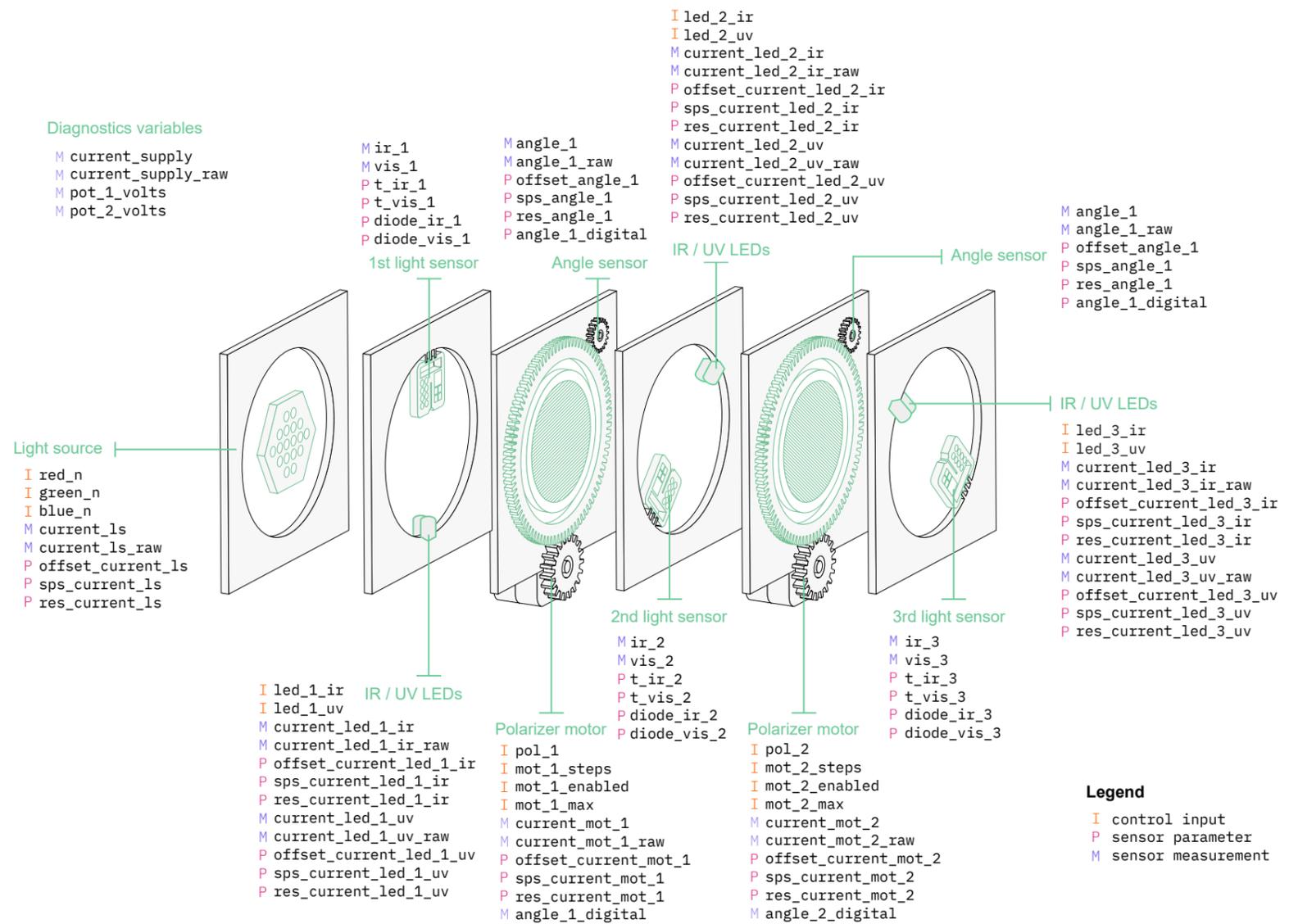
Table of contents

Description

This configuration exposes all variables of the Light Tunnel Mk2 and the camera, with individual control of each LED in the main light source.

Chamber Diagram

See the variables table for a detailed description of each variable.

