LISYclock

A clock with WiFi and more …

Hardware version 2.01

Technical reference

ralf@lisy.dev

15.03.2026

Table of contents

1. Overview

The LISYclock is based on an ESP32-S3 firmware for a pinball/arcade-themed clock. Displays time, date, day of week, and year across four 6-digit TM1637 LED displays, with a programmable LED strip, MP3 audio playback, Text-to-Speech, and automatic time synchronization via WiFi (NTP) or a DS3231 RTC module.

1.1. Features

- **4× TM1637 6-digit displays** — shows time (HH:MM), date (DD MM), weekday, and year simultaneously
- **LED strip** — up to 31 addressable RGB LEDs with configurable GI (general illumination) and attract mode (5 blink groups)
- **Audio** — MP3 playback from SD card; Text-to-Speech via Wit.ai REST API
- **Time sync** — NTP over WiFi (primary) or DS3231 RTC (fallback / WiFi-less operation)
- **FTP server** — manage SD card files over WiFi (default credentials: `lisy` / `bontango`)
- **OTA firmware update** — place `update.bin` on the SD card; update runs automatically at boot
- **Event system** — schedule MP3, TTS, LED changes, or display changes at specific times/dates via `config.txt`

1.2. Configuration

Basic configuration can be done with the DIP switches and the push buttons. Advanced configuration is possible via a text file on the SD card. (See section 'config.txt' for details) Or, **recommended**, with the 'LISYclock config editor'.

1.2.1. DIP switches (basic config)

1.2.1.1. DIP1 WiFi OFF

By setting DIP switch #1 to ON the WiFi connect will be disabled and the RTC (real time clock) module will be activated.

1.2.1.1.1. DIP2 attract OFF

By setting DIP switch #2 to ON all LEDs will be deactivated

1.2.1.1.1.1. DIP3 sound ON

Not implemented yet

1.2.2. push buttons (not implemented)

