



# MotoBrakeBT User Manual



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## Revision History

Rev	Date	Change Description
01	26-Nov-16	Initial draft
02	16-Dec-16	Updates after first review
03	17-Feb-09	Added Android app usage

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# 1 Introduction

The [Ohmics MotoBrakeBT](#) is the latest generation of deceleration brake light that now incorporates Bluetooth LE technology for configuration using mobile devices. Main features of the [MotoBrakeBT](#) are:

- Provide early vehicle deceleration indication even before the brake pedal/lever is activated. This function is very useful when used on motorcycles, where deceleration caused by shifting gears is very abrupt and can cause traffic accidents if traffic is fast and tight
- The configurable 40 LED matrix lets the user configure a pattern to display when the brakes are applied, or, when the vehicle decelerates.
- Tail light function
- Brake light modulation
- Brightness control
- Embedded turn signals
- Four deceleration sensitivity settings
- Independent pattern user configuration for tail, brake and deceleration functions
- White LED strobe at a frequency that makes it extremely visible to the traffic behind.
- Firmware upgradeable or configuration via Windows
- Configuration only via mobile devices (Apple and Android)

## 2 Installation and Operation

### 2.1 Box contents



Figure 1 Included Components

No	Description	Qty
1	MotoBrakeBT	1
2	USB micro cable 3ft	1
3	PosiTap/Lock connectors	5
4	USB Dust Cap	1
6	Universal mounting bracket	1
7	Screws for universal mounting bracket	2

Figure 2 MotoBrakeBT Package Contents

### 2.2 Installation

The [Ohmics MotoBrakeBT](#) is provided with a universal installation bracket and hardware for the unit only. Because there are multiple ways to install the module, depending on the vehicle, hardware for particular vehicles is not provided. The unit is also supplied with a combination of five (5) [Posi-Tap/Lock](#) connectors allowing easy tapping into existing vehicle brake light wiring systems without cutting or damaging wires and, for connecting an external LED light bar or strip (not provided).

Follow these simple general steps to install the [MotoBrakeBT](#):

1. Unpack the unit and identify the components.
2. Ensure your vehicle is not running and that all systems are off.
3. First install the universal bracket onto the vehicle ensuring there is access to install the two mounting screws for the unit from behind the bracket.
4. Identify the wires that lead to the turn signals and the tail/brake light on your. Check your vehicle service manual for wire color coding and ensure you mark them accordingly.
5. Identify the connection wires on the [Ohmics MotoBrakeBT](#), marked as follows:
  - a. **Ground = BLACK** - 'GND' (Connects to ground on the bike)
  - b. **12V = RED** - '+12V' or 'SW12V' (Connects to a switched 12V on the bike)
  - c. **Brake= BLUE** – Brake input
  - d. **Yellow= YELLOW** – turn signal left input
  - e. **Green= GREEN** – Turn signal right input
6. Install the [MotoBrakeBT](#) device using the two M3 provided screws on the bracket. A drop of Loctite 243 or equivalent product is recommended when fastening the mounting screws to avoid accidental loosening due to vibration. Do not over-tighten the screws or the threads may get damaged.

**Note** - The MotoBrakeBT has been designed to be installed with the LED matrix facing the rear of the vehicle in a horizontal position; otherwise the accelerometer functions may not work properly.

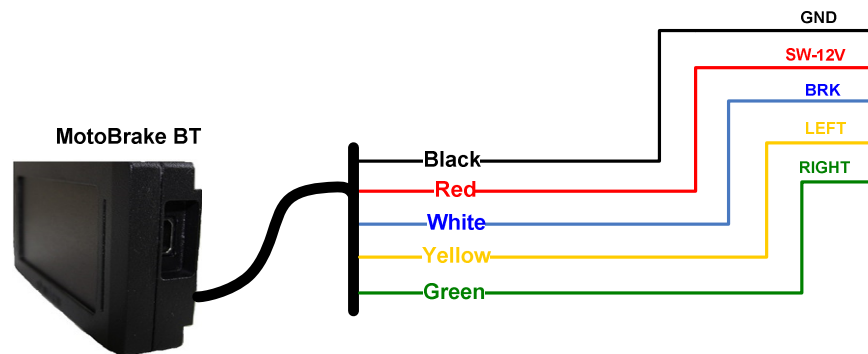


Figure 3 Wiring identification

**Attention!** - Connecting the conductors incorrectly can damage the unit or stress your vehicle electrical system.

7. Most motorcycles typically have three to five conductors leading to the tail/brake light and rear turn signal lights (**SL** and respectively **SR**).
  - a. One is ground (**GND**), another is power (**12V**) for the tail light and the third is brake (**BRK**); they can be identified with a simple voltmeter or by studying your vehicle wiring diagram.

- b. On newer motorcycle models, particularly 2013+ BMW models the ECU system is designed to sense the load on each light bulb and may trip and issue a warning and a fault light. The **Ohmics MotoBrakeBT** was designed to put minimal stress and load on your vehicle modern system so it is so-called CANBUS compatible).
- c. Later model motorcycles may also send a pulsing signal (PWM) when the brake is not applied (tail light mode), switching only to 12V when the brake is applied - the **Ohmics MotoBrakeBT** has software and hardware compensation for this condition built in.

Please refer to Figure 4, below, for suggested wiring.

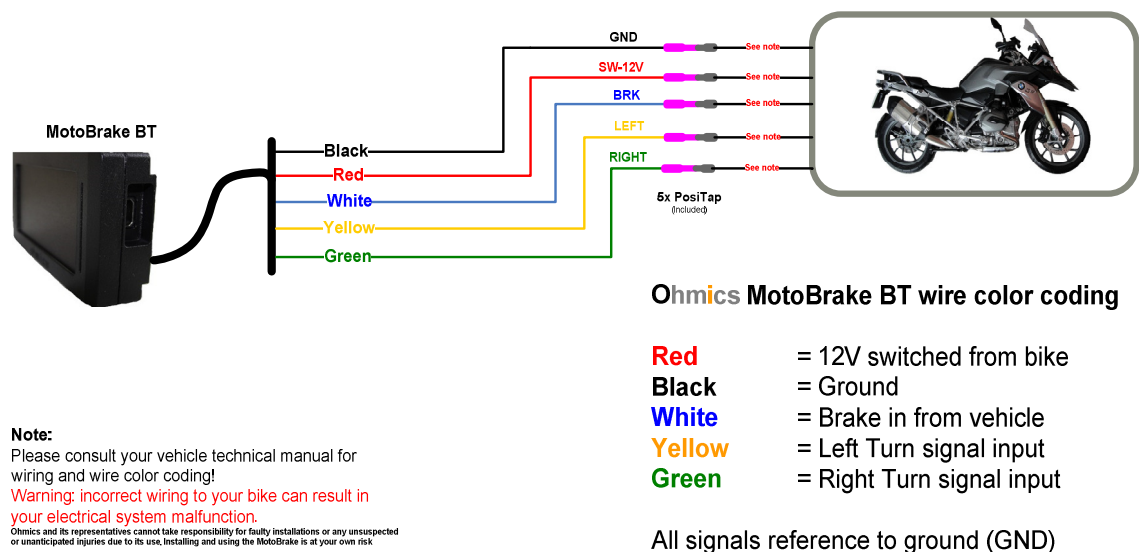


Figure 4 MotoBrakeBT Connection Diagram

**Attention!** - The MotoBrakeBT performs a self-calibration sequence when powered up – this may turn on the LED matrix for up to five (5) seconds. The light emitted is extremely bright and can cause eye injury if viewed directly at close distance - please exercise caution during installation and operation.

