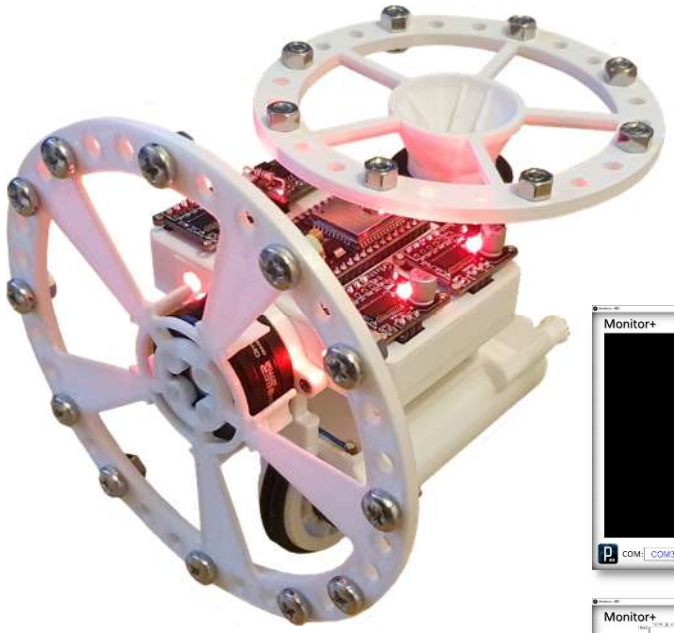
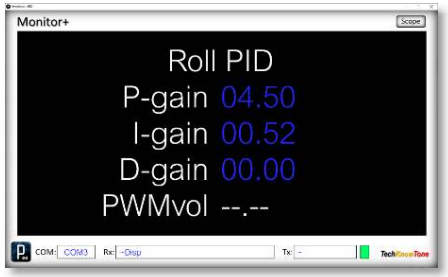
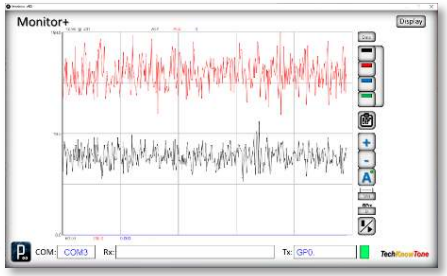
Uni-Bot – Monitor+ & Wi-Fi Functions







Tech:

- ESP32 microcontroller, 2-core @80MHz
- 3 x BLDC gimbal motors
- 3 x SimpleFOC mini drivers
- 2 x RGB LEDs
- 2.4GHz wireless control
- 3 x 3.7v 18650 3000mAh batteries
- 3-D printed construction

Features:

- Safe start, with LED blink indicators
- Orientation selects primary modes, TEST or DEMO
- Links to Monitor+ Windows application
- Battery status and data displayed on PC screen
- Monitor+ provides status information
- Monitor+ enables variables to be tuned in real time
- Monitor+ displays waveforms from sensor data
- Controlled via Wii Nunchuk/Classic over Wi-Fi

Enhancements:

- TBD.

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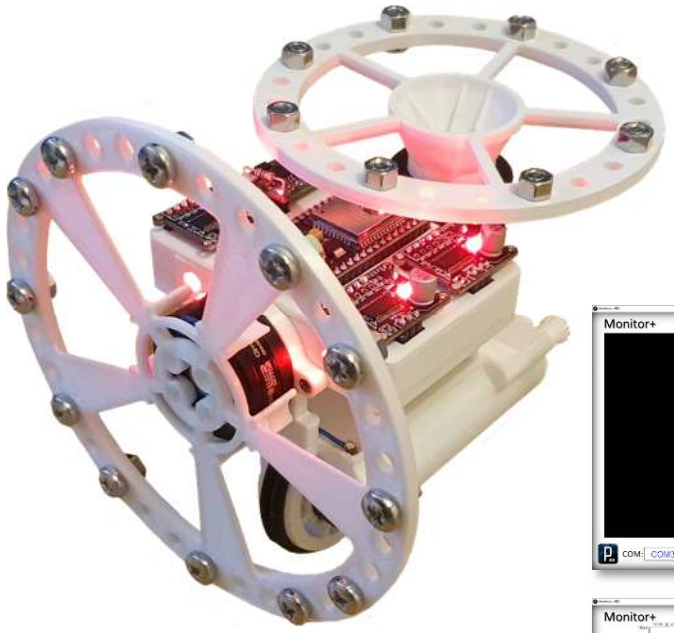
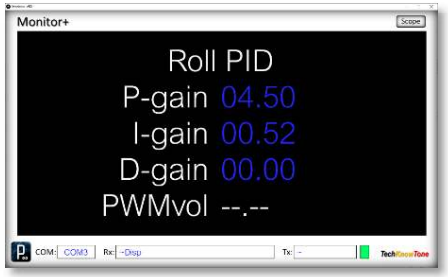
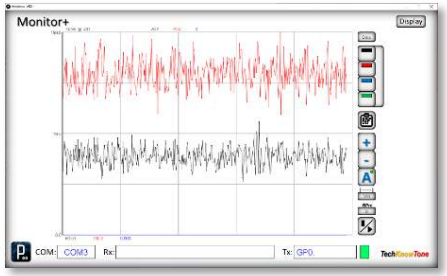