Will be removed in next hardware version
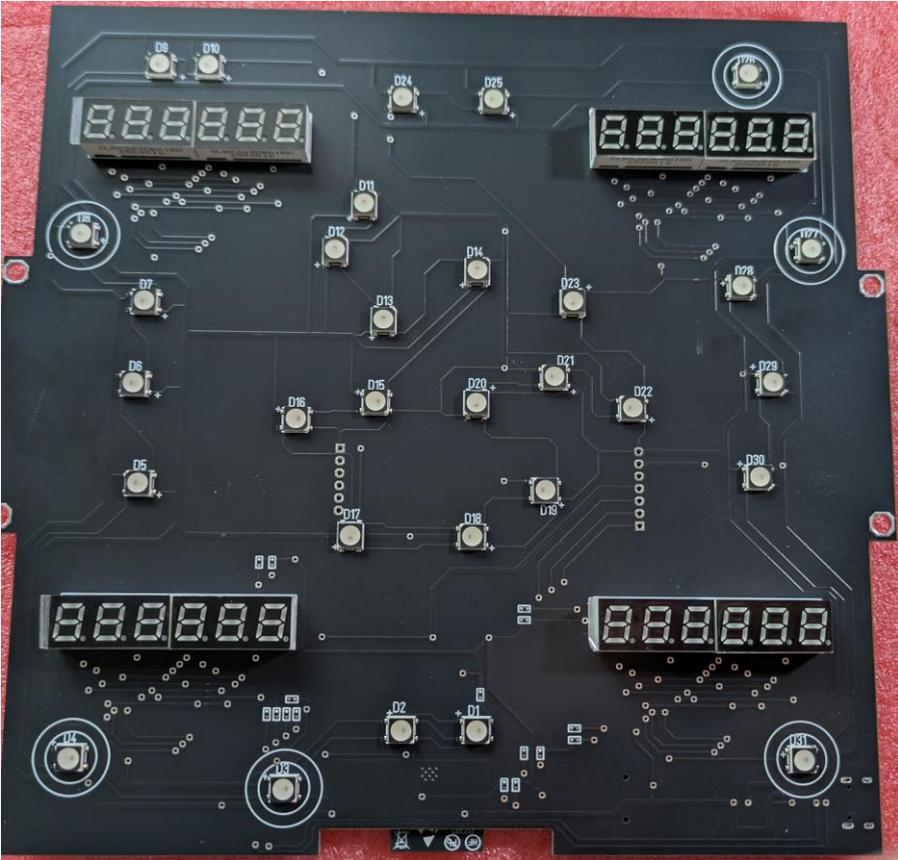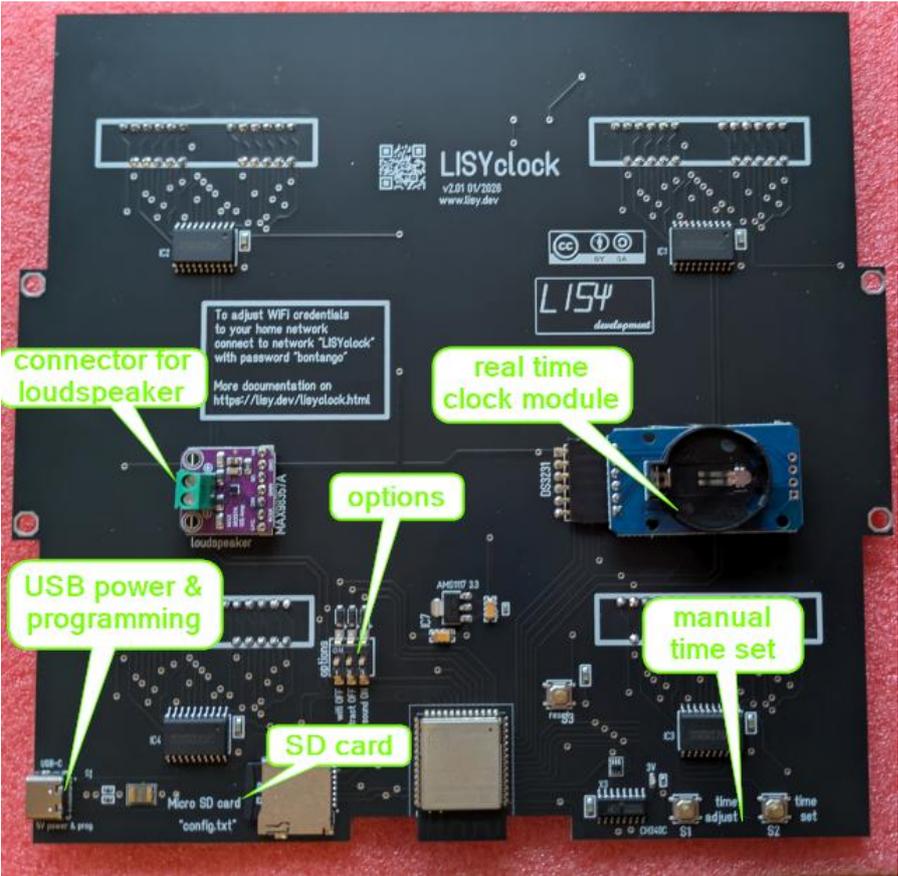
1.2.3. config.txt

Without an SD card or a config file LISYclock will come up with a set of defaults. You can adjust these defaults by editing the file 'config.txt' on the SD card. See Appendix A for possible settings and defaults in case you do not have a SD card inserted.

1.2.4. config editor

A standalone browser application for creating and editing LISYclock `config.txt` files. No installation, no server — just open `LISYclock_config_editor.html` in Chrome or Edge.

See my website https://lisy.dev/lisyclock.html for details.

3

2. PCB layout

connector for loudspeaker

real time clock module

options

USB power & programming

manual time set

SD card

3. Real time clock (RTC)

If you do not have WiFi access in the area your LISYclock resides you can use the Real Time Clock module.

3.1. setting RTC time

Automatically with the LISYclock config editor connected via USB.

3.2. DS3231 modul

With this (optional) modul LISYclock can run without WiFi connection.