8. Mount the device on the included bracket using two M3 screws (provided). The use of Loctite 243 or equivalent product is always recommended to minimize loosening of the screws due to vibrations

**Note** - The unit has been tested under various condition including temperature extremes, water (heavy rain) and dust exposure. However, it requires having the USB dust cap on during operation at all times except when performing firmware upgrades or device configuration.

## 2.3 Operation

The [Ohmics MotoBrakeBT](#) modes of operation are:

- A. Mixed, Deceleration and Brake activated
- B. Brake activated only - the accelerometer is disabled
- C. Deceleration only
- D. Tail Light mode

**Note** – When connected, the turn signal lights will work in parallel to all above operation modes.

### 2.3.1 Deceleration and braking (mixed)

In this mode the unit will turn the LED matrix on if the vehicle decelerates. As the vehicle decelerates, it will display a succession of three (LED output) user programmable patterns forming a sequence directly proportional with the deceleration.

When deceleration stops, the LED matrix will go in Tail-light-mode.

At any time, if the brakes are activated, the unit will enter Brake-mode operation. In this mode the unit will display, (if enabled) the user-chosen brake modulation pattern, followed by steady brake output. In parallel, the centre white, if enabled, will strobe twice every 0.5 seconds (at 20Hz frequency) for higher and sustained visibility in traffic.

**Note** – The Braking mode always takes priority, means if the brakes are applied, the accelerometer will automatically be disabled for the duration brakes are applied.

### 2.3.2 Brake-activated-only

In this mode the accelerometer is disabled as configured. The unit will turn on the LED matrix only when the brakes are applied. When the brake is released the matrix will return to tail light mode light.

### 2.3.3 Deceleration-only

This mode of operation is specific to vehicles that are not natively equipped with brake lights, such as bicycles, four-wheelers etc.

In this case, the system relies only on the accelerometer to determine if the vehicle decelerates and accordingly, turns on the LED matrix. The LED matrix will turn off as soon as deceleration ceases.

When deceleration stops the lights will return to tail light mode.



### 2.3.4 Tail-light mode

Tail light mode, if enabled, is resumed once the conditions (deceleration or braking) ceases.

### 2.3.5 Turn signal lights

When connected to the vehicle turn signal lights, the embedded [MotoBrakeBT](#) turn signal lights will operate as well.

### 2.3.6 Configuration options

The [MotoBrakeBT](#) can be configured via a Windows application as well as using your mobile smart phone. The available settings are as follows:

- Deceleration sensitivity: [low](#), [medium](#), [high](#) and [active](#)
- Strobe (white dot in centre matrix): [on/off](#)
- Brake modulation: [off](#), [2](#), [4](#), [6](#) pulses before brake light remains on
- Brightness
- Tail light: [on/off](#)
- User configurable patterns for tail, braking and deceleration.

## 3 User Configuration Application and Firmware

The [Ohmics MotoBrakeBT](#) can be configured using your Android or iOS mobile device as well as a PC equipped with Windows operating system. Firmware updating can only be done via USB port and using your Windows PC application.

The [Ohmics Pattern Designer](#) for Microsoft Windows application is used to configure and upgrade the [Ohmics MotoBrakeBT](#).

Upon connecting to the unit, the applications will read the current device configuration and display the current status and settings as well as the firmware version.

### 3.1 Windows Pattern Designer

The application enables the users to program the forty LED matrix with patterns and sequences of their choice through interactive design. It also configures operation modes (mixed operation - brake plus accelerometer activated or just brake activated only) as well as the brightness of the external LED lights for a given braking level. Initial brake modulation tail on/off and brightness can also be programmed.

#### 3.1.1 Software Installation

To install the [Ohmics MotoBrakeBT Pattern Designer](#), follow these steps:

1. Download and run the latest version of the [Ohmics\\_MotoBrakeBT\\_Setup](#) file from the [Ohmics](#) website and place it in a folder on your computer. This will install the [Ohmics MotoBrakeBT](#) software and create an [Ohmics](#) folder in your <ProgramFiles> on your computer containing the following:
  - a. [Ohmics Pattern Designer](#) – Configuration utility
  - b. Firmware update utility
  - c. Windows Device Driver
  - d. All the necessary files to run the [Ohmics MotoBrakeBT](#) programming applications.

**Note:** Always check the [Ohmics website](#) for latest available documentation, software and firmware.

2. The setup utility will also install one icon on the desktop.
3. Using a screwdriver, remove the USB dust cap as per attached figure.

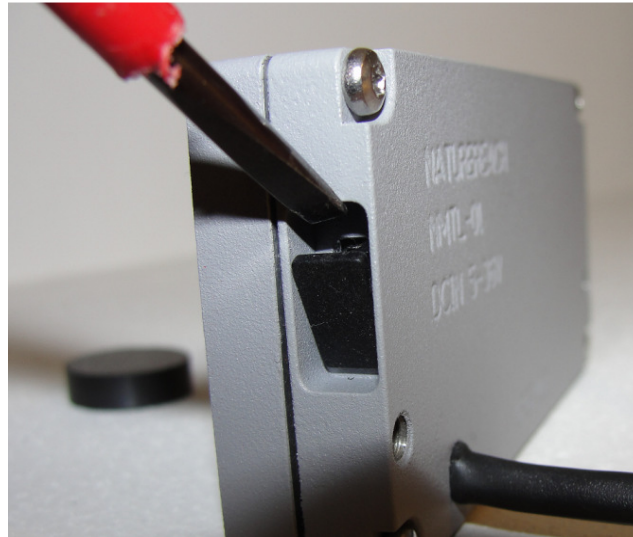


Figure 5 Removing the USB protective cap

4. Although basic configuration can be done only by connecting the USB cable, in order to have visual confirmation of your settings, **the vehicle ignition needs to be switched on** to power the LED matrix.
5. Connect your USB cable to the side port - the device will appear on Windows Device manager as '[MSP430 USB Example](#)'. The driver should install automatically as long as it can be found on your computer, otherwise choose a manual search for the driver and point to the [<Program Files> \(x86\)\Ohmics\WinDrv](#) folder on your computer where it was stored. A warning may be issued during installation that this is not a Windows signed driver - please ignore it to complete the installation process. Note that on Windows versions later

or equal to 8.X, will require one to [disable signature driver enforcement](#) temporarily to allow the driver to install.

