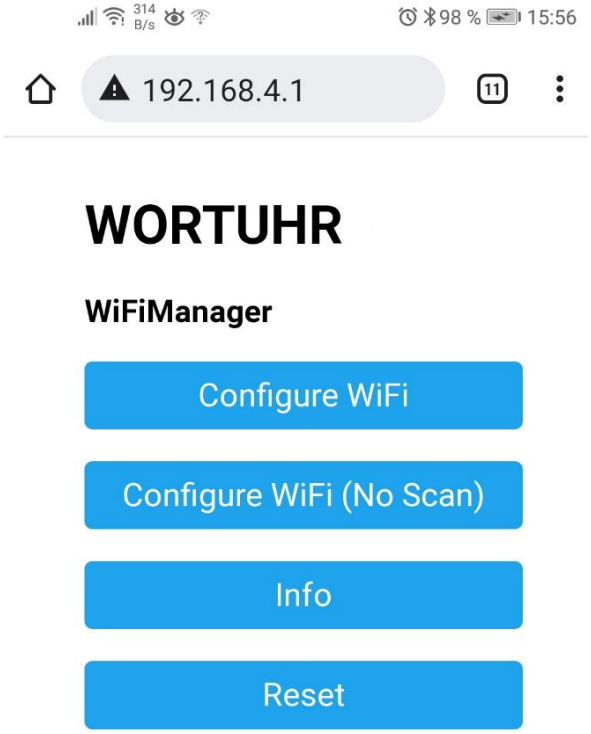
Instruction manual word clock

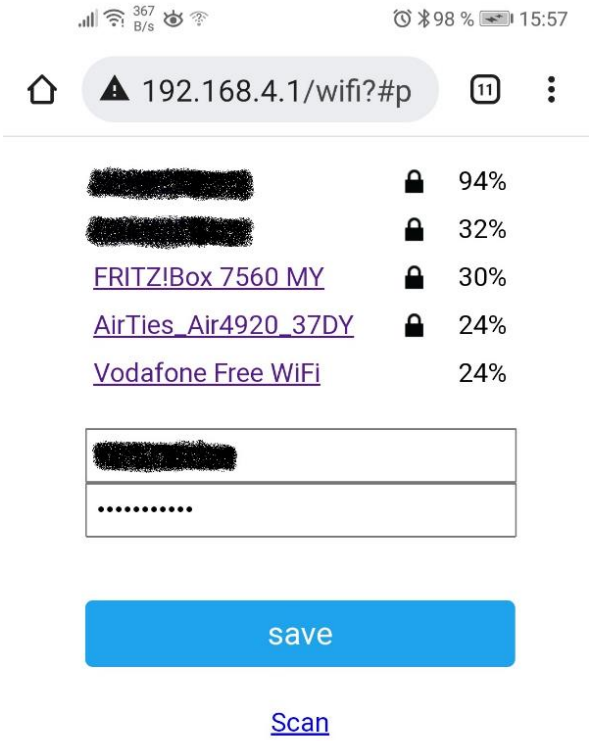
For firmware 2022122

Commissioning

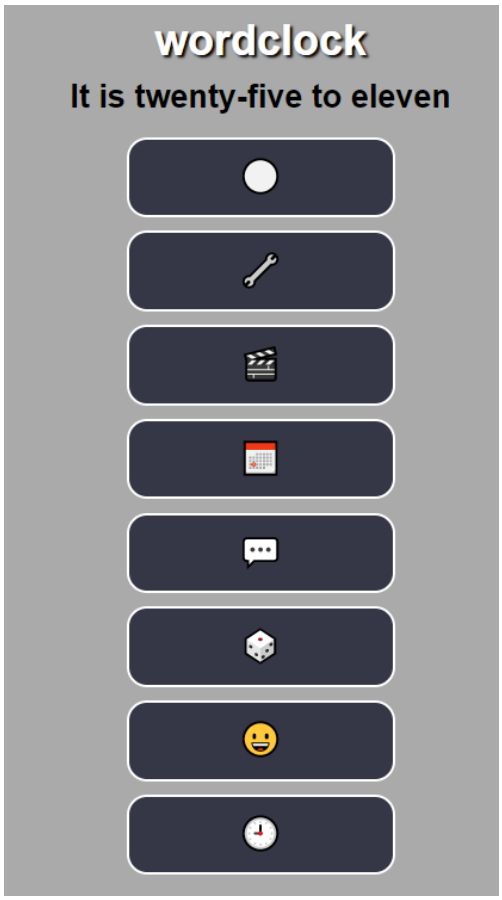
Connect the word clock with power supply unit to the mains.
The clock starts with a sea of colors and tries to connect to a WLAN. Since no WLAN SID is stored, a separate WLAN access point (AP) is created.
Use your cell phone to search for this WLAN with the name WORTUHR in the WLAN settings and connect to it (Key=12345678). This should open a login window directly.



All available WLANs are displayed via Configure WiFi.
Select your own WLAN and enter the corresponding WLAN password:



If everything has worked, the clock should be able to log on to the WLAN. Restart the device again if necessary!
After the sea of colors, the WiFi text should turn green and the announcement "WLAN connected" should come.
If not, the WLAN data must be entered again!
Now you can access the Word Clock website (http://wordclock).

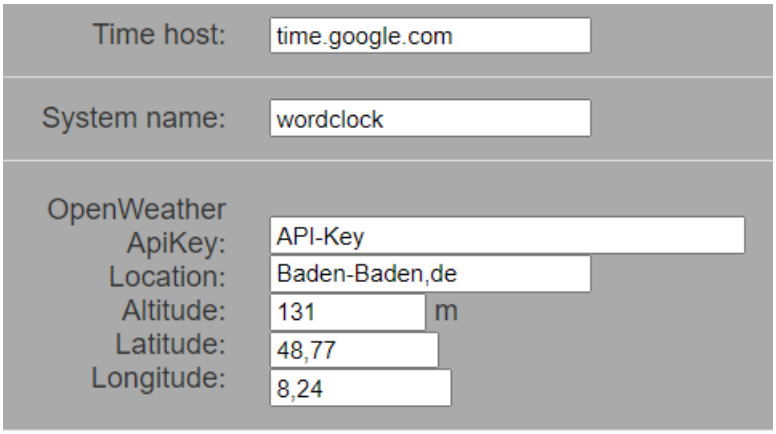


If you can't access the web page by name, you can try to access it by IP address (see advanced info mode display).