The RTC module has its own tiny clock inside to keep track of time by themselves. It comes with a battery holder to connect a battery so that they keep working even if the ESP32 resets or in the event of a power loss.
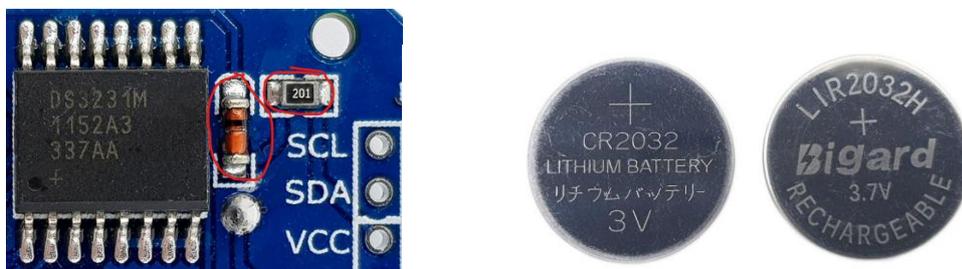
For this a battery or accumulator need to be inserted.
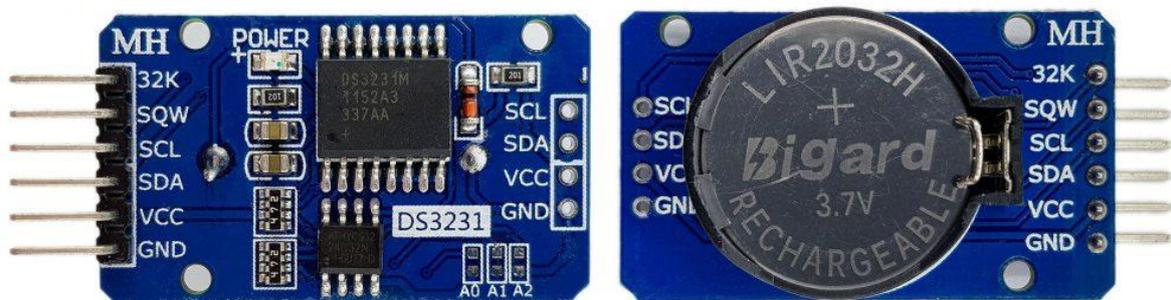
3.3. battery or accumulator

You **should use a LIR2032 battery, which is rechargeable**.

If you want to use a CR2032 battery, which is non-rechargeable, you must disconnect the battery charging circuit by unsoldering and removing the diode or the resistor next to the diode.

4. FTP server

Note: with LISYclock config editor it is also possible to exchange files or do software updates to the LISYclock. So use the FTP server only if you do not like web applications 😵

In WiFi mode, if enabled via config.txt', LISYclock do provide an FTP server to easily change config.txt and/or do software updates.

It uses the work of 'nopnop2002' which you can find here https://github.com/nopnop2002/esp-idf-ftpClient

The FTP server do support FTP 'passive mode' only, so you need to configure your FTP client accordantly. See below config needed for 'Filezilla', other config hints are on 'nopnop2002' github page.