**Important note** - Typical USB connections will supply between 300-500mA; some notebooks could be even less. The MotoBrakeBT device requires a minimum of 400mA @ 5V to operate. Therefore if the unit appears to be having issues detecting the driver, one may need to switch on the bike ignition to complement the power supplied.

6. Once installed, the device will appear as a **Virtual COM port CDC (COM x)** where 'x' can be any COM port number, under your **Ports (COM&LPT)** section in your Windows Device Manager as shown in the picture below.

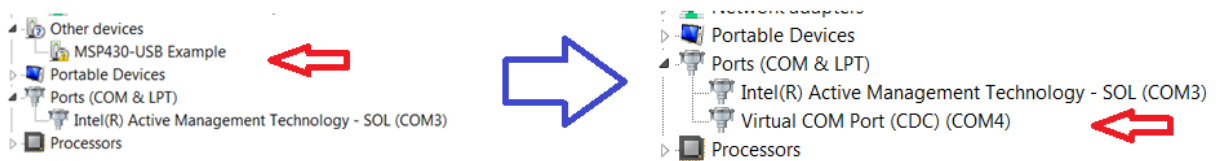


Figure 6 Installing the device driver

7. If unsure, click Start -> Right Click on My Computer -> Properties -> Device Manager and open up Ports (COM & LPT). The device will show as "**Virtual COM Port CDC(COM4)**". Record the port number.
8. Launch the **Pattern Designer** application from the folder it was placed upon download.
9. Select **File** -> **Serial**. Configure port using the earlier recorded COM port number,
  - speed - 9600 baud or higher,
  - 8bits, 1 stop,
  - no parity and no flow control.

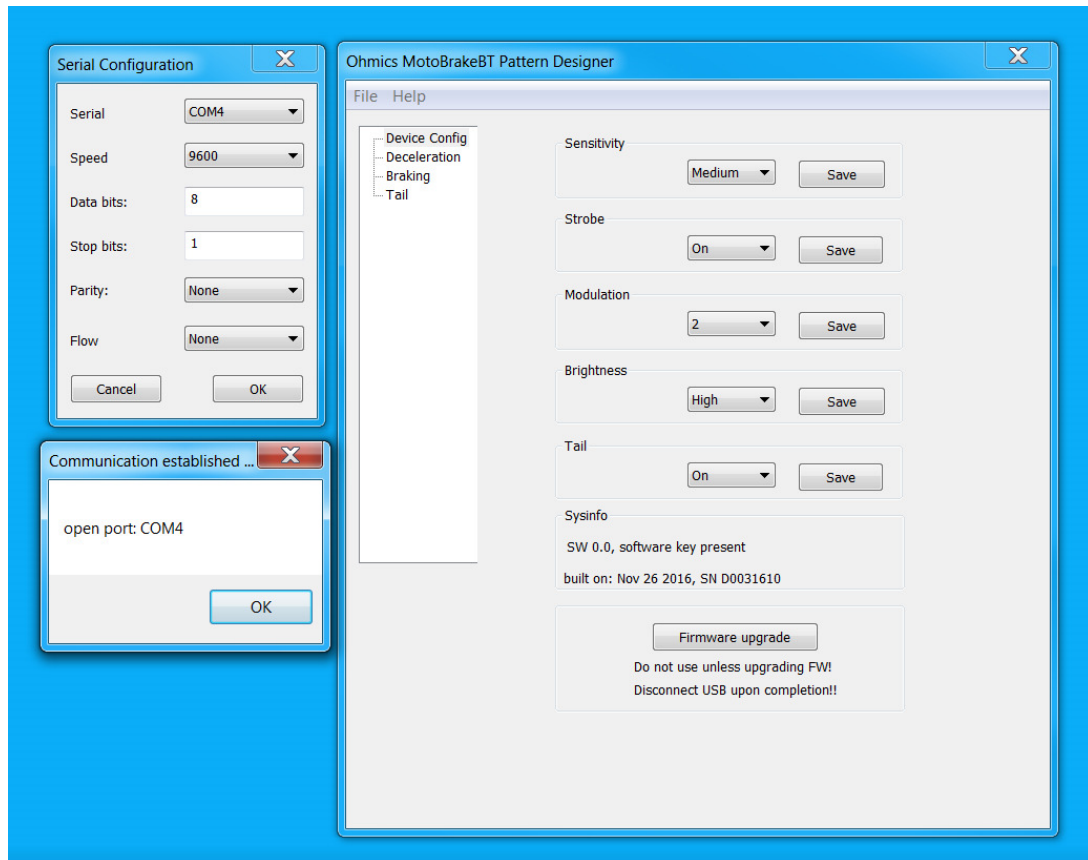


Figure 7 Configuring the serial port

10. Press 'OK'. If the port is configured correctly the menu will report the selected port is open, otherwise an error message will appear. At the same time the 'Sysinfo' section will be populated with the device hardware and firmware information as shown above.

11. If no error is reported, the COM port setting is complete.

**!!Warning!!** - The LED matrix, when lit is extremely bright and could cause temporary blindness. Please exercise caution and do not stare directly into the matrix at close range when configuring the device.

### 3.1.2 Device configuration

The [Ohmics MotoBrakeBT](#) configuration is done in four steps:

1. Design the [Tail](#) pattern
2. Design the [Brake](#) pattern
3. Design the [Deceleration](#) sequence
4. Configure [Sensitivity](#), [Strobe](#), [Modulation](#), [Tail](#) and [Brightness](#)

**Note** – The white center white strobe LED's, the brake light modulation and brightness can be disabled or enabled to comply with the local regulations. The tail light output is at 10% of normal brightness when on.

### 3.1.3 Design the Tail light pattern

Select **Tail** from the left menu. There are a total of 5 shapes consisting of a group of a few LED's, each, that can be turned on or off by selecting it with your mouse. Design your pattern using your mouse, then, press the **Save** button. If no shape is selected, the tail light will remain off, regardless of the **Tail** configuration in the main menu. Upon saving, if the vehicle ignition is turned on, the selected pattern will be displayed on the LED matrix and a '**Success**' message will appear on screen.