Diagnostics variables

```
M current_supply
M current_supply_raw
M pot_1_volts
M pot_2_volts
```

```
M ir_1
M vis_1
P t_ir_1
P t_vis_1
P diode_ir_1
P diode_vis_1
```
1st light sensor

```
M angle_1
M angle_1_raw
P offset_angle_1
P sps_angle_1
P res_angle_1
P angle_1_digital
```
Angle sensor

```
I led_2_ir
I led_2_uv
M current_led_2_ir
M current_led_2_ir_raw
P offset_current_led_2_ir
P sps_current_led_2_ir
P res_current_led_2_ir
M current_led_2_uv
M current_led_2_uv_raw
P offset_current_led_2_uv
P sps_current_led_2_uv
P res_current_led_2_uv
```
IR / UV LEDs

```
M angle_1
M angle_1_raw
P offset_angle_1
P sps_angle_1
P res_angle_1
P angle_1_digital
```
Angle sensor

Light source

```
I red_n
I green_n
I blue_n
M current_ls
M current_ls_raw
P offset_current_ls
P sps_current_ls
P res_current_ls
```

```
I led_1_ir
I led_1_uv
M current_led_1_ir
M current_led_1_ir_raw
P offset_current_led_1_ir
P sps_current_led_1_ir
P res_current_led_1_ir
M current_led_1_uv
M current_led_1_uv_raw
P offset_current_led_1_uv
P sps_current_led_1_uv
P res_current_led_1_uv
```
IR / UV LEDs

```
M ir_2
M vis_2
P t_ir_2
P t_vis_2
P diode_ir_2
P diode_vis_2
```
2nd light sensor

Polarizer motor
```
I pol_1
I mot_1_steps
I mot_1_enabled
I mot_1_max
M current_mot_1
M current_mot_1_raw
P offset_current_mot_1
P sps_current_mot_1
P res_current_mot_1
M angle_1_digital
```

Polarizer motor
```
I pol_2
I mot_2_steps
I mot_2_enabled
I mot_2_max
M current_mot_2
M current_mot_2_raw
P offset_current_mot_2
P sps_current_mot_2
P res_current_mot_2
M angle_2_digital
```

```
M ir_3
M vis_3
P t_ir_3
P t_vis_3
P diode_ir_3
P diode_vis_3
```
3rd light sensor

IR / UV LEDs
```
I led_3_ir
I led_3_uv
M current_led_3_ir
M current_led_3_ir_raw
P offset_current_led_3_ir
P sps_current_led_3_ir
P res_current_led_3_ir
M current_led_3_uv
M current_led_3_uv_raw
P offset_current_led_3_uv
P sps_current_led_3_uv
P res_current_led_3_uv
```

Legend
```
I control input
P sensor parameter
M sensor measurement
```

Variables Table

Variable	Settable	Values	Default	Description
timestamp	No	float	–	The timestamp of the measurement, in seconds with respect to the system wall-clock.
counter	No	$\{i \in \mathbb{Z} : i \geq 0\}$	–	Measurement counter.
flag	Yes	float	0	User-defined flag.
intervention	No	$\{0,1\}$	–	Intervention flag. Has a value of 1 if this is the first measurement after a SET instruction, and 0 otherwise.
image_size	Yes	$\{1, \ldots, 1024\}$	1024	The size of the image produced by the camera, e.g., 100 corresponds to an image of 100×100 pixels.
red_n	Yes	$\{0, \ldots, 255\}$	0	The red level of LED n on the light source, with $n = 0, \ldots, 36$. Higher values correspond to higher brightness.
green_n	Yes	$\{0, \ldots, 255\}$	0	The green level of LED n on the light source, with $n = 0, \ldots, 36$. Higher values correspond to higher brightness.
blue_n	Yes	$\{0, \ldots, 255\}$	0	The blue level of LED n on the light source, with $n = 0, \ldots, 36$. Higher values correspond to higher brightness.
