MTD2A_binary_input

MTD2A: Model **Train Detection And Action – arduino library** https://github.com/MTD2A/MTD2A
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MTD2A_binary_input is an easy-to-use, advanced and functional C++ class for time-controlled handling of inputs from sensors, buttons and more, as well as the program itself. MTD2A supports parallel processing and asynchronous execution.

The class is among a number of logical building blocks that solve different functions.
Common to all building blocks are:
• They support a wide range of input sensors and output devices
• Are simple to use to build complex solutions with few commands
• They operate non-blocking, process-oriented and state-driven
• Offers extensive control and troubleshooting information
• Thoroughly documented with examples

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Feature Description

MTD2A_binary_input process consists of 3 functions:

1. `MTD2A_timer object_name (”object_name” , CountDownMS );`
2. `object_name.timer ( { RESET_TIMER | START_TIMER | PAUSE_TIMER | STOP_TIMER }, countDownMS} );` Called in `void setup ();`
3. `MTD2A_loop_execute ();` Called as the last instruction in `void loop ();`

The first argument uses the default value and the function can be called with none and up to 2 arguments.

```
MTD2A_timer object_name ();
MTD2A_timer object_name (”Object_name”);
MTD2A_timer object_name (”Object_name”, countDownMS);
Default:                          (”Object  name”, 0                    );
```

Eksempel

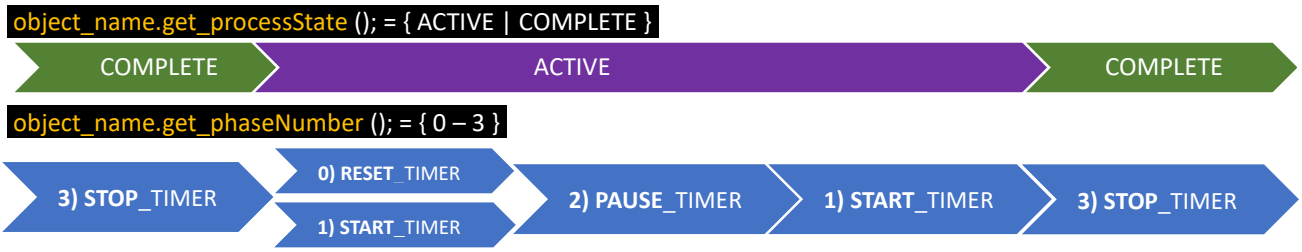
```
// Event if-condition controlled. Recommended for simple solutions
// Read infrared sensor. Short detection: One LED blink.
// continuously detection: continuously LED blink
// Suitable for Unpredictable process flows such as object detection with a sensor
if (IR_sensor.get_processState() == ACTIVE) {
  Serial.println ("Object detected");
  if (timer_GL1.get_processState() == COMPLETE) {
    timer_GL1.timer (START_TIMER, 1000); // 1   second
    green_LED_1.activate (500);          // 0,5 second
  }
}
```

More examples and youtube demo video:

https://github.com/MTD2A/MTD2A/tree/main/examples
DEMO video: https://youtu.be/UU4k4_8GWfM

Process phases

Depending on the current configuration, the process is carried out in between 2 and multiple phases with pauses.



3. The initial phase when the program starts STOP_TIMER.
0. When function object_name.timer (RESET_TIMER); Is called. Can occur at any time.
1. When function object_name.timer (START_TIMER); Is called. May occur several times after each pause.
2. When function object_name.timer (PAUSE_TIMER); Is called. May occur several times after start and reset.
3. When function object_name.timer (STOP_TIMER); Is called or when the time has expired. countDownMS = 0.

Global Number Constants:
RESET_TIMER, START_TIMER, PAUSE_TIMER og STOP_TIMER

The immediate phase shift can be identified by function: object_name.get_phaseChange (); = { true | false }

Proces status

When transitioning to START_TIMER or RESET_TIMER, ProcessState switches to ACTIVE.
When transitioning to STOP_TIMER, the processState switches to COMPLETE.
ProcessState remains ACTIVE during PAUSE_TIMER.

Timing

The time period can be set when the object is instantiated. Subsequently, new time periods can be defined with the functin: object_name.set_countDownMS ({0 - 4294967295}); But only when processState is COMPLETE

Refer to the document MTD2A.PDF and the section "Cadence", "Synchronization" and "Execution speed".

Set and Get Features Overview

Set functions	Comment
set_countDownMS ({0 - 4294967295});	Set new count down time in milliseconds
set_debugPrint ({ENABLE | DISABLE});	Activate print phase number and text.
set_errorPrint ({ENABLE | DISABLE});	Activate error messages.

Get functions	Comment
get_processState (); return bool {ACTIVE | COMPLETE}	Process state
get_phaseChange (); return bool {true | false}	Momentarily phase change (one loop time)
get_phaseNumber (); return uint8_t {0 - 3}	RESET_TIMER = 0, START_TIMER =1, PAUSE_TIMER = 2, STOP_TIMER = 3
get_startTimeMS (); return uint32_t milliseconds	Last START_TIMER
get_stopTimeMS (); return uint32_t milliseconds	STOP_TIMER or countDownMS is zero
get_pauseTimeMS (); return uint32_t milliseconds	Acuumulated pause time (sum of all pause periods). Zero if no pause initiated
get_remainTimeMS (); return uint32_t milliseconds	Remining time since first start
get_elapsedTimeMS (); return uint32_t milliseconds	elapsed time since first start
get_reset_error (); return uint8_t {0-255}	Get error/warning number and reset number: Error [1 – 127] warning [128 – 255]

Operator overloading	Function
object_name_1 == object_name_2	bool processState_1 == processState_2
object_name_1 != object_name_2	bool processState_1 != processState_2
object_name_1 > object_name_2	bool processState_1 = ACTIVE & processState_2 = COMPLETE
object_name_1 < object_name_2	bool processState_1 = COMPLETE & processState_2 = ACTIVE
object_name_1 >> object_name_2	bool stopTimeMS_1 > stopTimeMS_2
object_name_1 << object_name_2	bool stopTimeMS_1 < stopTimeMS_2

Print_conf();

```
object_name.print_conf ();
```

```
MTD2A_timer:
--------------------
  objectName    : Timer
  processState  : COMPLETE
  phaseText     : [3] Stop timer
  debugPrint    : ENABLE
  globalDebugPr: DISABLE
  errorPrint    : DISABLE
  globalErrorPr: ENABLE
  errorNumber   : 0 OK
  countDownMS   : 20000
  startTimeMS   : 4015
  stopTimeMS    : 19011
  remainTimeMS  : 9896
  elapsedTimeMS: 10104
  pauseTimeMS   : 5999
  pauseBeginMS  : 13012
  pauseEndMS    : 16012
```

If there are multiple breaks during the time period, it shows the total pause time pauseTimeMS, but pauseBeginMS and pauseEndMS only appear for the last pause.

Precise timing

If greater time accuracy is desired, it is recommended to use the Arduino ESP32 and the cadence DELAY_1MS

```
MTD2A_timer:
--------------------
  objectName    : Timer
  processState  : COMPLETE
  phaseText     : [3] Stop timer
  debugPrint    : ENABLE
  globalDebugPr: DISABLE
  errorPrint    : DISABLE
  globalErrorPr: ENABLE
  errorNumber   : 0 OK
  countDownMS   : 8000
  remainTimeMS  : 6000
  elapsedTimeMS: 2000
  startTimeMS   : 4576
  stopTimeMS    : 9576
  pauseTimeMS   : 3000
  pauseBeginMS  : 6576
  pauseEndMS    : 9576
```