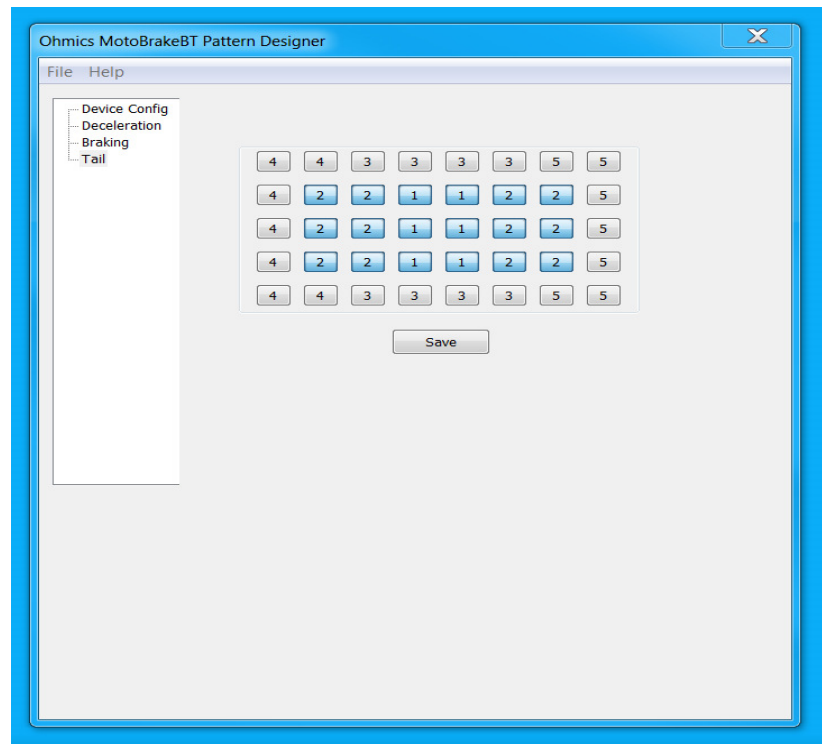


Figure 8 Configuring the Tail pattern

### 3.1.4 Design the Brake pattern

Select **Braking** from the left menu. There are a total of 5 shapes consisting of a group of a few LED's, each, that can be turned on or off by selecting it with your mouse. Design your pattern using your mouse, then, press the **Save** button.

**Important Note:** If no shape is selected, the brake light will remain off during operation.

Upon saving, if the vehicle ignition is turned on, the selected pattern will be displayed on the LED matrix and a '**Success**' message will appear on screen.

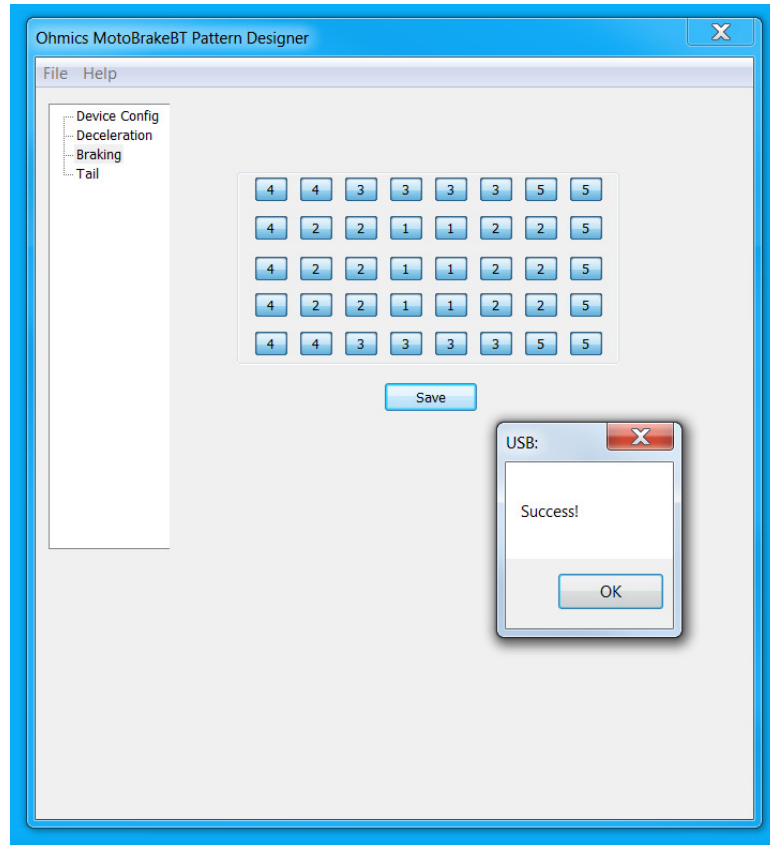


Figure 9 Configuring the Braking pattern

### 3.1.5 Design the deceleration pattern sequence

The **Ohmics MotoBrakeBT** will display a sequence of 3 patterns during deceleration direct proportional with the vehicle deceleration. Level 1 will light first during deceleration followed by Level 2 and respectively 3. These patterns can be programmed as follows:

Select **Deceleration** from the left menu. Design the pattern for each level using your mouse, then, press the **Save** button. Upon saving, if the vehicle ignition is turned on, the designed sequence will be displayed on the LED matrix and a '**Success**' message will appear on screen.

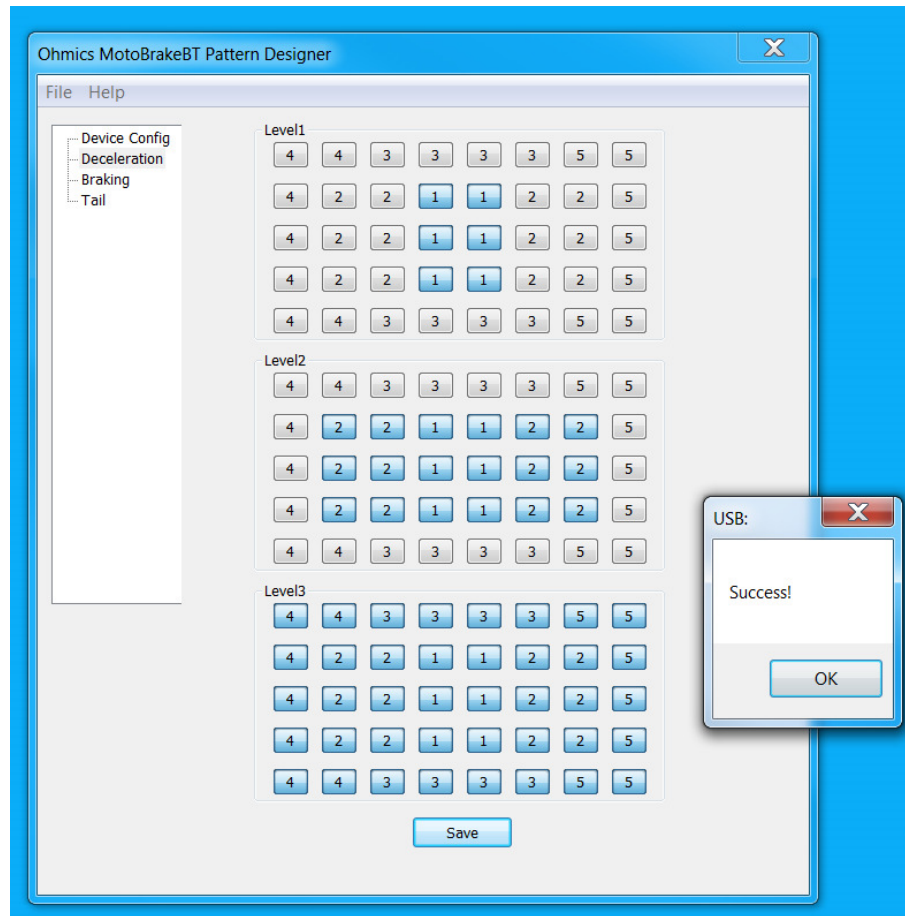


Figure 10 Configuring the Deceleration sequence

### 3.1.6 Device Configuration

General configuration parameters, such as deceleration sensitivity, white strobe dots operation, brake light modulation, brightness and tail light operation can be set in the [Device Config](#) menu. Upon connection, the software will load current device configuration settings and will display them.