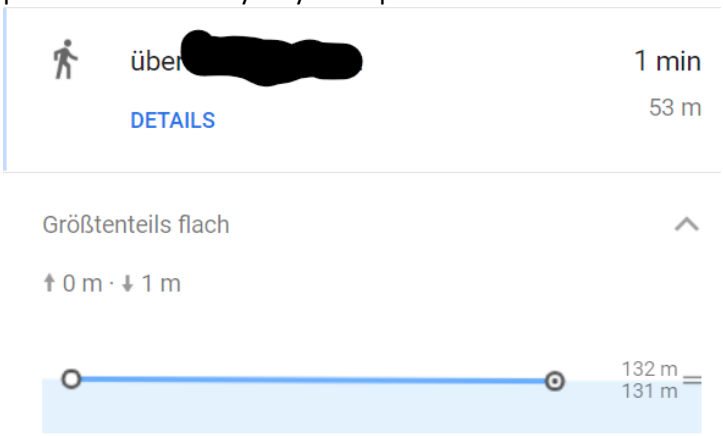
First configuration

First you need to enter system name, time server, OpenWeather API Key and location.

To do this, go to Settings via  and scroll down:

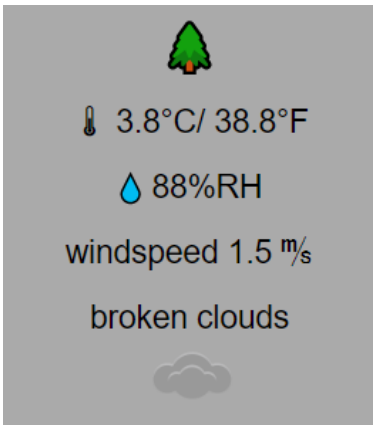


Here a time server can be selected from the list or entered. The system name is the name under which the clock is accessible.
On https://openweathermap.org/api generate the free API key and enter it in API Key.
Then search for your own location on the https://openweathermap.org page and enter it after Location.
The location altitude and latitude/longitude can be determined via Google Maps. To do this, select the location and plan a short route by bicycle or pedestrian. Link below can display the elevation profile:

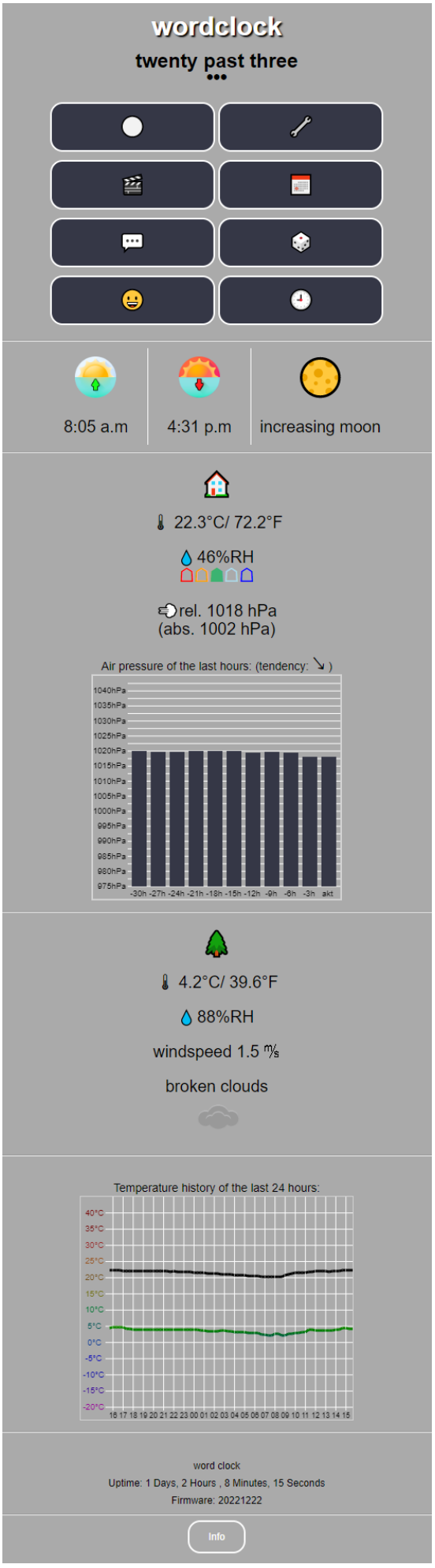


The coordinates can be easily displayed on the map with the right mouse button. Note that the decimal point (.) of GoogleMaps must be entered in the settings as (,).
Save the Settings and restart the device.

Now the correct time and outside temperature should be displayed:



Main page



System name
Time as text.

LEDs On/Off | Settings

Animations | Events

Message | Games

Info display | Time display

The Buttons are explained in sequence in the following pages.

Sunrise/Sunset/Moon phase

Indoor temperature

humidity

Humidity status

air pressure

Air pressure trend with tendency

Outdoor temperature

Outdoor humidity

Wind speed

current weather

Temperature curve inside/outside

System name and uptime

Info display

Settings

Alarm function with two independent alarm times.

Countdown Timer.

Hour sound on/off.

Main volume.

A different hour sound can be selected for each day of the week. Possible sounds are:

Sound1-4, cuckoo, bing, church, Westminster 1, Westminster 2, old clock, ding, dog and cat, death, Vicki, Hans, Vicki/Hans alternating.