current_ls	No	float	–	The measurement of electric current drawn by the light source, in Amperes.
current_ls_raw	No	$\{-32768, \ldots, 32767\}$	–	The uncalibrated measurement, i.e., the raw ADC output, corresponding to the measurement `current_ls`.
offset_current_ls	Yes	$\{0, \ldots, 4095\}$	0	The reference voltage (offset) of the ADC producing the `current_ls` and `current_ls_raw` measurements. The actual reference voltage (in Volts) is given by $$5 \times \frac{\texttt{offset\_current\_ls}}{4095}.$$ Because the signal from the current sensor is passed through an inverting amplifier, higher values of `offset_current_ls` result in lower values of `current_ls_raw`.
sps_current_ls	Yes	$\{0, \ldots, 7\}$	7	The data rate of the ADC producing the `current_ls` and `current_ls_raw` measurements. Lower values mean the ADC accumulates more readings to produce a single measurement, reducing noise but also lowering the measurement speed. The actual data rates are (respectively) $8, 16, 32, 64, 128, 250, 475$ and 860 samples per second.
res_current_ls	Yes	$\{0, \ldots, 5\}$	0	The resolution of the ADC producing the `current_ls` and `current_ls_raw` measurements. Higher values mean a higher resolution, where a smaller voltage range is mapped to the ADC output range $\{-32768, 32767\}$. The voltage ranges are, respectively, $\pm 6.144, \pm 4.096, \pm 2.048, \pm 1.024, \pm 0.512$ and ± 0.256 Volts. The reading will saturate, i.e., clamp at -32768 or 32767, if the input voltage exceeds the set range.
pol_1	Yes	float $\in [-270, 270]$	0	The set position of the first polarizer, in degrees. The actual angle of the polarizer may slightly deviate from this setting due to the imperfect coupling of the mechanical pieces and the resolution of the motor (see `mot_1_steps`).
mot_1_steps	Yes	$\{3200, 1600, 800, 400, 200\}$	3200	The steps-per-revolution of the stepper motor controlling the first polarizer. Higher values mean a higher motor resolution, i.e., more precise positioning. At low current levels `mot_1_max` and/or step values below 800, the motor may lose torque and start missing steps, resulting in a mismatch between the set position `pol_1` and the actual polarizer angle.
mot_1_enabled	Yes	$\{0,1\}$	1	Enables (1) or disables (0) the motor of the first polarizer. If the motor is disabled (0), setting `pol_1` will have no effect on the actual position of the polarizer.
mot_1_max	Yes	$\{0, \ldots, 4095\}$	3000	Regulates the maximum current drawn by the motor controlling the first polarizer. At low current levels and/or `mot_1_steps` values below 800, the motor may lose torque and start missing steps, resulting in a mismatch between the set position `pol_1` and the actual polarizer angle.
current_mot_1	No	float	–	The measurement (in Amperes) of the electric current drawn by the motor controlling the first polarizer.