Also displayed in this menu is the device information and software version. The utility also has shortcut button that can put the device in programming mode for future firmware upgrades.

**Important Note:** Only use the Firmware upgrade button if a new firmware is recommended by Ohmics.

Select [Device Config](#) from the left menu:

#### **Sensitivity:**

Use this setting to adjust the accelerometer sensitivity or to turn the feature off altogether

- 'Off' - Deceleration feature is turned off
- 'Low' - Unit will only activate under extremely hard deceleration
- 'Med' - Most popular bikes and most common driving habits (Default)
- 'High' - Very conservative riding (can also be used for bicycle applications)
- 'Active' - Generally used for sport-bike applications

### Strobe:

When 'On' - The white LEDs will strobe when brake is applied

### Modulation:

Use this setting to adjust the brake light modulation or to turn it off

- '0' - Brake light modulation is off
- '2' - Brake light will pulse twice and remain on when brakes are applied
- '4' - Brake light will pulse four times and remain on when brakes are applied
- '6' - Brake light will pulse six times and remain on when brakes are applied

### Brightness:

Use this setting to adjust the brake and deceleration light brightness 1-lowest,9-highest

### Tail:

Use this setting to turn tail light on or off.

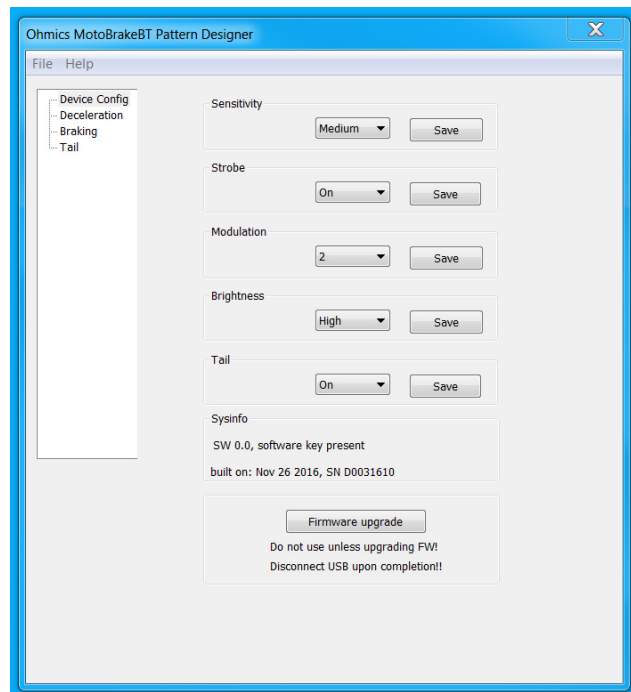


Figure 11 Device configuration menu



### 3.1.7 Firmware Upgrades

Firmware upgrades will be necessary for future feature upgrades or bug fixes. The current firmware version can be determined by connecting the brake light module to your PC via the USB cable and launching the [Ohmics MotoBrakeBT Pattern Designer](#) as seen in the figure below.

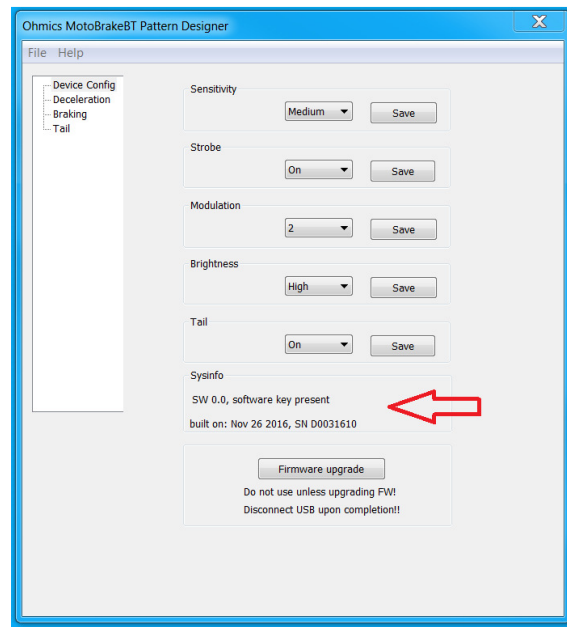


Figure 12 Determining the firmware version

1. Ensure the unit is powered off or your vehicle ignition is switched off.
2. Launch the [Ohmics MotoBrakeBT Firmware Upgrade](#) utility by clicking the [ohmicsFirmware Upgrade button](#) on the main configuration screen. A message will appear indicating the unit will go in programming mode.
3. Click OK. The [Pattern Designer](#) will close and the [Ohmics Firmware Programmer](#) application will launch and will show that a device was found.

**Note** – The Firmware programming button will not work if the Pattern Designer utility is not successfully connected to the device as described in the previous chapters.

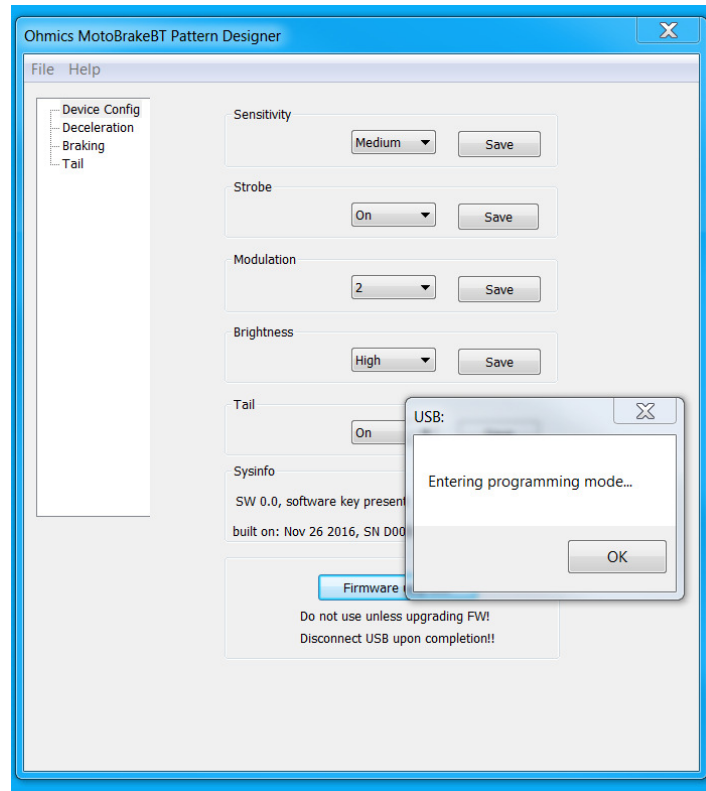


Figure 13 Firmware programming button

4. In the [Ohmics MotoBrakeBT Firmware Programmer](#) utility select the firmware file by pressing the 'Browse' Button and pointing to its location as shown in the figure below. The firmware file has \*.txt extension. Please be careful not to load other text files (such as the release notes) or the upgrade will fail:

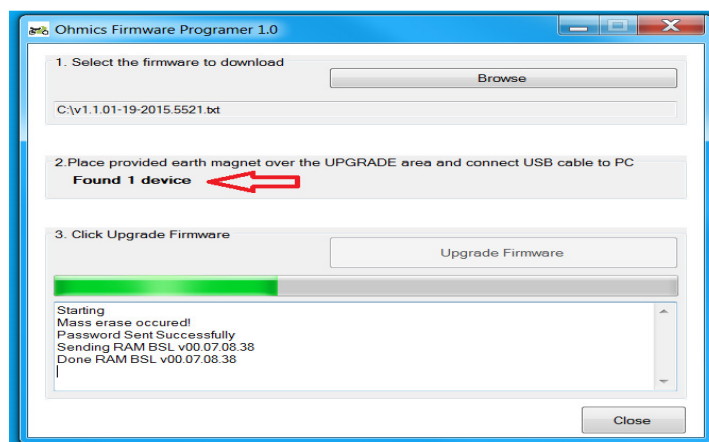


Figure 14. Selecting and programming the firmware file

5. Click [Upgrade Firmware](#) button and wait for the utility to report completion and unit automatic disconnection.

6. You **MUST** Disconnect the USB cable and re-connect if further configuration needs to be done, otherwise replace the USB cap.
7. Upgrade is complete, you can operate the vehicle normally

**Note** - Firmware upgrades will not erase the stored pattern or sequences from the flash, nor will it change the last configured settings.

## 3.2 Mobile Devices configuration

The [Ohmics MotoBrakeBT](#) is equipped with a Bluetooth LE module that allows the device to be configured via mobile devices, such as Android or Apple iOS.

### 3.2.1 Apple iOS (iPhone, iPad)

The [MotoBrakeBT](#) can be configured using the Apple [MotoBrakeBT](#) application found on Apple AppStore. Upon installation, launch by tapping on the [MotoBrake](#) app icon on your screen.

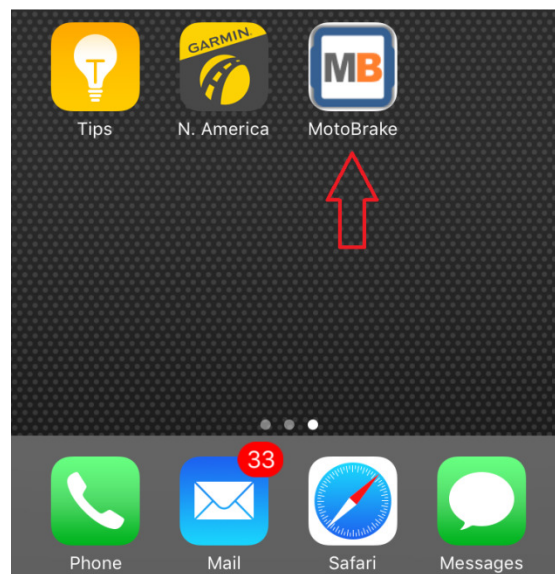


Figure 15 Launching MotoBrakeBT on your Apple device

The application will launch the Bluetooth scanning menu. Power up the [MotoBrakeBT](#) device or turn your bike ignition on. The [MotoBrakeBT](#) will show as an [Ohmics\\_xxxx](#) device in the list as shown in the picture below, where the 'xxxx' are the Bluetooth MAC ID.

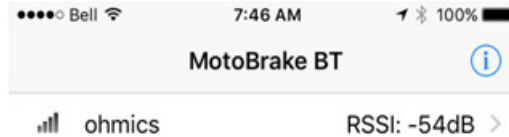


Figure 16 Detecting the Ohmics Bluetooth device

Tap on the available device(s). The mobile device will connect, a blue LED will light in the left corner of the **MotoBrakeBT** confirming successful connection and the configuration menu will pop as in the picture below. At the same time the **MotoBrakeBT** will load and display the current settings.

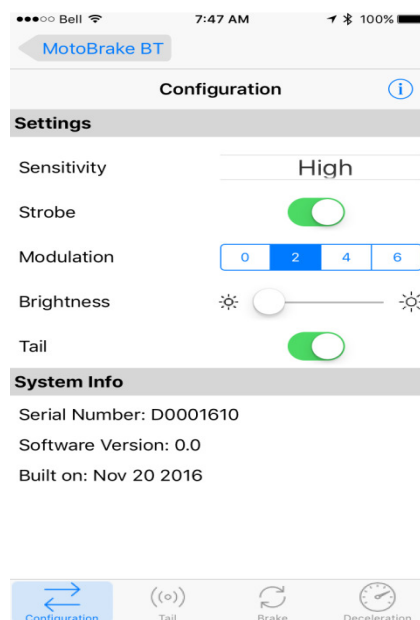


Figure 17. MotoBrakeBT configuration menu

**Important:** It is recommended that the distance between the mobile device and the MotoBrakeBT unit is kept under 1-2meters in order to maintain the connection active. MotoBrakeBT will automatically warn and disconnect if the Bluetooth connection is not reliable.

The **MotoBrakeBT** device can be configured dynamically in the **Configuration** screen. At any time, press the info icon on the top right corner for help using the application.

To configure the **Tail**, **Brake** and **Deceleration** patterns and sequence, respectively, tap onto the bottom panel as shown in the picture below and press **Save** for the respective changes to dynamically reprogram the device features. The **MotoBrakeBT** will visually acknowledge the changes.