Randomly each time a random sound from the list.

The volume depends on the time of day. On weekends it gets louder 2 hours later.
Chime only single or number of hours.
At hourly sound Vicki or Hans announcement in 12 or 24 hours format.
Which speaker makes the announcements.
Special display of temp., moon phase, weather and date alternating every x minutes.

Special display/animation at sunrise/sunset.

Adjust brightness to the ambient brightness.

Max. Brightness.

current main color.

current color of the minutes LEDs.
Color change (daily,hourly,5minutely, no change).

Color change of the minutes LEDs

Setting a background color. Only for time display always or off.
18 transitions selectable, random or sequential .

Switching off/on the LEDs at defined time.

„It is“ display or not.
Any time can be set here for test purposes.

Time server list, or enter manually.

System name.
OpenWeather API-Key (to deactivate „disable“)
OpenWeather Location, Location altitude above sealevel.
Latidude Location, Longitude.

Reset saved games high scores.

Button to the LittleFS file manager.

Back (without saving)/ Save values

LittleFS

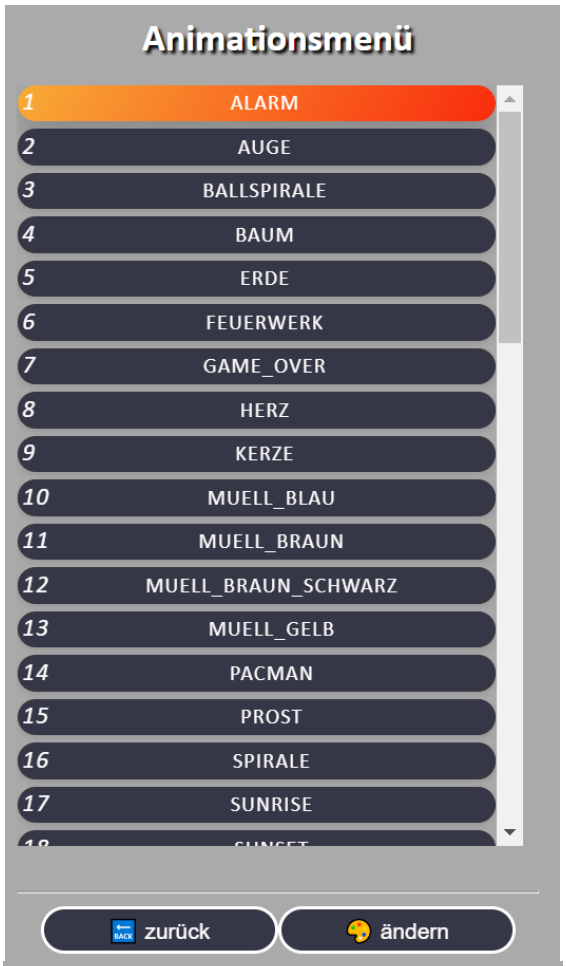
Under LittleFS is the file manager of the word clock.

Here are
Animation files (ani_*.json)
Events (events.json),

Under web are weather symbols, icons, some webpages and even more.

Files can be uploaded and downloaded.

Animations



Here all animations can be displayed and selected that are stored in the file system of the word clock.
The ALARM animation is displayed at the alarm or timer event.

All animations can be displayed before and after the event text for specific events.

SUNRISE and SUNSET are the sunrise and sunset animations.

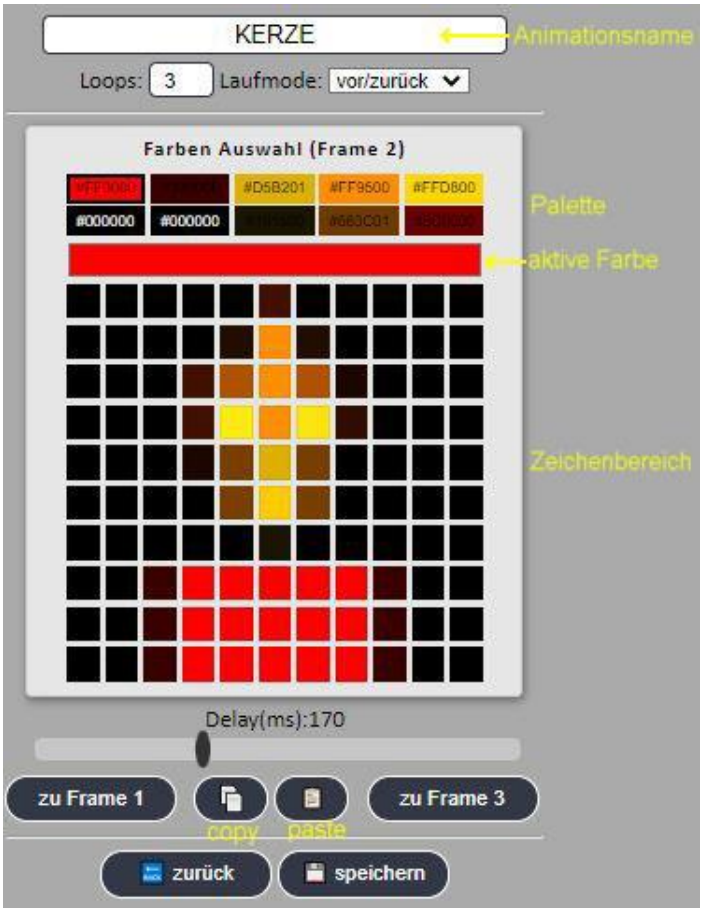
All ZXXXX animations are so called time animations which are always shown at a certain hour and minute on the day.
For example, Z0000 is an animation at midnight (ghost)

A new animation can be created here.

Click here to go to the animation editor.