Table 1: Description of the variables produced by the chamber configuration `lt_mk2_led_matrix`. Settable variables can be manipulated by calling .set(<variable>,<value>). "float" corresponds to a 32-bit float.

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Variable	Settable	Values	Default	Description
`current_mot_1_raw`	No	$\{-32768,\ldots,32767\}$	–	The uncalibrated measurement, i.e., the raw ADC output, corresponding to the measurement `current_mot_1`.
`offset_current_mot_1`	Yes	$\{0,\ldots,4095\}$	0	The reference voltage (offset) of the ADC producing the `current_mot_1` and `current_mot_1_raw` measurements. The actual reference voltage (in Volts) is given by $$5 \times \frac{\texttt{offset\_current\_mot\_1}}{4095}.$$ Because the signal from the current sensor is passed through an inverting amplifier, higher values of `offset_current_mot_1` result in lower values of `current_mot_1_raw`.
`sps_current_mot_1`	Yes	$\{0,\ldots,7\}$	7	The data rate of the ADC producing the `current_mot_1` and `current_mot_1_raw` measurements. Lower values mean the ADC accumulates more readings to produce a single measurement, reducing noise but also lowering the measurement speed. The actual data rates are (respectively) $8, 16, 32, 64, 128, 250, 475$ and 860 samples per second.
`res_current_mot_1`	Yes	$\{0,\ldots,5\}$	0	The resolution of the ADC producing the `current_mot_1` and `current_mot_1_raw` measurements. Higher values mean a higher resolution, where a smaller voltage range is mapped to the ADC output range $\{-32768, 32767\}$. The voltage ranges are, respectively, $\pm6.144, \pm4.096, \pm2.048, \pm1.024, \pm0.512$ and ±0.256 Volts. The reading will saturate, i.e., clamp at -32768 or 32767, if the input voltage exceeds the set range.
`angle_1`	No	float	–	The position (in degrees) of the first polarizer as measured by the analog angle sensor.
`angle_1_raw`	No	$\{-32768,\ldots,32767\}$	–	The uncalibrated angle measurement for the first polarizer, i.e., the raw ADC output corresponding to `angle_1`.
`offset_angle_1`	Yes	$\{0,\ldots,4095\}$	0	The reference voltage (offset) of the ADC producing the `angle_1` and `angle_1_raw` measurements. The actual reference voltage (in Volts) is given by $$5 \times \frac{\texttt{offset\_angle\_1}}{4095}.$$
`sps_angle_1`	Yes	$\{0,\ldots,7\}$	7	The data rate of the ADC producing the `angle_1` and `angle_1_raw` measurements. Lower values mean the ADC accumulates more readings to produce a single measurement, reducing noise but also lowering the measurement speed. The actual data rates are (respectively) $8, 16, 32, 64, 128, 250, 475$ and 860 samples per second.
`res_angle_1`	Yes	$\{0,\ldots,5\}$	0	The resolution of the ADC producing the `angle_1` and `angle_1_raw` measurements. Higher values mean a higher resolution, where a smaller voltage range is mapped to the ADC output range $\{-32768, 32767\}$. The voltage ranges are, respectively, $\pm6.144, \pm4.096, \pm2.048, \pm1.024, \pm0.512$ and ±0.256 Volts. The reading will saturate, i.e., clamp at -32768 or 32767, if the input voltage exceeds the set range.
`angle_1_digital`	No	$\mathbb{Z}$	–	The position (in degrees) of the first polarizer as measured by the rotary encoder.
`pol_2`	Yes	float $\in [-270, 270]$	0	The set position of the second polarizer, in degrees. The actual angle of the polarizer may slightly deviate from this setting due to the imperfect coupling of the mechanical pieces and the resolution of the motor (see `mot_2_steps`).
`mot_2_steps`	Yes	$\{3200, 1600, 800, 400, 200\}$	3200	The steps-per-revolution of the stepper motor controlling the second polarizer. Higher values mean a higher motor resolution, i.e., more precise positioning. At low current levels `mot_2_max` and/or step values below 800, the motor may lose torque and start missing steps, resulting in a mismatch between the set position `pol_2` and the actual polarizer angle.
`mot_2_enabled`	Yes	$\{0,1\}$	1	Enables (1) or disables (0) the motor of the second polarizer. If the motor is disabled (0), setting `pol_2` will have no effect on the actual position of the polarizer.
`mot_2_max`	Yes	$\{0,\ldots,4095\}$	3000	Regulates the maximum current drawn by the motor controlling the second polarizer. At low current levels and/or `mot_2_steps` values below 800, the motor may lose torque and start missing steps, resulting in a mismatch between the set position `pol_2` and the actual polarizer angle.
`current_mot_2`	No	float	–	The measurement (in Amperes) of the electric current drawn by the motor controlling the second polarizer.