The default username for FTP is 'lisy' and the password is 'bontango'. Both can b adjusted by editing the config.txt.
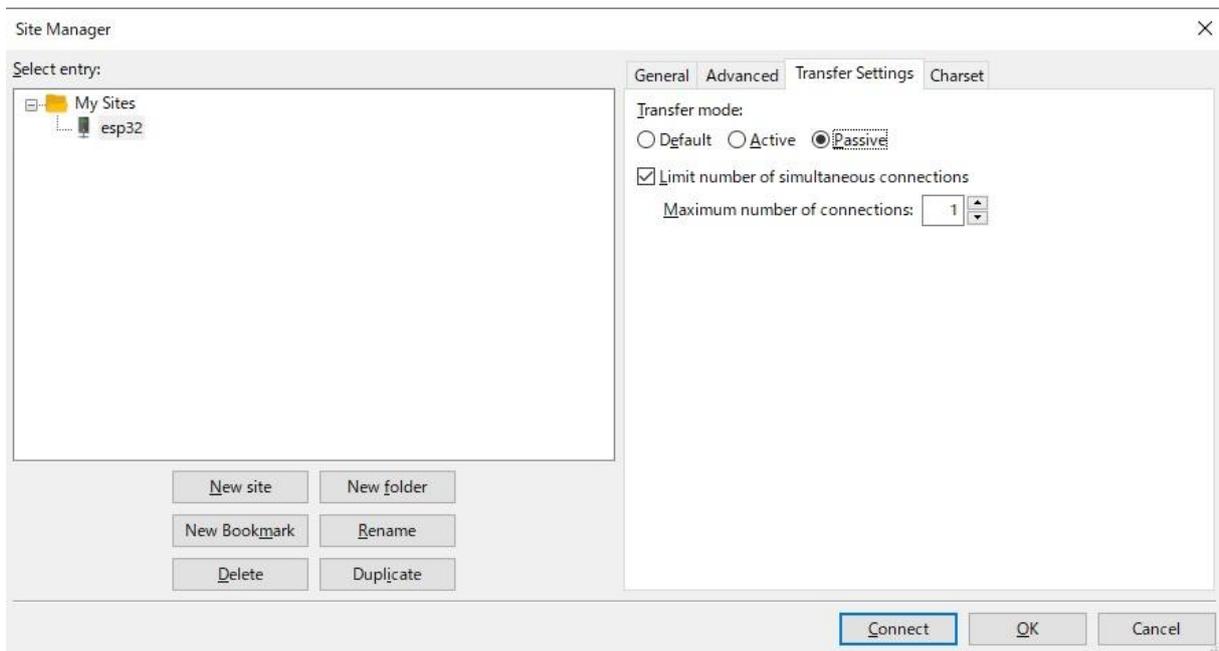
Appendix A 'config.txt'

```
# config for LISYclock 2.43

# lines starting with '#' are comments


#WiFi is enabled by default

#clock will fallback to DS3231 RTC module when disabled

WIFI_ENABLE=yes

WIFI_SSID="your_SSID"

WIFI_PWD="your_password"


# =================== TTS TEXT TO SPEECH DEFAULT PARAMETER ===================

# ====== can be overwritten in event files (see below ) =======================

TTS_WIT_TOKEN="KIY6326Q5XTBHAV6E6HSNLSG3653Q2XY"

TTS_Voice="wit$Cooper"

TTS_Style="default"

TTS_Speed=80

TTS_Pitch=80

TTS_Gain=30

TTS_SFXChar="robot"

TTS_SFXEnv="none"


# =================== Events ====================
#
# syntax start time events: HH:MM-DD.MM.YYYY ==> <hour>:<minute>.<day>.<month>.<year>

# OR

#HH:MM:W ==> <hour>:<minute>:<weekday> with weekday 0..6

# 0 = Sunday | 1 = Monday | 2 = Tuesday | 3 = Wednesday | 4 = Thursday | 5 = Friday | 6 = Saturday
```

7

```
#
# setting to '**' or '*' instead of numbers will mean 'anytime' for this field
#
# if the user want just to play one file or let speak one sentence with the default speak options
# it is possible to do this without having to craete a second file


#possible comands:
#EVENT_TTS=<HH:MM-DD.MM.YYYY>|<HH:MM:W>,"text to speak"
#EVENT_MP3=<HH:MM-DD.MM.YYYY>|<HH:MM:W>,"mp3 file on SD card to play"
#EVENT_BATCH=<HH:MM-DD.MM.YYYY>|<HH:MM:W>,"batchfile on SD to execute"
#EVENT_DISPLAY=<HH:MM-DD.MM.YYYY>|<HH:MM:W>,"on | off"
#EVENT_GI_LEDS=<HH:MM-DD.MM.YYYY>|<HH:MM:W>,"on | off"
#EVENT_ATTRACT_LEDS=<HH:MM-DD.MM.YYYY>|<HH:MM:W>,"on | off"
#EVENT_SYNC_TIME=<HH:MM-DD.MM.YYYY>|<HH:MM:W>,<retries 1..10>
#EVENT_SAY_TIME=<HH:MM-DD.MM.YYYY>|<HH:MM:W>,"german|english|italian"
#
#Event description:
#EVENT_TTS: The text is output as speech.
#EVENT_MP3: The mp3 file (on SD) will be played
#EVENT_BATCH: The Batch (on SD) will be executed
#EVENT_DISPLAY: all displays on or off
#EVENT_GI_LEDS: all GI LEDs on or off
#EVENT_ATTRACT_LEDS: all attract mode LEDs on or off
#EVENT_SYNC_TIME: Sync time to NTP server on internet
#EVENT_SAY_TIME: Say current time via TTS (german/english/italian)
#


EVENT_SAY_TIME=7:0:*,"german"
```
8