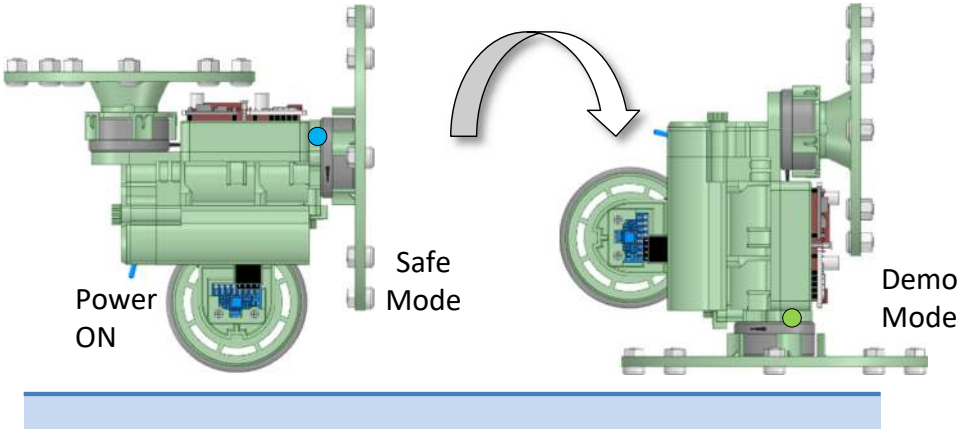
Uni-Bot Functions:

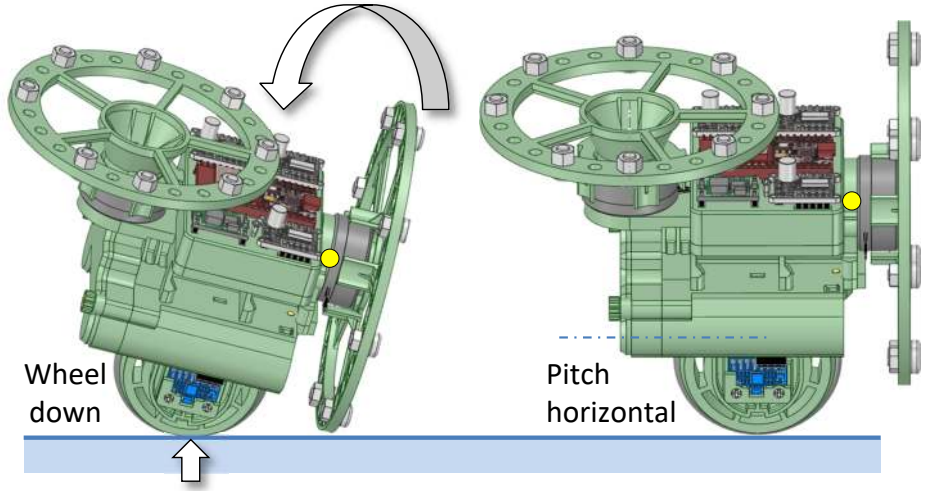
- Primary mode is determined by orientation on RESET.
- Point the robot face down to enter DEMO mode, then raising it to the horizontal will initiate self-balancing.
- Point the robot face up will enter TEST mode. The display has a white border when in TEST mode.

Monitor+ Functions:

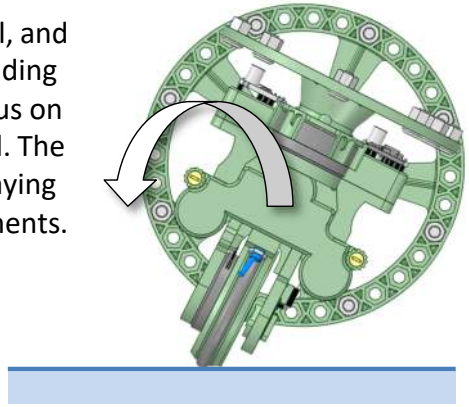
- Connects to remote micro using USB serial port.
- Default mode is displaying text and graphics.
  - Clicking on the window changes the display mode.
  - Clicking on blue text changes digits and code values.
  - Variable values can be observed. Ie. battery voltage
  - Tests can be initiated from some screens.
- Scope mode displays data as waveforms.
  - Up to four traces can be displayed at once.
  - The pre-defined type of data can be selected.
  - Title data explains what the coloured traces are.
  - You can pause and inspect data values using the mouse.
  - Data can also be listed, like the Serial Monitor.
  - Traces can be switched ON/OFF independently.
  - Sample rate is up to 30 fps.
- The range of displays and scope traces can easily be extended within the micros code. So it could be used in other projects. And it's FREE!

Uni-Bot – Self-balance Procedure





Once the pitch axis is horizontal, and you can feel the robot drive holding it in that position; then you focus on rolling it towards the horizontal. The Monitor+ app is great for displaying the angles, and making adjustments.



Step 1:

- Hold the robot in both hands in front of you, facing away.
- RGB LEDs will be blue, and blink.
- Then point the robot face down, to enter DEMO mode.
- RGB LEDs will turn green. Monitor+ displays DEMO Mode.

Step 2:

- Slowly return the robot to facing forward position, but tilted to one side.
- The rubber wheel should be touching a flat surface.
- RGB LEDs will be yellow, and blink.

Step 3:

- Slowly rotate (roll) the robot towards the horizontal, whilst trying to keep it on a horizontal axis (pitch).
- The pitch drive motor will pull the robot towards 0° pitch.

Step 4:

- Continue to roll the robot towards being horizontal.
- When you reach the start angle, set in code, the roll axis of the PID controller will start to turn the reaction wheel.
- Release the robot at this point, and it should maintain self-balance using its reaction wheel.

If it proves difficult to achieve self-balance in practise, then the start angle may be slightly off. Mine was set to -2.1° to get an easy start point. The centre of gravity may be different in your robot, so you need to find this angle. Use Monitor+ to achieve this, by clicking on the blue value.

Issue: 1.1 Released: 15/08/2024 TechKnowTone