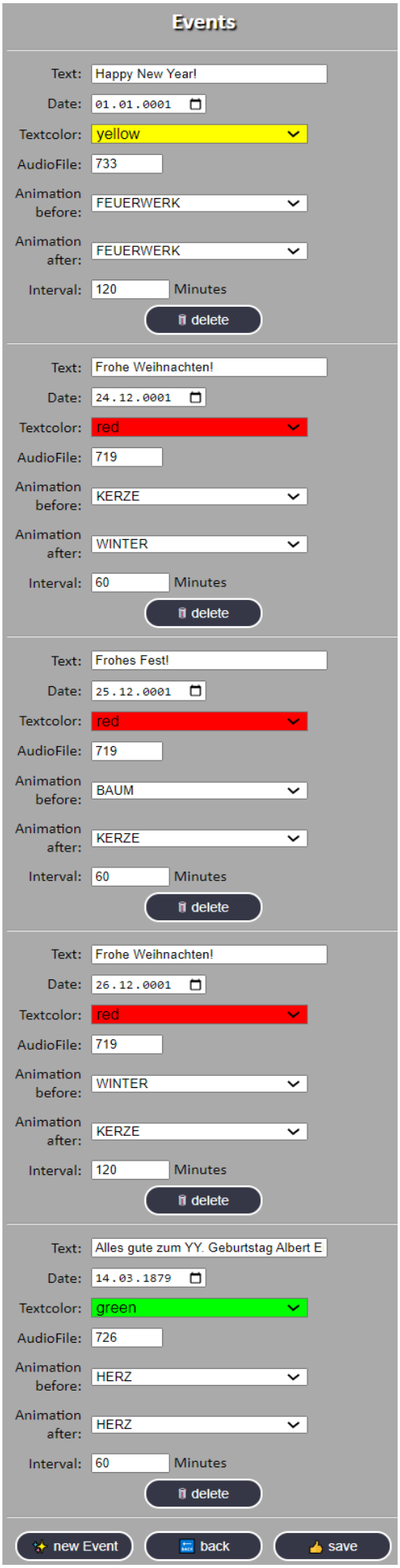
Animation editor

Animations are a string of up to 25 images (frames). The display duration can be set from 10ms-500ms per frame. The animation either starts again and again from the beginning, or runs back again at the end. It is also possible to display the frames just randomly. The animation can be run up to 20 times (loops) per call.

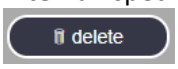


Here a name should be assigned first. (please avoid special characters here, a space will be replaced by _).
There is a palette of 10 colors, but all of them can be set as desired.
The selected color is shown by a black frame. In addition, the wide bar takes on the respective selected color.
The current color is also changed via this bar. In addition, the minute LEDs of the word clock show the current character color.
The character area is the LED matrix of the word clock. If a pixel (a letter of the clock) is clicked, it will light up in the current character color.
A double click on a field takes over the color of the pixel to the current color. This makes it easy to copy a pixel color. (Does not work on the cell phone!)
On the word clock, the respective letters will always light up at the same time. This is important because the colors on the page sometimes look different from those on the clock.
The delay slider at the bottom determines how long the respective frame will be visible.
Attention: a 0ms time always marks the end of an animation. All other frames behind it will not be saved! With the button to FrameX you always come to the next or previous frame. (Max. 25 frames are possible). The Copy button copies a frame to the clipboard. With the Paste-Button you can paste the copied frame at any place. At the first call the first frame is always in the clipboard. In the upper left corner of Loops, you can set how often a run is repeated for an event.
The run mode in the upper right corner determines what is done at the end (end is the first frame with 0ms delay or frame 25). Start from the beginning, or the whole backwards. With "random" all frames with a delay > 0ms are displayed randomly. Here 20 frames count as 1 pass.
Via the save button the whole thing is now saved.

Events

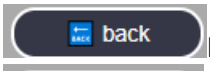


So-called events can be created here. An event is an event, which falls on a best. Day in the year. e.g. Birthdays, Christmas, etc.
Event parameters are:
Text: The text that will be displayed on the clock when the event is triggered is entered here. YY in the text is replaced by the age. See here the last event.
Date: Enter the date of the event here. Usually the date of birth. At Christmas, the year does not matter.
Text color: The color with which the text is displayed on the clock.
AudioFile: In the MP3 player, certain areas are reserved for events.
710-719 Christmas melodies
720-726 Birthday songs
730-733 New Year's Eve/New Year's Day
The melodies are always randomly selected up to the 10s digit.
So 714 plays Christmas songs 710,711,712,713 and 714 randomly.
If other songs are desired here, they can be exchanged/added on the SD card of the MP3 player.
Animation before: Here you can select from all available animations the one that will be displayed before the event text.
Animation after: Select here the animations that will be displayed after the text.
Interval: specify here how often the event will be displayed on this day.

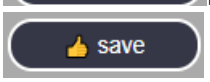


The event will be deleted.

create a new event.
Currently, up to 25 events can be created.

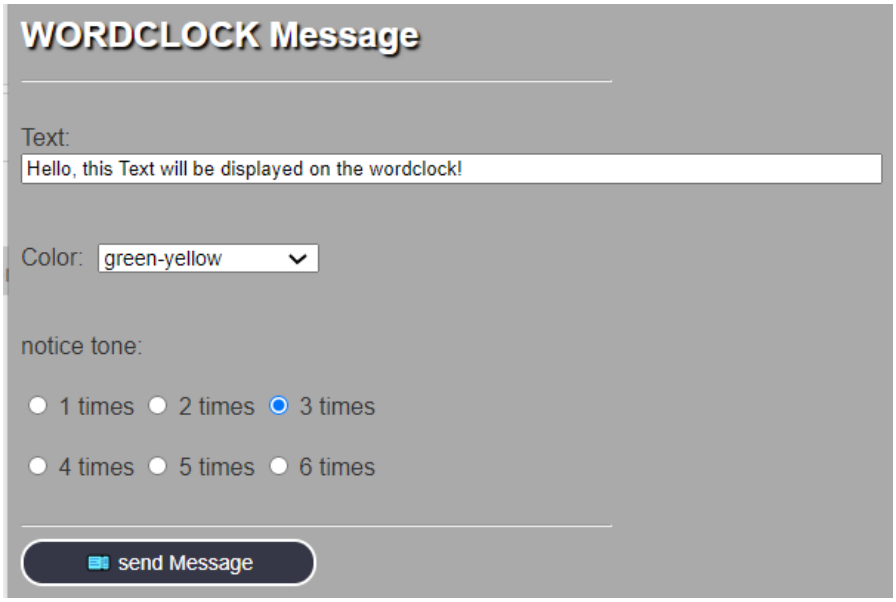


back without saving.



