



PandroidWiz

Introduction

PandroidWiz is an Android app designed to control the low cost Merlin/Orion astro-telescope mount via a wireless Bluetooth connection so that it can be used as a robotic head for panoramic photography. The Merlin/Orion mount is also marketed by Kolor under the Panogear brand name.

PandroidWiz utilizes the XML format shooting positions preset file definition, and the XML format shooting positions data file definition, developed for Papywizard, an Opensource cross-platform program which runs on Windows, Mac OSX, Linux, and Nokia N800 and N810 Internet Tablets.

For more information about Papywizard see: <http://www.papywizard.org>

For more information about the Papywizard XML format preset file definition see:
<http://www.papywizard.org/wiki/UserGuideSvn#Presetmode>

For more information about the Papywizard XML format data file definition see:
http://www.autopano.net/wiki-en/action/view/Panohead_XML_data_file

PandroidWiz aims to deliver a subset of the functionality of Papywizard in a very easy to use app running on a low cost, compact, widely available hardware platform.

PandroidWiz is designed to run on small Android devices equipped with Bluetooth.

PandroidWiz creates a Bluetooth wireless connection to the Panogear/Merlin/Orion astro-telescope mount equipped with a suitable Bluetooth interface device, such as the Panogear/Deltawave PapyMerlin Bluetooth interface module.

For more information about the Panogear/Deltawave/PapyMerlin Bluetooth interface module see:
<http://www.papymerlin.com/interface-électronique/>
<http://www.kolor.com/buy/photo-hardware/accessories/recepteur-bluetooth.html>
<http://magasin.skivr.com/materiel/rotules/panogear/accessoires-panogear/module-bt-panogear.html>

PandroidWiz reads Papywizard-compatible XML format shooting positions preset files to control the movement of the dual-axis motorized mount to take a series of photographs automatically, following the pattern defined in the XML format preset file.

During the shoot the yaw and pitch of the shooting position at which each photo is taken are recorded in a Papywizard-compatible XML format data file. This data file can later be used with Autopano Pro, Autopano Giga or PTGui Pro to help the panorama stitching programs to place 'featureless' images which might otherwise be omitted from the stitch.

PandroidWiz is intended to be as simple as possible yet complete enough to perform effective panoramic shoots using only your Panogear/Merlin/Orion mount with its Bluetooth interface, your camera, and a small Android device which you can take with you everywhere.

PandroidWiz was designed to work well on the smallest and least expensive Android devices. It should also work on larger and more expensive Android devices, such as tablets, but those were not the main target.



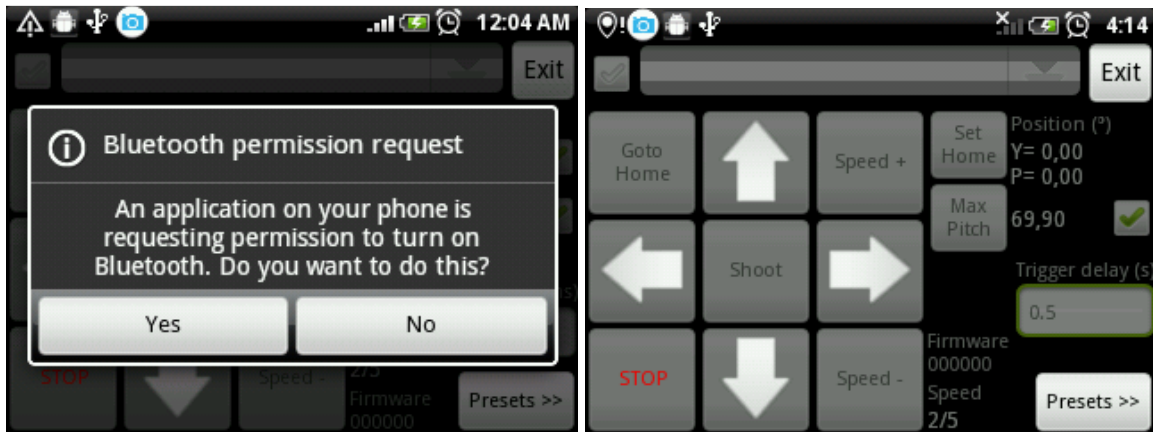
Requirements

- Android device (v2.1 or later) equipped with Bluetooth and an SD, miniSD or MicroSD card slot with a card. The internal one will be used if no external card slot is present.
- A way of transferring files between your computer and your Android device.
- A Panogear/Merlin/Orion mount.
- A compatible Bluetooth-TTL interface adapter for the mount, such as the Panogear/Deltawave PapyMerlin Bluetooth adapter.
- A camera whose shutter can be triggered by a wired remote control or via infrared using a gentLED-TRIGGER device.

