

## Instructions

The wheelieometer is a bike computer with a mode to measure the bike's angle and time the duration of wheelies! If the wheel sensor is fitted, it will also display many of the statistics available on a standard bike computer (current speed, average speed, maximum speed, total distance, total riding time, energy expended and work rate). It will also display the time and date, temperature, humidity and air pressure.

1. Mount the wheelieometer on the bike handlebars so it is visible to the rider. The control panel should be within  $\pm 45^\circ$  of horizontal.
2. Optionally, fit the magnet to a spoke of the wheel and fit the wheel sensor to the bike frame so it passes close to the magnet as the wheel turns, route the cable up to the wheelieometer, and plug the cable in to the socket on the wheelieometer (if this step is omitted, the distance, speed, energy and power functions will be unavailable, but the wheelie, clock and weather functions will still work).
3. With the bike on level ground, turn the power switch On. The wheelieometer takes a reading that is used to adjust the displayed angle to account for its mounting angle.
4. A wheelie is detected when the bike angle exceeds the minimum specified in setup mode, the yellow light illuminates when a wheelie is in progress. If the wheelie duration exceeds the previous maximum, the green light illuminates. The green light resets when a new wheelie is detected.
5. Select from the nine available display modes by pressing the Display button (see next page for details of each mode).
6. Values (maximum angle and wheelie time, average and maximum speed, total distance, ride duration and total energy) are automatically saved after one minute of inactivity, if autosave is enabled in setup mode.
7. Press the Reset button to re-calibrate the angle as described in step 3, again ensure the bike is on level ground. If autoloop is not enabled in setup mode, all statistics will revert to zero.
8. Press the Save/Load button at any time to save all maximum and total values for future retrieval. Select one of the memory locations 0 to 10 (0 is shared with the auto save feature) using the Display button. To retrieve saved values, press and hold the Save/Load button and switch the wheelieometer on (or if already on, press and hold the Reset button, press and hold the Save/Load button, release the Reset button then release the Save/Load button when the confirmation message appears). Select one of the memory locations 0 to 10, or Reset All to reset the values to zero, using the Display button.

## Setup Mode

Setup mode allows the clock to be set, the units to be specified for some display items, the wheel diameter to be set (for accurate speed, distance, energy and power measurements using the wheel sensor) and the bike and rider weights to be specified (for accurate energy and power measurements).

1. To enter setup mode, press and hold the Display button and switch the wheelieometer on (or if already on, briefly press the Reset button). When prompted on the screen, release the Display button.
2. For each item, the current value is shown and can be increased by one step by briefly pressing the Display button (press and hold Display to continue advancing through the values). When the maximum possible value is reached, the value reverts to the lowest value. The currently displayed value is accepted if the Display button is not pressed for more than five seconds.
3. Items set are the year, month, day, hour, minute and second of the time, minimum angle to trigger wheelie detection ( $^\circ$ ), angle measurement averaging time (ms), whether tilt angle included to detect whether wheelie is ongoing (see diagnostic display mode for description), autosave mode, display brightness, and (if the wheel sensor is connected) the wheel diameter in inches (overall diameter including the tyre), rider weight (kg), bike weight (kg), speed display units (miles per hour (mph), kilometres per hour (km/h) or metres per second (m/s)), distance units (metres (m) and kilometres (km) or yards (yd) and miles (mi)), energy units (Joules (J) or Calories (kcal)), and power (Watts (W) or Calories per hour (kcal/h)).
4. If the wheel sensor is connected, a final mode allows the wheel sensor to be tested and displays the number of wheel revolutions detected, the value resets to zero after 255. Press Display to exit to normal operating mode.

## Maintenance

The 9 volt battery lasts a few hours, turn the wheelieometer off when not in use to conserve the battery. When switched off, the clock is maintained using a CR2032 battery inside the unit. This needs to be changed if the clock reverts to 01/01/00 00:00 whenever the unit has been switched off.

## Display Modes

Each display mode is described below. Modes marked \* are only available if the wheel sensor is connected.



**Wheelie Mode:** Displays the current bike angle, maximum bike angle since reset, duration of current or last wheelie and maximum duration of wheelie since reset (in seconds). The current wheelie duration resets when a new wheelie is detected.



**Wheelie Timer:** Displays the duration of the current or last wheelie.



**Speedometer Mode\*:** Displays the current speed (measured as a ten second average), using the units selected in setup mode.



**Odometer (distance) Mode\*:** Displays the total distance travelled since the unit was switched on or reset, using the units selected in setup mode.



**Ride Stats Mode\*:** Displays the total distance, total riding time and average speed since the unit was switched on or reset, using the units selected in setup mode. The average speed and total time exclude periods when the bike was stationary.



**Speed Stats Mode\*:** Displays the instantaneous (Inst), average (Ave) and maximum (Max) speeds since the unit was switched on or reset, using the units selected in setup mode. The average speed excludes periods when the bike was stationary.



**Energy Mode\*:** Displays energy expended since the unit was switched on or reset, using the units selected in setup mode. Includes the effect of uphill gradients. Energy expended when riding down slopes greater than  $5^\circ$  is assumed to be zero.



**Power Mode\*:** Displays rate of energy expended (as a ten second average), using the units selected in setup mode.



**Clock Mode:** Displays the current date and time.



**Weather Mode:** Displays the current temperature ( $^\circ\text{C}$ ), relative humidity (RH in %) and atmospheric pressure in millibars (mb). High atmospheric pressure values indicate fine weather and low values indicate stormy conditions. A rising or falling value indicates improving or worsening conditions respectively.