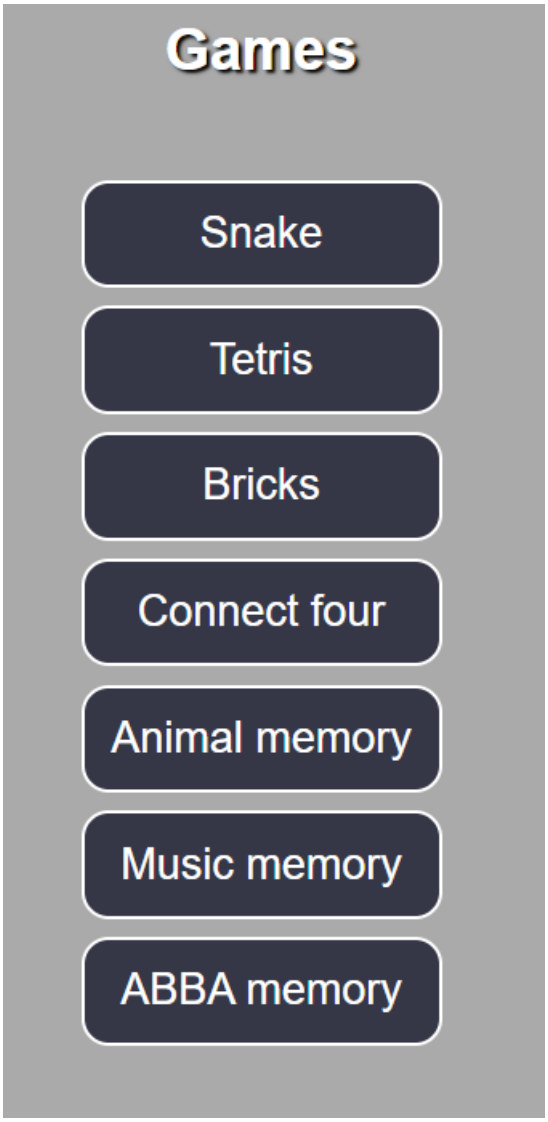
Save all events and back.

Message



Here it is possible to display ad hoc a text with a Color and pre-announcement sound on the word clock.

Games



There are a total of 4 single player games:

Snake: eat the apple with the snake without biting yourself.

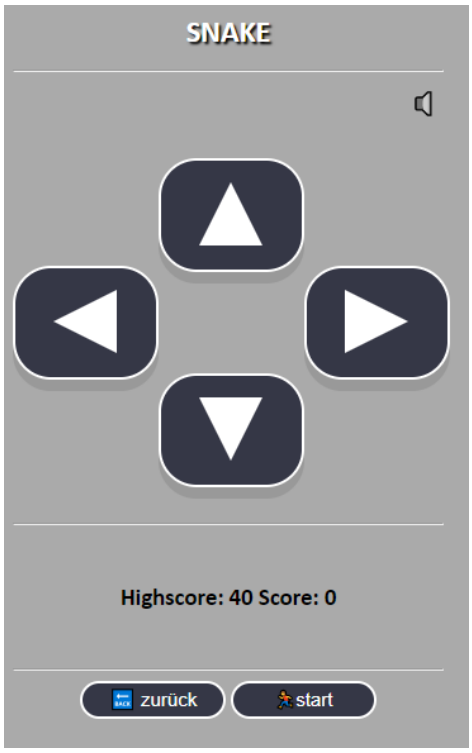
Tetris: should actually know everyone.

Bricks: play with the ball against a wall. When you hit a brick, it disappears.

Connect four: try to get 4 stones in a row (vertically, horizontally or diagonally) before your opponent.
And 1 multiplayer game:

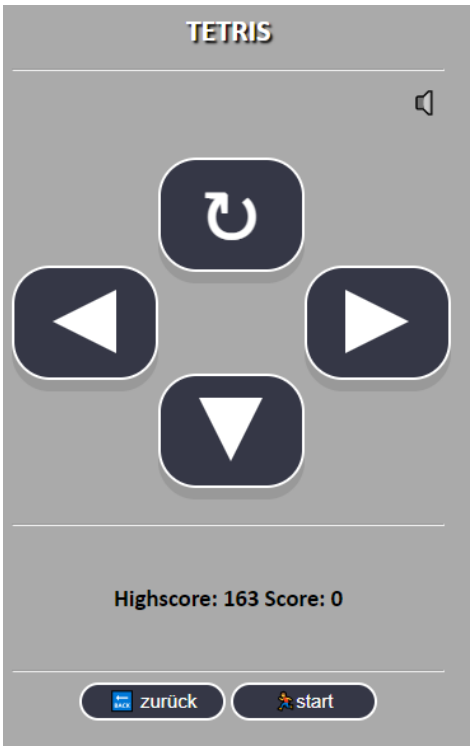
Memory: there are different sounds 2 times each on the board. Try to find as many identical pairs as possible.
In Animal Memory, it's animal sounds.
In Music Memory, it's short song excerpts.
And for ABBA fans the ABBA Memory with Abba song clips.