For more information about the gentLED-TRIGGER device see:

<http://www.gentles.ltd.uk/gentled/trigger.htm>

Install



- Download and install the PandroidWiz app from the Google Play Android app store. (no link for the moment, the application is not published yet)
- Run the PandroidWiz app. On your first run do not activate Bluetooth, instead select **No** and then **Exit** the application.
- Now you will find a PandroidWiz directory on your SDCard, with two subdirectories named **Presets** and **XMLAutoPano**. Usually, they can be found in the /sdcard directory. Note that you may need to disconnect and reconnect your Android device to your computer to see the new directory.
- Import all your Papywizard-compatible XML preset files from your computer into the **Presets** directory on your Android device.
- The Papywizard-compatible XML format data files recorded when you shoot panoramas will be stored in the XMLAutoPano directory.

You are now ready to use PandroidWiz to shoot panoramas.

Required permissions explained

Sometimes, when viewing details of an Android app on the store, it is a rather intimidating to see the list of permissions the Android app demands; here is a brief description of those needed by PandroidWiz

BLUETOOTH : the application need this to support Bluetooth, which enables a wireless connection to be established to the Panogear/Merlin/Orion mount.

BLUETOOTH_ADMIN : this will ask your permission to activate Bluetooth when you try to connect to the Panogear/Merlin/Orion mount, and it will disable Bluetooth when you exit PandroidWiz to conserve battery power.

WRITE_EXTERNAL_STORAGE : this is needed to write the Papywizard-compatible XML format data file recording shooting positions to the SD card.

WAKE_LOCK : this prevents your Android device from entering deep sleep, which would stop all activities including PandroidWiz. Disabling the ability to enter deep sleep allows PandroidWiz to continue shooting a panorama even if your Android device enters normal sleep.

VIBRATE : the vibrator is used to warn the user that the camera/lens is moving dangerously close to the maximum pitch limit, risking a collision between the camera/lens and the mount.

Initial Head & Camera Positions

It is very important to set the Home position correctly after establishing a connection to the mount at the start of each session because all shooting positions are calculated relative to the Home position, shown in the photo below.



Home position



Max Pitch position (around +60° pitch in this example)



Home Position (Left Arm) don't forget to set the left arm option on the first screen

Note - The camera position is unusual in the first “Home Position” photo above. It was attached to the rail in this position to more easily illustrate the Home position and the Maximum pitch concepts. So it is mounted neither at the No Parallax Point (NPP), which is essential if you wish to shoot spherical panoramas, nor at the center of mass which is desirable if shooting partial panoramas using longer focal length lenses.

PandroidWiz is designed to work with presets where the pitch home position is horizontal. The mount does not store the Home position co-ordinates when powered off, so you must set the Home position anew for each session.

If the Home position is not set correctly unexpected and undesirable things may happen resulting in damage to your equipment.

Depending on your camera and lens it may also be desirable to set a Maximum pitch beyond which the mount will not move, to avoid the risk of collisions between your camera and the mount.

PandroidWiz can handle two different types of preset. Spherical and Mosaic presets.

Spherical presets are designed to shoot panoramas with a field of view of 360x180 degrees; 360 degrees on the horizontal yaw axis and 180 degrees on the vertical pitch axis.

PandroidWiz is designed to work with Spherical presets in the range of 0 to +360 degrees on the Yaw axis, and in the range of -90 to +90 degrees for the Pitch axis. Presets that define shooting positions outside those ranges of Yaw and Pitch values risk damaging your equipment.

Multi-row spherical presets typically have fewer images per row approaching the zenith and nadir to avoid excessive overlapping. Mosaic presets are different and always have the same number of images in every row, in a regular matrix/grid pattern.

Mosaic presets define regular grid/matrix shooting patterns with the same number of images in every row. Mosaic presets are designed for shooting panoramas with a field of view of less than 360 degrees on the yaw axis and less than 180 degrees on the vertical pitch axis, these are usually called partial panoramas. The graphical display in the Shooting screen will be adjusted automatically to the ranges of the preset.

To make it easier to shoot partial panoramas using Mosaic presets they should be centered on the 0,0 origin and will then include negative yaw values. Point the camera at the position you wish to become the center of your panorama and then set the Home position before shooting with a Mosaic preset of this type.

Unusual Home positions

PandroidWiz works best when the Home position set with the camera/lens axis positioned horizontally on the pitch axis.

If you wish to use a non-standard Home position, with the camera/lens axis in a vertical position for example, then be aware that the only mechanism offered by PandroidWiz to avoid collisions between camera/lens and the mount application is a maximum pitch, so be aware of what you are doing.