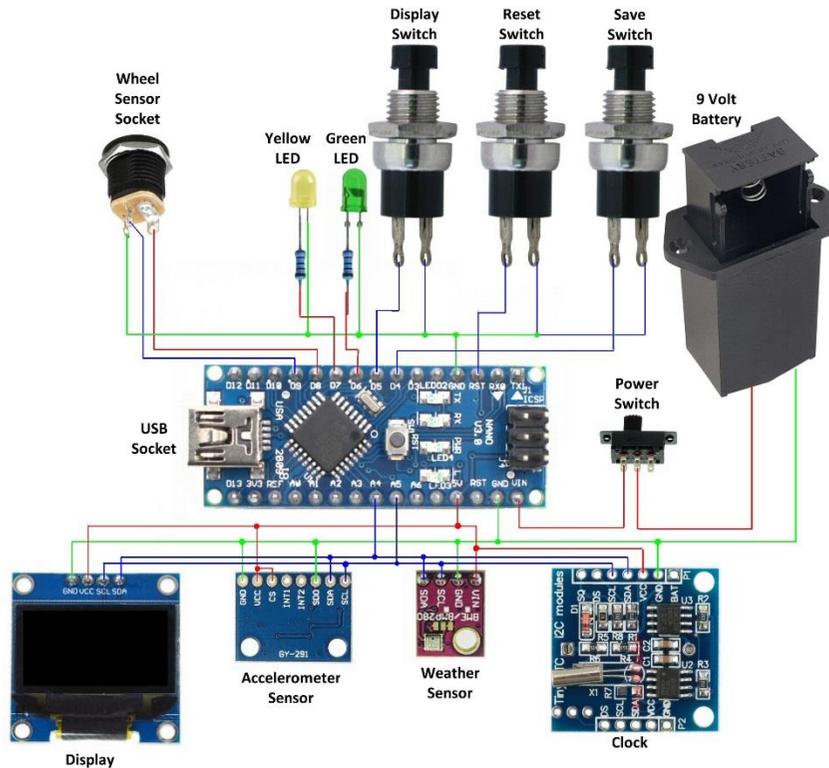
**Diagnostic Mode:** Displays the current bike angle, tilt angle (angle sideways from vertical) and software version. Tilt detection can be turned on or off in setup mode, and may help ensure that wheelies are not prematurely detected as ending if handlebars are turned to the side during a wheelie, as some riders do to retain balance.

## Technical Information and Reprogramming

The Wheelieometer is based around an Arduino Nano compatible microcontroller (a miniature computer) and can be reprogrammed to improve it or even completely change what it does! The USB socket is used to reprogram the unit using a computer or Android device using free software (for a computer: <https://www.arduino.cc/en/main/software> or for Android: <https://play.google.com/store/apps/details?id=name.antonsmirnov.android.arduinoandroid2>). Note: the unit uses the "CH340" USB driver, which must be installed on the computer or selected in the Android app. When USB is connected this will power the wheelieometer and the power switch will have no effect.

The wheelieometer software program ("sketch") is available from <http://www.ex.ac.uk/~tamitche/arduino/>. A simplified version (version 13) is also available.

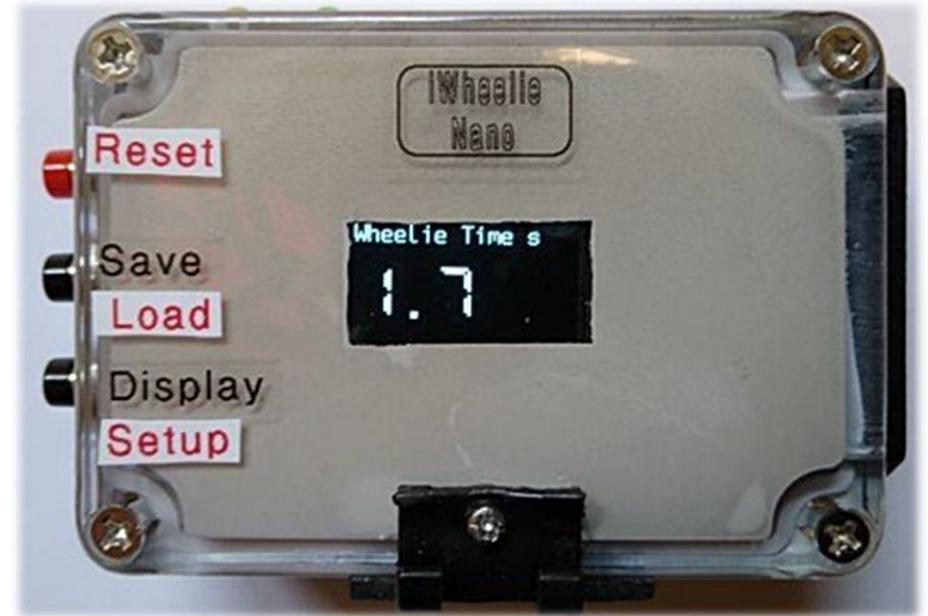
Wiring connections are indicated below.



## Disclaimer

It is the rider's responsibility to exercise due care and attention when using the device. Awareness of vehicles and pedestrians must always take precedence over operating or viewing the device. Do not mount the device where it impairs the operation of the bike's controls or manoeuvrability. Data provided by the device are approximate only and the device should not be used in situations where accuracy is critical for safety. Inaccuracies in the device or these instructions and consequential loss or damage arising from any such inaccuracies or use of the device are the responsibility of the user. The device's characteristics and features may be changed by the developer at any time. It is recommended that the user verifies that the version number of the instructions (shown on the front cover) matches that shown on the device's diagnostic display (where available).

# Wheelieometer Instruction Manual



## Software Version 20