Snake



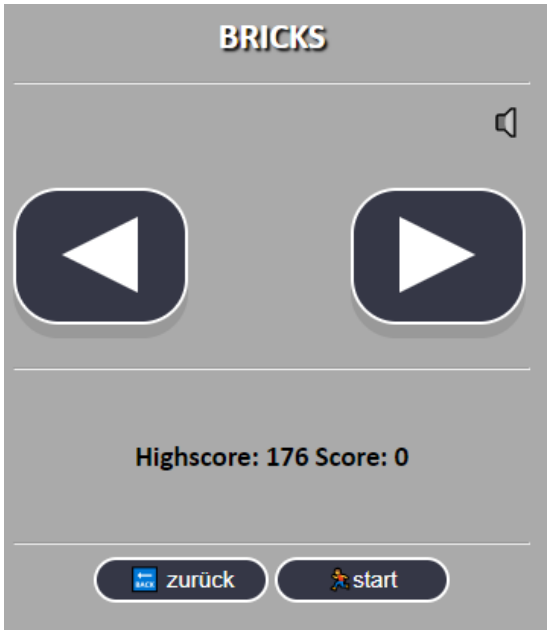
The snake is controlled via the 4 cursor keys. At the top right, the sound volume can be changed in 3 steps.
On the PC, the snake can also be controlled using the cursor keys.
The red apple counts 1 point, the yellow apple counts 3 points, but is only there for a short time.

Tetris



The falling blocks are also controlled with the cursor keys. The key with the arrow rotates the block.
The cursor keys can also be used here on the PC.
Whenever a row is completely full, it disappears.

Bricks



Use the cursor keys to move the bat back and forth. Try to hit the ball to shoot the bricks.

connect four

Use the left/right keys to select the free column in which the tile is to be thrown. Use the down key to throw the tile into the selected column. Try to get 4 stones of your color (yellow) in a row (horizontally, vertically or diagonally) before the opponent (red).
The playing strength of the word clock can be determined via the playing strength selection. If the playing strength is selected strong, the controller has to think longer more often. This is then indicated by the flashing minute LEDs.

Memory

There are 3 different sound/song memories in which up to 4 players can participate:
Animal Memory it is animal sounds.
Music Memory they are short song excerpts.
ABBA Memory with Abba song clips.

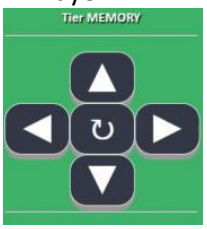
per memory game 3 different game field sizes are available:
small: 5x6 so 15 pairs
medium: 7x6 so 21 pairs
large: 9x6 = 27 pairs.

The volume can again be adjusted in 3 steps via the volume icon.

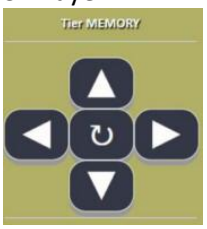
More players can be added through the website
http://<wordclock>/player
play along with Memory.
Each player is displayed at the bottom of the main page. (Players green, yellow and blue).
Note: Tapping the red player icon at the bottom will again show how another player can sign up.
As long as the game has not been started, players can log in.
Note: If the game is not running yet, do not refresh the page, because then a new player will be registered again!

Each registered player is assigned one color each:

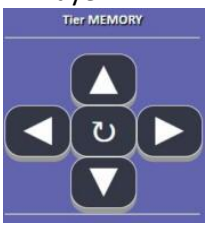
2. Player

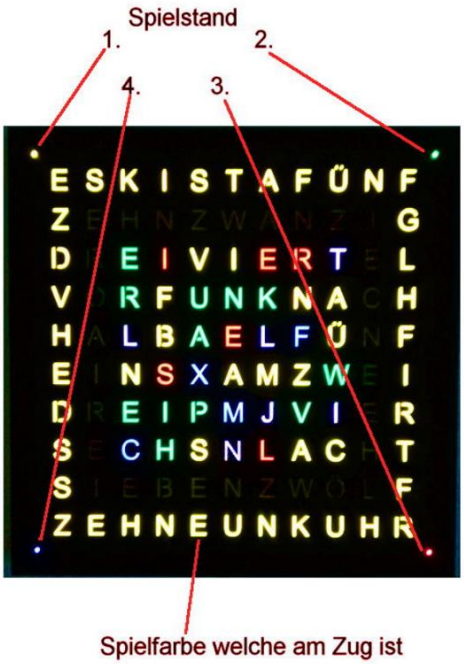


3. Player



4. Player





At the beginning there is a white playing field. The player whose turn it is can move the flashing field with the cursor keys. With the middle round arrow key the field is rotated and the underlying sound is played. Then the second field must be selected. If it was the same melody, the two fields change to the current color of the player. Otherwise, the next player takes his turn. The minute LEDs indicate the score. Top left is the player with the most pairs turned over. Then it goes clockwise in rows. In the event of a tie, the player who has taken the shortest time counts.
The goal is to remember the melodies and turn over as many pairs as possible.
After a game, the individual players only have to refresh the web page to log in again. You can see which players are logged in on the main game page by the colored player points (see above).

Mode button

Using the mode button on the word clock or the button in the main menu, the word clock will run as follows:

Announcements: Time

Weekday

Date

Moon phase

Indoor temperature

Humidity inside

Air pressure

Weather

Outdoor temperature

Outdoor humidity

Seconds

If the mode key is pressed again during the seconds display,

the extended info mode is called..

IP address

Mode

Matrix test

Mode

All red

Mode

All green

All blue

Mode

All white

Mode

Timer

Info

At the very bottom of the main page, there is a white info button that hides all sorts of technical information and parameters of the word clock:

wordclock Info

- **Firmware: 20221222** 📖

Current firmware version 20221222 and link to this manual.

- **WiFi/Network**
  - WLan-SID: [redacted]
  - WLan-BSSID: 3C:A6:2F[redacted]
  - signal strength: -61 dBm (very good)
  - WIFi reconnect per day: 0
  - IP address: [redacted]
  - Client IP-Addr: [redacted]

WLAN SID with which the word clock is connected.
WLAN BSSID Basic Service Set Identification of the AP
Signal strength of the WLAN.
IP address of the word clock.
IP address of the logged in client. Who sees this page.