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Variable	Settable	Values	Default	Description
`current_mot_2_raw`	No	$\{-32768, \ldots, 32767\}$	–	The uncalibrated measurement, i.e., the raw ADC output, corresponding to the measurement `current_mot_2`.
`offset_current_mot_2`	Yes	$\{0, \ldots, 4095\}$	0	The reference voltage (offset) of the ADC producing the `current_mot_2` and `current_mot_2_raw` measurements. The actual reference voltage (in Volts) is given by $$5 \times \frac{\texttt{offset\_current\_mot\_2}}{4095}.$$ Because the signal from the current sensor is passed through an inverting amplifier, higher values of `offset_current_mot_2` result in lower values of `current_mot_2_raw`.
`sps_current_mot_2`	Yes	$\{0, \ldots, 7\}$	7	The data rate of the ADC producing the `current_mot_2` and `current_mot_2_raw` measurements. Lower values mean the ADC accumulates more readings to produce a single measurement, reducing noise but also lowering the measurement speed. The actual data rates are (respectively) $8, 16, 32, 64, 128, 250, 475$ and 860 samples per second.
`res_current_mot_2`	Yes	$\{0, \ldots, 5\}$	0	The resolution of the ADC producing the `current_mot_2` and `current_mot_2_raw` measurements. Higher values mean a higher resolution, where a smaller voltage range is mapped to the ADC output range $\{-32768, 32767\}$. The voltage ranges are, respectively, $\pm 6.144, \pm 4.096, \pm 2.048, \pm 1.024, \pm 0.512$ and ± 0.256 Volts. The reading will saturate, i.e., clamp at -32768 or 32767, if the input voltage exceeds the set range.
`angle_2`	No	float	–	The position (in degrees) of the second polarizer as measured by the analog angle sensor.
`angle_2_raw`	No	$\{-32768, \ldots, 32767\}$	–	The uncalibrated angle measurement for the second polarizer, i.e., the raw ADC output corresponding to `angle_2`.
`offset_angle_2`	Yes	$\{0, \ldots, 4095\}$	0	The reference voltage (offset) of the ADC producing the `angle_2` and `angle_2_raw` measurements. The actual reference voltage (in Volts) is given by $$5 \times \frac{\texttt{offset\_angle\_2}}{4095}.$$
`sps_angle_2`	Yes	$\{0, \ldots, 7\}$	7	The data rate of the ADC producing the `angle_2` and `angle_2_raw` measurements. Lower values mean the ADC accumulates more readings to produce a single measurement, reducing noise but also lowering the measurement speed. The actual data rates are (respectively) $8, 16, 32, 64, 128, 250, 475$ and 860 samples per second.
`res_angle_2`	Yes	$\{0, \ldots, 5\}$	0	The resolution of the ADC producing the `angle_2` and `angle_2_raw` measurements. Higher values mean a higher resolution, where a smaller voltage range is mapped to the ADC output range $\{-32768, 32767\}$. The voltage ranges are, respectively, $\pm 6.144, \pm 4.096, \pm 2.048, \pm 1.024, \pm 0.512$ and ± 0.256 Volts. The reading will saturate, i.e., clamp at -32768 or 32767, if the input voltage exceeds the set range.
`angle_2_digital`	No	$\mathbb{Z}$	–	The position (in degrees) of the second polarizer as measured by the rotary encoder.
`ir_1`	No	$\{0, \ldots, 65535\}$	–	The uncalibrated infrared intensity measurement produced by the first light sensor, placed in front of both polarizers (wrt. the light source).
`vis_1`	No	$\{0, \ldots, 65535\}$	–	The uncalibrated visible-light intensity measurement produced by the first light sensor, placed in front of both polarizers (wrt. the light source).
`ir_2`	No	$\{0, \ldots, 65535\}$	–	The uncalibrated infrared intensity measurement produced by the second light sensor, placed between the two polarizers.
`vis_2`	No	$\{0, \ldots, 65535\}$	–	The uncalibrated visible-light intensity measurement produced by the second light sensor, placed between the two polarizers.
`ir_3`	No	$\{0, \ldots, 65535\}$	–	The uncalibrated infrared intensity measurement produced by the third light sensor, placed after both polarizers (wrt. the light source).
`vis_3`	No	$\{0, \ldots, 65535\}$	–	The uncalibrated visible-light intensity measurement produced by the third light sensor, placed after both polarizers (wrt. the light source).
`t_ir_1`	Yes	$\{0,1,2,3\}$	3	The exposure time of the first sensor during an infrared intensity measurement. Higher values correspond to longer exposure, increasing the sensitivity of the sensor.