Vertical Home position



Max pitch position (Right Arm)

Be very careful, when you press the up arrow on the first screen, the head is supposed to move to higher pitch. If it's not the case, come back to home and change the arm setting. The photos above show a vertical home position with a 144° Max Pitch setting. If you use such configuration be sure also to use according preset with a 0 to 180° pitch value range.

Using PandroidWiz

PandroidWiz is controlled using three separate screen displays:

- First screen – Connection and Configuration
- Second screen – Presets
- Third screen - Shooting screen

First screen – Connection & configuration



The First screen contains the controls needed:

- to establish a wireless Bluetooth connection between your Android device and the mount.
- to set the Home position.
- optionally to set a maximum pitch limit.

The steps involved are as follows:

Establishing a Bluetooth wireless connection between your Android device and the mount

1. Attach the Bluetooth interface adapter to your Panogear/Merlin/Orion mount and power it up.
2. Run PandroidWiz. The application will request permission to enable Bluetooth on your Android device. If you don't enable Bluetooth, you still can use the application but only to browse and display your presets.
3. PandroidWiz will now scan for all available Bluetooth devices in the vicinity. The devices list will be filled with the results. ⁽¹⁾

Note that only the Panogear/Deltawave PapyMerlin and Ursa Minor Bluetooth devices will be listed by name.

4. If only one Bluetooth device is detected then PandroidWiz will try to connect to it automatically. If more than one Bluetooth device is detected you will have to select the correct device from the list of devices, by pressing the Devices dropdown list control ⁽²⁾, and then make the connection using Connect control ⁽³⁾.
5. Note - pressing the Connect control ⁽³⁾ a second time will disconnect the wireless Bluetooth connection to the mount, it is a toggle control.
6. Select the Right Arm / Left Arm position by pressing the toggle button ⁽¹¹⁾

Setting the Home position

1. Now you have a wireless connection between your Android device and the mount, use the Arrow buttons remote control on screen to position your head at the correct Home position. All the shooting positions defined in a preset are relative to this 0/0 (zero/zero) Pitch/Yaw position.
2. When positioning the mount manually using the Arrow buttons, you can choose different speeds from **1** (the slowest) to **5** (the fastest). It is recommended to use the default speed 2 until you are confident with the controls. Increase the speed with the **Speed+** button ⁽⁹⁾, and decrease it with the **Speed-** button ⁽¹⁰⁾.

Note - the speed selected only affects movements using the arrow buttons. The speed of movement, when shooting a panorama automatically under program control, is not affected by this speed setting.

3. When you have moved the mount the correct **Home** position, press the **Set Home** button ⁽⁴⁾ to establish the Home position for this session, until the mount is next powered down.

Setting the Maximum pitch limit

If the camera may collide with the mount before attaining +90 degrees on the Pitch axis then it is recommended that you set a Maximum pitch limit to avoid the risk of collision with the mount and damage to your equipment.

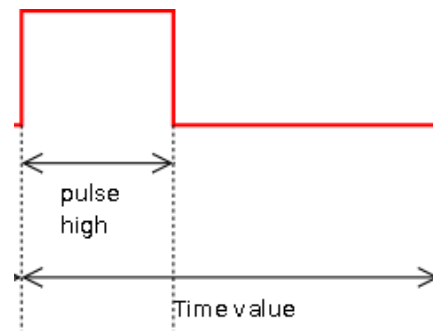
1. Using the arrow buttons, move the head carefully to your desired Maximum pitch position, allowing a few degrees margin for security, and then press the **Max Pitch** button. ⁽⁵⁾
2. You can temporarily disable the Maximum pitch constraint while retaining its value in memory simply by toggling the Max Pitch check button ⁽⁶⁾.

Shutter trigger settings

You have two parameters :

- Time value : in seconds, is the total time allocated for taking the picture, the total time between the head movements.

- Pulse high : in milliseconds, starting from the beginning of the Time value, is the time the Merlin/Panogear mount Snap port switch contacts remain closed.



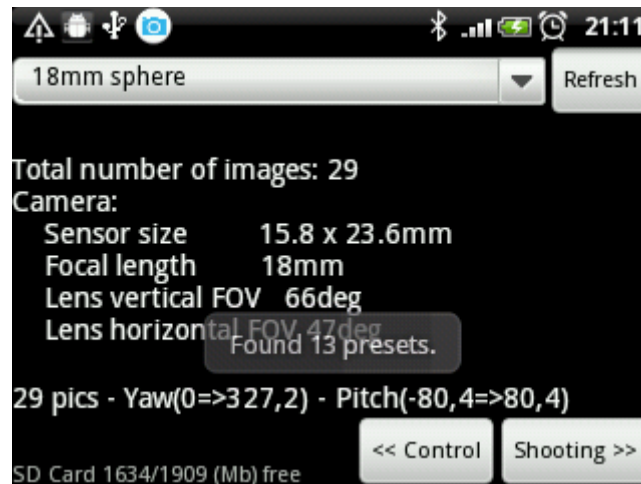
For a camera whose shutter can be triggered by a wired remote control, you can normally set Pulse high and Time value to the same duration.