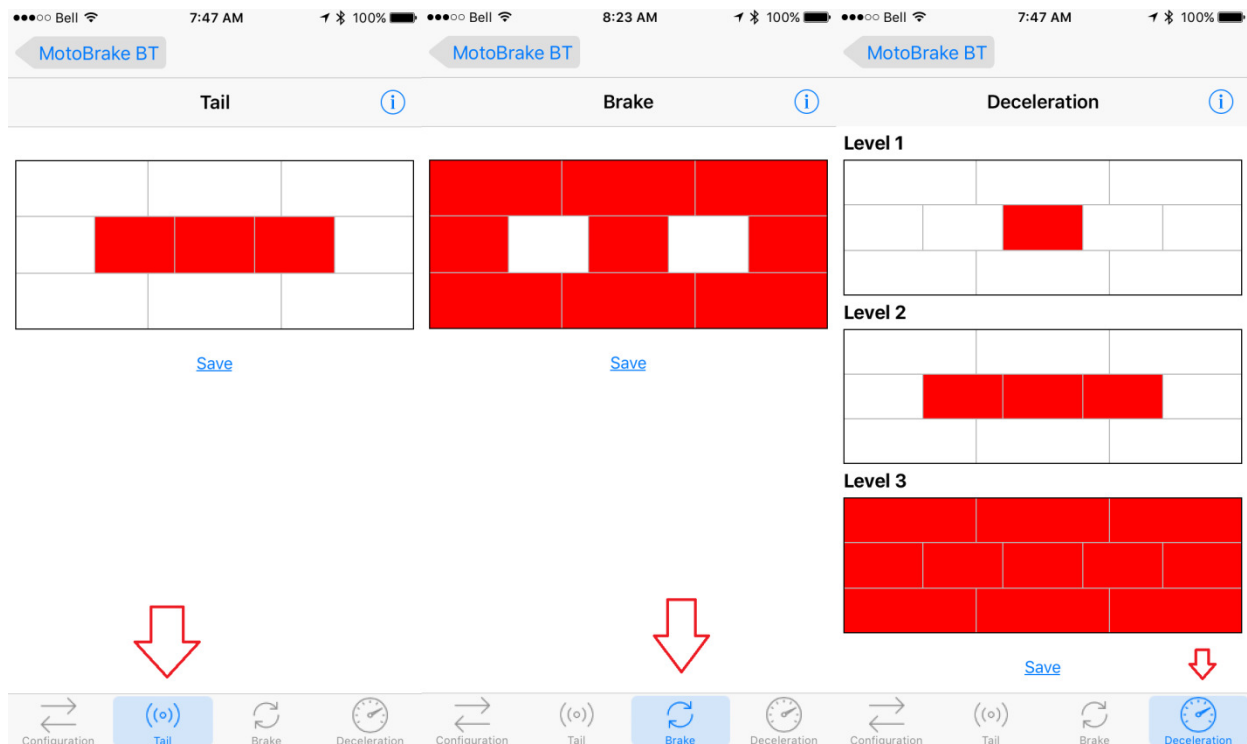


Figure 18 Apple OS – Ohmics MotoBrake Tail, Braking and Deceleration menus

To disconnect from the device simply tap the [MotoBrakeBT](#) button on the top left corner until the scanning menu is reached.

### 3.2.2 Android mobile devices

The [MotoBrakeBT](#) can be configured using the Android [MotoBrakeBT.apk](#) application package found on Ohmics website. Upon installation, launch by tapping on the [MotoBrake](#) app icon on your screen.

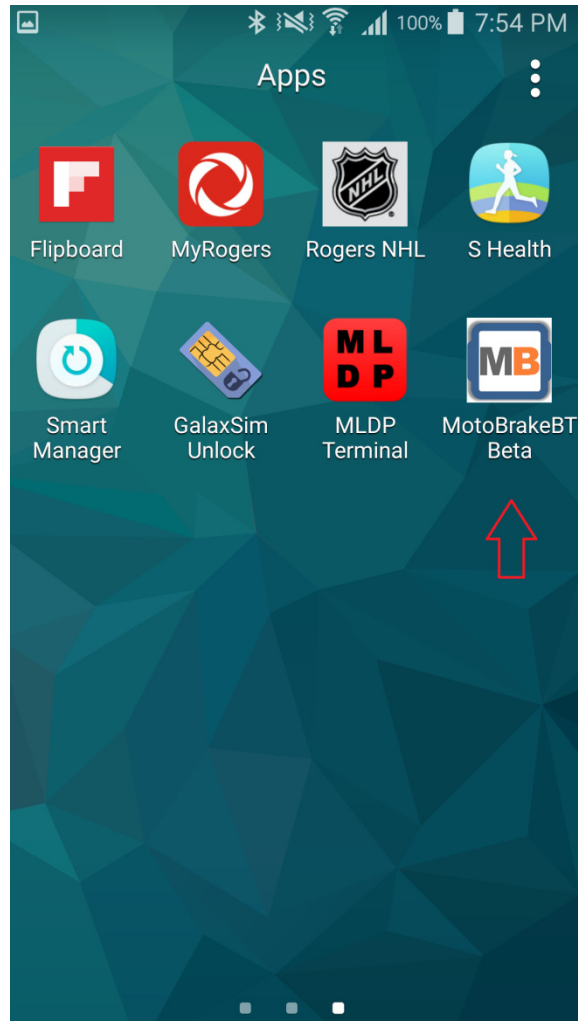


Figure 19 Launching MotoBrakeBT on your Android device

The application will launch the Bluetooth scanning menu. Power up the [MotoBrakeBT](#) device or turn your bike ignition on. The [MotoBrakeBT](#) will show as an [Ohmics MotoBrakeBT](#) device and the Bluetooth MAC address in the list as shown in the picture below.

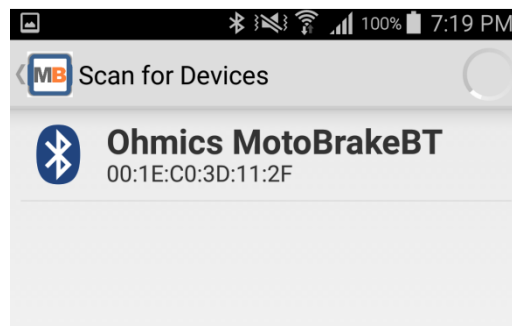


Figure 20 Detecting the Ohmics Bluetooth device

Tap on the available device(s). The mobile device will connect, a blue LED will light in the left corner of the **MotoBrakeBT** confirming successful connection and the configuration menu will pop as in the picture below. At the same time the **MotoBrakeBT** will load and display the current settings.

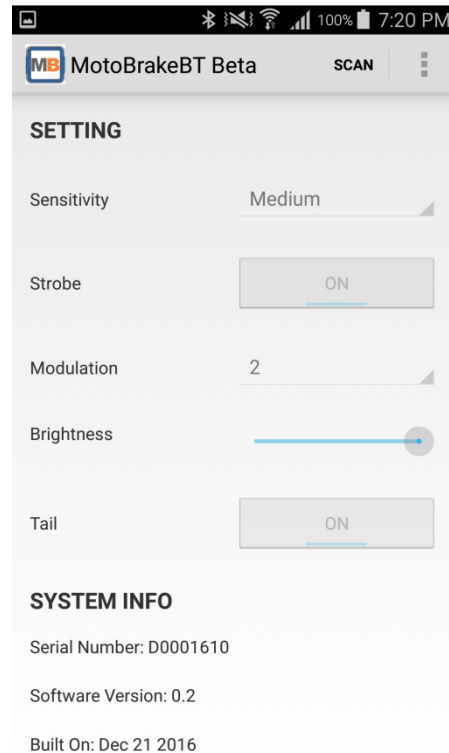


Figure 21. MotoBrakeBT configuration menu

**Important:** It is recommended that the distance between the mobile device and the MotoBrakeBT unit is kept under 1-2meters in order to maintain the connection active. MotoBrakeBT will automatically warn and disconnect if the Bluetooth connection is not reliable.

The **MotoBrakeBT** device can be configured dynamically in the **Configuration** screen. At any time, press the help icon on the top right corner drop-down menu for tips using the application.

To configure the **Tail**, **Brake** and **Deceleration** patterns and sequence, respectively, tap onto the respective icon on the drop down menu as shown in the picture below and press **Save** for the respective changes to dynamically reprogram the device features. The **MotoBrakeBT** will visually acknowledge the changes.