Table 1: Description of the variables produced by the chamber configuration `lt_mk2_led_matrix`. Settable variables can be manipulated by calling `.set(<variable>,<value>)`. "float" corresponds to a 32-bit float.

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Variable	Settable	Values	Default	Description
`t_vis_1`	Yes	$\{0,1,2,3\}$	3	The exposure time of the first sensor during a visible-light intensity measurement. Higher values correspond to longer exposure, increasing the sensitivity of the sensor.
`t_ir_2`	Yes	$\{0,1,2,3\}$	3	The exposure time of the second sensor during an infrared intensity measurement. Higher values correspond to longer exposure, increasing the sensitivity of the sensor.
`t_vis_2`	Yes	$\{0,1,2,3\}$	3	The exposure time of the second sensor during a visible-light intensity measurement. Higher values correspond to longer exposure, increasing the sensitivity of the sensor.
`t_ir_3`	Yes	$\{0,1,2,3\}$	3	The exposure time of the third sensor during an infrared intensity measurement. Higher values correspond to longer exposure, increasing the sensitivity of the sensor.
`t_vis_3`	Yes	$\{0,1,2,3\}$	3	The exposure time of the third sensor during a visible-light intensity measurement. Higher values correspond to longer exposure, increasing the sensitivity of the sensor.
`diode_ir_1`	Yes	$\{0,1,2\}$	2	The photodiode used by the first light sensor when taking an infrared measurement, corresponding to the small (0), medium(1) and large (2) photodiodes. Larger values increase the sensitivity of the sensor.
`diode_vis_1`	Yes	$\{0,1\}$	1	The photodiode used by the first light sensor when taking a visible-light measurement, corresponding to the small (0) and medium (1) photodiodes. Larger values increase the sensitivity of the sensor.
`diode_ir_2`	Yes	$\{0,1,2\}$	2	The photodiode used by the second light sensor when taking an infrared measurement, corresponding to the small (0), medium (1) and large (2) photodiodes. Larger values increase the sensitivity of the sensor.
`diode_vis_2`	Yes	$\{0,1\}$	1	The photodiode used by the second light sensor when taking a visible-light measurement, corresponding to the small (0) and medium (1) photodiodes. Larger values increase the sensitivity of the sensor.
`diode_ir_3`	Yes	$\{0,1,2\}$	2	The photodiode used by the third light sensor when taking an infrared measurement, corresponding to the small (0), medium (1) and large (2) photodiodes. Larger values increase the sensitivity of the sensor.
`diode_vis_3`	Yes	$\{0,1\}$	1	The photodiode used by the third light sensor when taking a visible-light measurement, corresponding to the small (0) and medium (1) photodiodes. Larger values increase the sensitivity of the sensor.
`led_1_ir`	Yes	$\{0,\ldots,4095\}$	0	The brightness setting of the infrared (IR) LED above the first light-intensity sensor. Higher values correspond to higher brightness.
`led_1_uv`	Yes	$\{0,\ldots,4095\}$	0	The brightness setting of the ultraviolet (UV) LED above the first light-intensity sensor. Higher values correspond to higher brightness.
`led_2_ir`	Yes	$\{0,\ldots,4095\}$	0	The brightness setting of the infrared (IR) LED above the second light-intensity sensor. Higher values correspond to higher brightness.
`led_2_uv`	Yes	$\{0,\ldots,4095\}$	0	The brightness setting of the ultraviolet (UV) LED above the second light-intensity sensor. Higher values correspond to higher brightness.
`led_3_ir`	Yes	$\{0,\ldots,4095\}$	0	The brightness setting of the infrared (IR) LED above the third light-intensity sensor. Higher values correspond to higher brightness.
`led_3_uv`	Yes	$\{0,\ldots,4095\}$	0	The brightness setting of the ultraviolet (UV) LED above the third light-intensity sensor. Higher values correspond to higher brightness.
`current_led_1_ir`	No	float	–	Measurement (in Amperes) of the current drawn by the IR LED above the first sensor.
`current_led_1_ir_raw`	No	$\{-32768,\ldots,32767\}$	–	The uncalibrated measurement, i.e., the raw ADC output, corresponding to the measurement `current_led_1_ir`.
`offset_current_led_1_ir`	Yes	$\{0,\ldots,4095\}$	0	The reference voltage (offset) of the ADC producing the `current_led_1_ir` and `current_led_1_ir_raw` measurements. The actual reference voltage (in Volts) is given by $$5 \times \frac{\texttt{offset\_current\_led\_1\_ir}}{4095}.$$ Because the signal from the current sensor is passed through an inverting amplifier, higher values of `offset_current_led_1_ir` result in lower values of `current_led_1_ir_raw`.