- **Time**
  - Time host: fritz.box
  - Error (NTP): 0
  - ESP-Time Drift in sek: 0 (max: 0)
  - Time: 10:25:54
  - date:Monday, 5. December 2022
  - UTC-TST:1670232354
  - Uptime: 0 d, 0 h, 0 m, 38 s
  - Starttime: 10:25:16 5.12.2022
  - daily Hour: 10,hourly Minute: 28
  - moonphase Clock: 9 Web: 3

NTP server from which the time is fetched.
NTP server error since midnight.
Time drift of the ESP at NTP time.
Current date.
UTC timestamp.
Start time of the clock.
Hour/minute in the various things are made daily or hourly.
Moon phase index for clock and web display.

- **System**
  - ESP-BoardVersion: 3.0.2
  - Free RAM: 13360 bytes
  - MaxFreeBlockSize: 12824 bytes
  - MinFreeBlockSize: 4552 bytes Codeline: Wortuhr_mp3_20221222.ino:5138
  - HeapFragmentation: 5 %
  - CpuFreq: 160 MHz
  - FlashSize (real/ide): 16/16 MB
  - Reset Reason: Software/System restart

Board version with which the ESP was compiled.
Current free RAM.
Current largest free block size.
Smallest free block size measured in code line X.
CPU Freq.
Reason for the last reset.

- **Audio**
  - Speaker: Vicki
  - Volume (0-30): 15

The current announcer (Vicki or Hans).
Current volume.

- **LDR**
  - Brightness: 172 (min: 5, max : 172)
  - ABC: enabled
  - LDR-value: 9 (min: 3, max: 400)

Light Dep. Resistance. Current brightness.
Automatic brightness control on/off.
Value of the LDR.

- **BME280**
  - Error (BME): 1
  - temperature: 0.00
  - Humidity: 0.00
  - Air pressure: 0.00
  - Air pressure diff: 0.00
  - threshold pressure: (A: -15/15 B: -30/30)

Sensor BME280 Error.
Values of the BME280. may differ from the displayed values, because there is a small correction value in the software. e.g. because the sensor becomes warmer due to the surrounding electronics.
Air pressure thresholds for trend determination.

- **OpenWeather**
  - OpenWeather Error: 0 (Code: 0)
  - Errortext: Everything OK!!!
  - Last Update: 10:25:16
  - weather Info 1: ID: 500 ICON: 10d CLOUDS: 75
  - weather Sound 1: 413
  - weather Info 2: ID: 0 ICON:
  - Sunrise/Sunset: **8:03:28/16:31:58**

OpenWeather Error
And the error text to go with it.
When was the last time the weather situation was refreshed.
Codes of the transmitting values.
Sunrise/sunset times from OpenWeather.

- **SunRiseLib**
  - Sunrise/Sunset: **8:03:26/16:31:32**

Calculated sunrise/sunset times based on location.

- **Events/Mode/Transitions**
  - ModeCount per day: 0
  - Event-Timer: 1786
  - autoModeChange-Timer: 386
  - Last Trans: (2)up

How many times the mode button has been pressed since 0 o'clock.
Time remaining until the next event check.
Sec. to special display of temp., moon phase, weather and date
Last transition

- **Games**
  - Snake Count/Highscore: 0/40
  - Tetris Count/Highscore: 0/163
  - Bricks Count/Highscore: 0/176
  - Connect four Count/Highscore: 0/0
  - Animal memory Count: 0
  - Music memory Count: 0
  - ABBA memory Count: 0

Number of games since 0 o'clock and highscore

- **Flags**
  - ~~RTC~~ BME LDR ~~BUZZER~~ AUDIO_SOUND
  - ~~IR_RECEIVER~~ ~~ESP_LED~~ BUTTONS

What elements are installed in the clock and in operation.

http requests

It is possible to control the clock via the WLAN using http requests.

Show Adhoc Event:

`http://<wortuhr>-IP/setEvent?`

`text`	Text of the Events
`color`	Color of the text 0 to 24
`audio`	Number of the audio file
`preani`	Animation which is displayed before the text
`postani`	Animation after the text

Examples:
http://<wortuhr_ip>/setEvent?text=I+love+you&color=1&audio=701&preani=HERZ&postani=HERZ

http://<wortuhr_ip>/setEvent?text=Morgen+wird+gelbe+Tonne+geleert&color=5&audio=750&preani=MUELL_GELB&postani=MUELL_GELB

http://<wortuhr_ip>/setEvent?text=Morgen+wird+Biotonne+und+Restm%C3%BCll+geleert&color=0&audio=750&preani=MUELL_BRAUN_SCHWARZ&postani=MUELL_BRAUN_SCHWARZ

Show messages:

`http://<wortuhr_ip>/showText?`

`buzzer`	Number of announcement sound
`color`	Text color 0 to 24
`text`	Message

Example:
http://<wortuhr_ip>/showText?buzzer=2&color=1&text=Das+ist+eine+rote+Nachricht+viel+Spass+mit+der+Wortuhr

Reboot:

http://<wortuhr_ip>/reboot

Delete the WLAN parameters:

http://<wortuhr_ip>/wifireset

The clock restarts in AP mode and the WLAN parameters must be entered again!