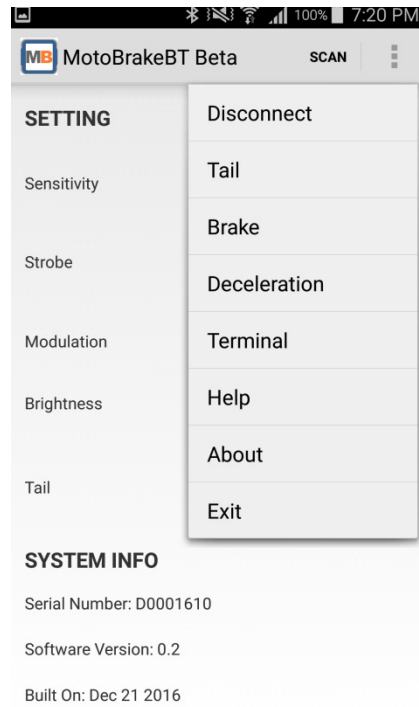


Figure 22. Android MotoBrakeBT drop-down menu

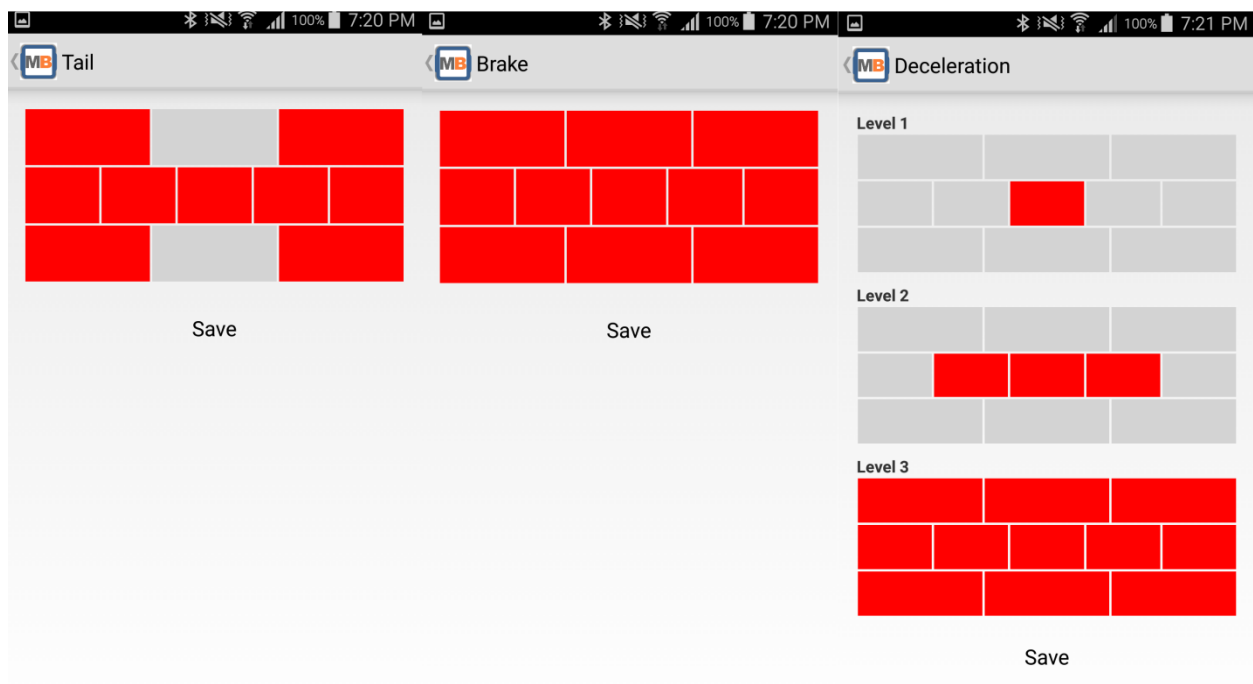


Figure 23 Android – Ohmics MotoBrake Tail, Braking and Deceleration menus

To disconnect from the device simply tap the **SCAN** button on the top menu in Main Configuration menu which will also put the application back in Bluetooth scan mode.



## 4 FAQ, Known Issues, Troubleshooting

### 4.1 Known issues

Issue	Workaround / Fix
Connecting and disconnecting the unit while Pattern Designer is still open can cause communication issues.	Always ensure to connect the device via USB open up first then, open the configuration utility. If disconnecting the device, ensure the application is being closed too. This is a known processor manufacturer limitation
Cannot install the device driver in Windows 8.x and 10 as it says signature is required	Microsoft has implanted security features in Windows 8 and later and part of it requires that drivers must be signed in

	order to prevent malware to affect your system. In order to install low level drivers one must disable signed drivers enforcement temporarily and the VCP driver provided will install fine. There are plenty of examples of 'how to' to be found on the web.
In Deceleration mode the unit does not detect light decelerations	This was a very big challenge for us. We have over a thousand lines of code for algorithms that detect a true deceleration and while we are continually improving it, we cannot make the unit to have a full range therefore we created more sensitivity levels to choose from.
Does my unit perform calibration?	Yes, it does every time it powers up, in most cases quietly. In severe cases when major calibration is required the LED matrix will light up for approx. 1-2 seconds indicating the unit needs extra time for calibration. Once the matrix is off, the unit is calibrated.

## 5 Specifications

### 5.1 Specifications

Input Power: 9-15VDC,

- max. 240mA@14V and maximum brightness full matrix on
- max. 30mA @ 14V with tail on full matrix

Tail brigtness: 10%

Lowest settings brightness: 13%

Highest settings brightness: 46.5%

Brake input: up to 15V

Red LED Matrix brightness: 4200mcd per LED (40 LEDs)

Center Line White LED brightness: 3400mcd per LED (2 LEDs)

Center Line and brake LED modulation: every 500ms twice at 20Hz

Bluetooth:

- version 4.1 Low Energy
- 7dBm transit power for 100m range
- Certifications: SIG QDID, EN300 328v 1.9.1, EU, FCC, Japan, Korea, Taiwan, IC

Dimensions: (Width x Height x Depth): 101x41x15mm (4,3/8 x 1,5/8 x 1/2 in)

Environmental:

- Operation -20 to +50C.

- Storage -40 to +55C,
- Dust and water resistant

## 5.2 System Requirements

Supported Operating System for Pattern Designer and Firmware Upgrade Utility:  
Windows 7 Service Pack 1, Windows 8, Windows 8.1, Windows 10.

Apple iPhone 4S, 5, 5c, 5S, 6, 6S, 7 Ipad, iOS 7.1.2(not fully tested) - 10.1.1

Android devices tested:

Samsung Galaxy S5 Android 6.01

Nexus 5 Android 6.01.

Nexus 4 Android 5.1.1.

Samsung T580 tablet Android 6.0.1 (Turn off nearby device scanning!!)

ONEPLUS A300 Android 7.0 OxygenOS 4.03

Samsung Galaxy S6 Android 6.01