EVENT_DISPLAY=7:0:*,"on"

EVENT_GI_LEDS=7:0:*,"on"

EVENT_ATTRACT_LEDS=7:0:*,"on"

EVENT_SAY_TIME=23:0:*,"german"

EVENT_DISPLAY=23:0:*,"off"

EVENT_GI_LEDS=23:0:*,"off"

EVENT_ATTRACT_LEDS=23:0:*,"off"

================== Defaults ==================

DISP_BRIGHT=1

#FTP server defaults

#FTP_SERVER_ENABLE=yes

#FTP_USER=lisy

#FTP_PWD=bontango

local timezone default

TIMEZONE="CET-1CEST,M3.5.0,M10.5.0/3"

weekday strings (must be 6 chars! fill up with spaces if shorter)

defaults

#DAY_SUN="Sunday"

#DAY_MON="Monday"

#DAY_TUE="Tuesda"

#DAY_WED="Wednes"

#DAY_THU="Thursd"

#DAY_FRI="Friday"

9

#DAY_SAT="Saturd"

=================== LED config ====================

GI LEDs are permanent on

#

use GI_LED <LED number>,<red 0..255>,<green 0..255>,<blue 0..255>

for white use same value for red,green,blue

#

GI_LED=1,100,100,100

GI_LED=2,100,100,100

GI_LED=5,100,100,100

GI_LED=6,100,100,100

GI_LED=7,100,100,100

GI_LED=24,100,100,100

GI_LED=25,100,100,100

GI_LED=28,100,100,100

GI_LED=29,100,100,100

GI_LED=30,100,100,100

GI_LED=11,100,100,100

GI_LED=12,100,100,100

GI_LED=9,100,100,100

GI_LED=10,100,100,100

#

=================== attract mode ====================

#

five groups of LEDs with different blink rates & optional random activation

10

attract mode blink rate in ms

AT1_BLINK_RATE=120

AT2_BLINK_RATE=120

AT3_BLINK_RATE=300

AT4_BLINK_RATE=120

AT5_BLINK_RATE=120

random LED activation for group2 (default off)

#AT1_RAND=1

#AT2_RAND=1

AT3_RAND=1

#AT4_RAND=1

#AT5_RAND=1

attract mode LEDs

will be ON/OFF in this order or random (see option)

AT1_LED=16,100,100,100

AT1_LED=17,100,100,100

AT1_LED=18,100,100,100

AT1_LED=19,100,100,100

AT1_LED=21,100,100,100

AT1_LED=20,100,100,100

AT2_LED=22,100,100,100

AT2_LED=23,100,100,100

AT2_LED=14,100,100,100

11

AT2_LED=13,100,100,100

AT2_LED=15,100,100,100

AT2_LED=20,100,100,100

AT3_LED=3,100,0,0

AT3_LED=4,100,100,0

AT3_LED=8,0,0,100

AT3_LED=26,100,100,100

AT3_LED=27,100,100,100

AT3_LED=31,0,100,0

AT4_LED=18,100,100,100

AT4_LED=19,100,100,100

AT4_LED=21,100,100,100

AT4_LED=20,100,100,100

AT5_LED=14,100,100,100

AT5_LED=13,100,100,100

AT5_LED=15,100,100,100

AT5_LED=20,100,100,100