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Variable	Settable	Values	Default	Description
sps_current_led_1_ir	Yes	$\{0,\ldots,7\}$	7	The data rate of the ADC producing the `current_led_1_ir` and `current_led_1_ir_raw` measurements. Lower values mean the ADC accumulates more readings to produce a single measurement, reducing noise but also lowering the measurement speed. The actual data rates are (respectively) $8, 16, 32, 64, 128, 250, 475$ and 860 samples per second.
res_current_led_1_ir	Yes	$\{0,\ldots,5\}$	0	The resolution of the ADC producing the `current_led_1_ir` and `current_led_1_ir_raw` measurements. Higher values mean a higher resolution, where a smaller voltage range is mapped to the ADC output range $\{-32768, 32767\}$. The voltage ranges are, respectively, $\pm6.144, \pm4.096, \pm2.048, \pm1.024, \pm0.512$ and ±0.256 Volts. The reading will saturate, i.e., clamp at -32768 or 32767, if the input voltage exceeds the set range.
current_led_1_uv	No	float	–	Measurement (in Amperes) of the current drawn by the UV LED above the first sensor.
current_led_1_uv_raw	No	$\{-32768,\ldots,32767\}$	–	The uncalibrated measurement, i.e., the raw ADC output, corresponding to the measurement `current_led_1_uv`.
offset_current_led_1_uv	Yes	$\{0,\ldots,4095\}$	0	The reference voltage (offset) of the ADC producing the `current_led_1_uv` and `current_led_1_uv_raw` measurements. The actual reference voltage (in Volts) is given by $$5 \times \frac{\texttt{offset\_current\_led\_1\_uv}}{4095}.$$ Because the signal from the current sensor is passed through an inverting amplifier, higher values of `offset_current_led_1_uv` result in lower values of `current_led_1_uv_raw`.
sps_current_led_1_uv	Yes	$\{0,\ldots,7\}$	7	The data rate of the ADC producing the `current_led_1_uv` and `current_led_1_uv_raw` measurements. Lower values mean the ADC accumulates more readings to produce a single measurement, reducing noise but also lowering the measurement speed. The actual data rates are (respectively) $8, 16, 32, 64, 128, 250, 475$ and 860 samples per second.
res_current_led_1_uv	Yes	$\{0,\ldots,5\}$	0	The resolution of the ADC producing the `current_led_1_uv` and `current_led_1_uv_raw` measurements. Higher values mean a higher resolution, where a smaller voltage range is mapped to the ADC output range $\{-32768, 32767\}$. The voltage ranges are, respectively, $\pm6.144, \pm4.096, \pm2.048, \pm1.024, \pm0.512$ and ±0.256 Volts. The reading will saturate, i.e., clamp at -32768 or 32767, if the input voltage exceeds the set range.
current_led_2_ir	No	float	–	Measurement (in Amperes) of the current drawn by the IR LED above the second sensor.
current_led_2_ir_raw	No	$\{-32768,\ldots,32767\}$	–	The uncalibrated measurement, i.e., the raw ADC output, corresponding to the measurement `current_led_2_ir`.
offset_current_led_2_ir	Yes	$\{0,\ldots,4095\}$	0	The reference voltage (offset) of the ADC producing the `current_led_2_ir` and `current_led_2_ir_raw` measurements. The actual reference voltage (in Volts) is given by $$5 \times \frac{\texttt{offset\_current\_led\_2\_ir}}{4095}.$$ Because the signal from the current sensor is passed through an inverting amplifier, higher values of `offset_current_led_2_ir` result in lower values of `current_led_2_ir_raw`.
sps_current_led_2_ir	Yes	$\{0,\ldots,7\}$	7	The data rate of the ADC producing the `current_led_2_ir` and `current_led_2_ir_raw` measurements. Lower values mean the ADC accumulates more readings to produce a single measurement, reducing noise but also lowering the measurement speed. The actual data rates are (respectively) $8, 16, 32, 64, 128, 250, 475$ and 860 samples per second.
res_current_led_2_ir	Yes	$\{0,\ldots,5\}$	0	The resolution of the ADC producing the `current_led_2_ir` and `current_led_2_ir_raw` measurements. Higher values mean a higher resolution, where a smaller voltage range is mapped to the ADC output range $\{-32768, 32767\}$. The voltage ranges are, respectively, $\pm6.144, \pm4.096, \pm2.048, \pm1.024, \pm0.512$ and ±0.256 Volts. The reading will saturate, i.e., clamp at -32768 or 32767, if the input voltage exceeds the set range.
current_led_2_uv	No	float	–	Measurement (in Amperes) of the current drawn by the UV LED above the second sensor.
current_led_2_uv_raw	No	$\{-32768,\ldots,32767\}$	–	The uncalibrated measurement, i.e., the raw ADC output, corresponding to the measurement `current_led_2_uv`.