MP3 Reset:

http://<wortuhr_ip>/mp3reset
Initialization of the MP3 player

Control:

http://<wortuhr_ip>/control?mode=0&sound=0
Displays any mode with or without sound:
Modes are:

```
MODE_TIME = 0 (On)
MODE_ANNOUNCEMENT = 1
MODE_WEEKDAY = 2
MODE_DATE = 3
MODE_MOONPHASE = 4
```

```
MODE_TEMPERATURE = 5
MODE_HUMIDITY = 6
MODE_AIR_PRESSURE = 7
MODE_WEATHER = 8
MODE_EXT_TEMPERATURE = 9
MODE_EXT_HUMIDITY = 10
MODE_SECONDS = 11
MODE_IP = 12
MODE_TEST = 13
MODE_RED = 14
MODE_GREEN = 15
MODE_BLUE = 16
MODE_WHITE = 17
MODE_TIMER = 18
MODE_OFF = 20 (Off)
```

Note: if any modes are not active, the values may shift!
The best thing to do here is to try it out.
example, shows and speaks the current day of the week:
http://<wortuhr ip>/control?mode=2&sound=1

PlaySound:

http://<wortuhr ip>/PlayAudio?

soundfile	Soundfile number on the SD card
volume	volume 0-100 (at 0 the current volume is taken)

Example, lets the dog bark at full volume:
http://<wortuhr ip>/PlayAudio?soundfile=819&volume=100

Settings:

http://<wortuhr-ip>/commitSettings?

a1=0	Alarm 1 on [1] or off [0]
a1t=hh:mm	Alarm 1 hour [hh] and minute [mm]
a1w1=2	Set Sunday
a1w2=4	Set Monday
a1w3=8	Set Tuesday
a1w4=16	Set Wednesday
a1w5=32	Set Thursday
a1w6=64	Set Friday
a1w7=128	Set saturday
a2=0	Alarm 2 on [1] or off [0]
a2t=hh:mm	Alarm 2 hour [hh] and minute [mm]
a2w1=2	Set Sunday
a2w2=4	Set Monday
a2w3=8	Set Tuesday
a2w4=16	Set Wednesday
a2w5=32	Set Thursday
a2w6=64	Set Friday
a2w7=128	Set saturday
ti=0	Timer in minutes
hb=0	Hourly beat on [1] or off [0]
srand=0	random hour sound
wsf0=1	hour sound for Sunday
wsf1=2	hour sound for Monday
wsf2=3	hour sound for Tuesday
wsf3=5	hour sound for Wednesday
wsf4=8	hour sound for Thursday
wsf5=9	hour sound for friday
wsf6=12	hour sound for saturday
speak=1	Speaker = Vicki (0= Hans)
wsl=1	Weekend 2 hours later louder
sg=1	Singlegong
vh24=1	Announcements in 24h mode ab=1
ab=1	ABC on [1] or off [0]

```
br=50                       Brightness in percent
co=14                       Number of the LEDs color.
cco=5                       Color number of the minute LEDs
cc=0                        Number of color change (0:off,1:5min,2:1hour,3:daily)
ccc=0                       Number of the minute color change. (0:off,1:5min,2:1h3:tgl,4:main)
bgce=0                      background color off, 1=time, 2=always
Bgc=#1A00BC                 Background color value
tr=1                        Number of transition 0-16. 20: All successive, 21: Random.
no=hh:mm                    At night from hour [hh] and minute [mm].
do=hh:mm                    day one hour [hh] and minute [mm]
ii=1                        show "It's" on [1] or off [0]
ntphost=fritz.box           time server
sysname=wordclock           system name
owkey=ApiKey                Openweather ApiKey
owloc=city                  Openweather city
altitude=130                location altitude above sea level
latitude=48,77              Latitude location
longitude=8,24              Location Longitude
st=YYYY-MM-DDThh:mm         Set time and date
hsres=1                     Clear the games highscores
```

API

Via the API interface it is possible to read out information from the clock.

http://<wortuhr ip>/apidata

JSON Response:


```
{
"wifi": {
 "systemname": "WORTUHR",
 "ssid": "WLANSSID",
 "bssid": "XX:XX:XX:XX:XX:XX",
 "rssi": -68,
 "ip": "X.X.X.X"
},
"time": {
 "timeserver": "fritz.box",
 "ntp-error": 0,
 "time": 1670233052,
 "starttime": 1670160875,
 "moonphase": 9
},
"system": {
 "board": "3.0.2",
 "freeheap": 12752,
 "maxfreeblocksize": 9888,
 "heapfragmentation": 21,
 "cpufreq": 160
},
"audio": {
 "speaker": "Vicki",
 "mp3resets": 0,
 "volume": 0
},
"ldr": {
 "brightness": 63,
 "min_brightness": 5,
 "max_brightness": 144,
 "ldrvalue": 169,
 "min_ldrvalue": 3,
 "max_ldrvalue": 400
},
"bme280": {
 "error_count": 0,
 "temperature": 20.7,
```

```
 "humidity": 42,
 "pressure": 1004,
 "pressure_rel": 1020,
 "pressure_diff": 40
},
"openweather": {
 "error_count": 0,
 "error_text": "Alles OK!!",
 "temperature": 3.1,
 "humidity": 92,
 "pressure": 1018,
 "windspeed": 1.0,
 "weathericon1": "04d",
 "weathericon2": "",
 "last_update": 1670232842
},
"sun": {
 "sunrise": 1670227405,
 "sunset": 1670257893
},
"event_mode": {
 "modecount": 0,
 "currentmode": 0,
 "eventtimer": 690,
 "automodetimer": 254
},
"version": "20221222"
}
```


It is also possible to retrieve only individual groups.
Example, to get only the BME and LDR values:

http://<wortuhr ip>/apidata?group=bme280,ldr

JSON Response:


```
{
"ldr": {
 "brightness": 73,
 "min_brightness": 5,
 "max_brightness": 144,
 "ldrvalue": 192,
 "min_ldrvalue": 3,
 "max_ldrvalue": 400
},
"bme280": {
 "error_count": 0,
 "temperature": 20.7,
 "humidity": 43,
 "pressure": 1004,
 "pressure_rel": 1020,
 "pressure_diff": 40
},
"version": "20221222"
}
```

Link to the document

https://github.com/manfred-hofmann/Wortuhr_ESP8266/blob/main/Manual_Wordclock_mp3_20221222.pdf