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Variable	Settable	Values	Default	Description
offset_current_led_2_uv	Yes	$\{0,\dots,4095\}$	0	The reference voltage (offset) of the ADC producing the `current_led_2_uv` and `current_led_2_uv_raw` measurements. The actual reference voltage (in Volts) is given by $$5 \times \frac{\texttt{offset\_current\_led\_2\_uv}}{4095}.$$ Because the signal from the current sensor is passed through an inverting amplifier, higher values of `offset_current_led_2_uv` result in lower values of `current_led_2_uv_raw`.
sps_current_led_2_uv	Yes	$\{0,\dots,7\}$	7	The data rate of the ADC producing the `current_led_2_uv` and `current_led_2_uv_raw` measurements. Lower values mean the ADC accumulates more readings to produce a single measurement, reducing noise but also lowering the measurement speed. The actual data rates are (respectively) $8, 16, 32, 64, 128, 250, 475$ and 860 samples per second.
res_current_led_2_uv	Yes	$\{0,\dots,5\}$	0	The resolution of the ADC producing the `current_led_2_uv` and `current_led_2_uv_raw` measurements. Higher values mean a higher resolution, where a smaller voltage range is mapped to the ADC output range $\{-32768, 32767\}$. The voltage ranges are, respectively, $\pm 6.144, \pm 4.096, \pm 2.048, \pm 1.024, \pm 0.512$ and ± 0.256 Volts. The reading will saturate, i.e., clamp at -32768 or 32767, if the input voltage exceeds the set range.
current_led_3_ir	No	float	–	Measurement (in Amperes) of the current drawn by the IR LED above the third sensor.
current_led_3_ir_raw	No	$\{-32768,\dots,32767\}$	–	The uncalibrated measurement, i.e., the raw ADC output, corresponding to the measurement `current_led_3_ir`.
offset_current_led_3_ir	Yes	$\{0,\dots,4095\}$	0	The reference voltage (offset) of the ADC producing the `current_led_3_ir` and `current_led_3_ir_raw` measurements. The actual reference voltage (in Volts) is given by $$5 \times \frac{\texttt{offset\_current\_led\_3\_ir}}{4095}.$$ Because the signal from the current sensor is passed through an inverting amplifier, higher values of `offset_current_led_3_ir` result in lower values of `current_led_3_ir_raw`.
sps_current_led_3_ir	Yes	$\{0,\dots,7\}$	7	The data rate of the ADC producing the `current_led_3_ir` and `current_led_3_ir_raw` measurements. Lower values mean the ADC accumulates more readings to produce a single measurement, reducing noise but also lowering the measurement speed. The actual data rates are (respectively) $8, 16, 32, 64, 128, 250, 475$ and 860 samples per second.
res_current_led_3_ir	Yes	$\{0,\dots,5\}$	0	The resolution of the ADC producing the `current_led_3_ir` and `current_led_3_ir_raw` measurements. Higher values mean a higher resolution, where a smaller voltage range is mapped to the ADC output range $\{-32768, 32767\}$. The voltage ranges are, respectively, $\pm 6.144, \pm 4.096, \pm 2.048, \pm 1.024, \pm 0.512$ and ± 0.256 Volts. The reading will saturate, i.e., clamp at -32768 or 32767, if the input voltage exceeds the set range.
current_led_3_uv	No	float	–	Measurement (in Amperes) of the current drawn by the UV LED above the third sensor.
current_led_3_uv_raw	No	$\{-32768,\dots,32767\}$	–	The uncalibrated measurement, i.e., the raw ADC output, corresponding to the measurement `current_led_3_uv`.
offset_current_led_3_uv	Yes	$\{0,\dots,4095\}$	0	The reference voltage (offset) of the ADC producing the `current_led_3_uv` and `current_led_3_uv_raw` measurements. The actual reference voltage (in Volts) is given by $$5 \times \frac{\texttt{offset\_current\_led\_3\_uv}}{4095}.$$ Because the signal from the current sensor is passed through an inverting amplifier, higher values of `offset_current_led_3_uv` result in lower values of `current_led_3_uv_raw`.
sps_current_led_3_uv	Yes	$\{0,\dots,7\}$	7	The data rate of the ADC producing the `current_led_3_uv` and `current_led_3_uv_raw` measurements. Lower values mean the ADC accumulates more readings to produce a single measurement, reducing noise but also lowering the measurement speed. The actual data rates are (respectively) $8, 16, 32, 64, 128, 250, 475$ and 860 samples per second.

Table 1: Description of the variables produced by the chamber configuration `lt_mk2_led_matrix`. Settable variables can be manipulated by calling `.set(<variable>,<value>)`. "float" corresponds to a 32-bit float.

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Variable	Settable	Values	Default	Description
`res_current_led_3_uv`	Yes	$\{0,\dots,5\}$	0	The resolution of the ADC producing the `current_led_3_uv` and `current_led_3_uv_raw` measurements. Higher values mean a higher resolution, where a smaller voltage range is mapped to the ADC output range $\{-32768, 32767\}$. The voltage ranges are, respectively, $\pm6.144, \pm4.096, \pm2.048, \pm1.024, \pm0.512$ and ±0.256 Volts. The reading will saturate, i.e., clamp at -32768 or 32767, if the input voltage exceeds the set range.
`current_supply`	No	float	–	The current drawn by the chamber and all its components, including the onboard computer and server. Used for diagnosis.
`current_supply_raw`	No	$\{0,\dots,1023\}$	–	The uncalibrated measurement, i.e., the raw ADC output, corresponding to the measurement `current_supply`.
`pot_1_volts`	No	float	–	The raw voltage (in volts) of the first angle sensor. Used for diagnosis.
`pot_2_volts`	No	float	–	The raw voltage (in volts) of the second angle sensor. Used for diagnosis.

Table 1: Description of the variables produced by the chamber configuration `lt_mk2_led_matrix`. Settable variables can be manipulated by calling `.set(<variable>,<value>)`. "float" corresponds to a 32-bit float.