If you are using the gentLED-TRIGGER device to trigger the shutter of your camera via IR then set Pulse high to 500ms.

The Time value must be long enough for the camera to take the photo before the camera is moved to the next shooting position. This depends on the shutter speed you have selected.

The system is now ready to shoot a panorama. Press the **Next** button ⁽⁷⁾ to progress to the second screen to select a preset.

Second screen - Presets



The second screen allows you to choose a preset for the panorama shoot.

The dropdown list control at the top initially displays the first of the presets stored on your Android device.

Press on the dropdown list control to display the list of presets and select the preset you wish to use for this panorama shoot.

When a preset is selected a short description is displayed beneath the dropdown list control to help you check it is the preset you wish to use.

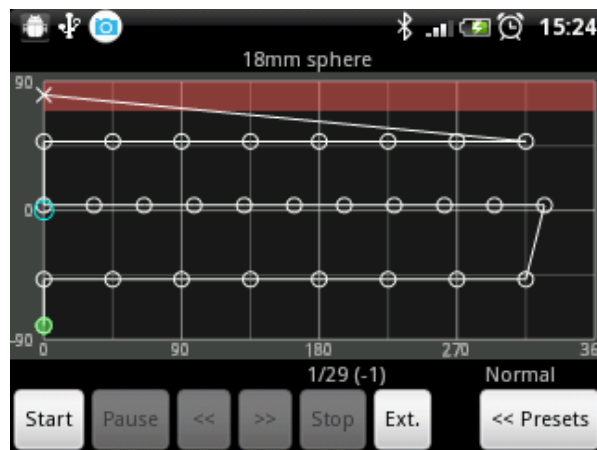
A summary with the total number of pics, the Yaw and Pitch ranges is displayed.

The number of presets stored on your Android device and the amount of storage available on the SD card are also displayed.

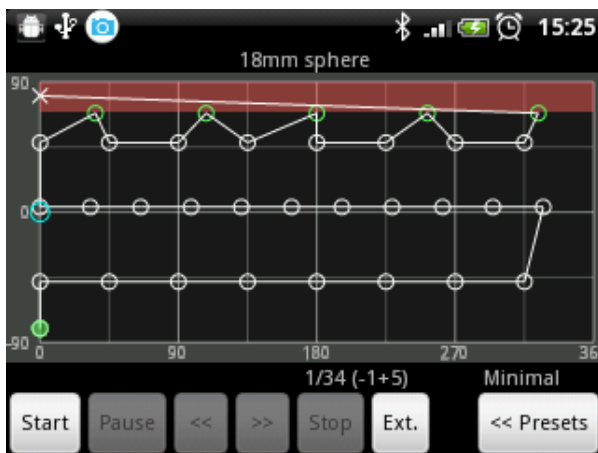
Now you have selected a preset for this panorama shoot, press the **Shooting>>** button (bottom right) to move to the Shooting screen.

If instead you wish to return to the Connection and Configuration screen press the **<<Controls** button.

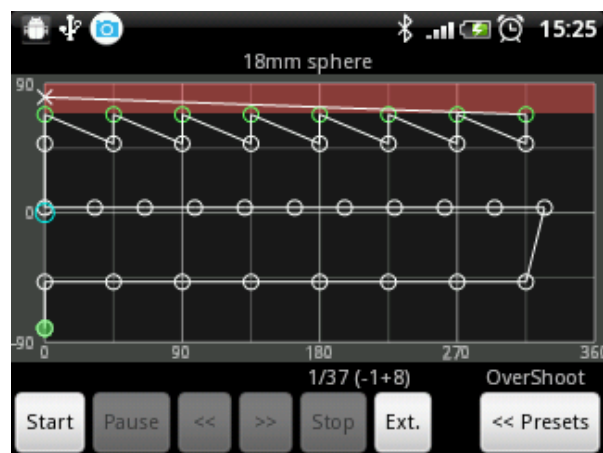
Third screen – Shooting



(2) (4) (3) (1)



Minimal extended mode



OverShoot extended mode

The shooting screen displays a graphical representation of the selected preset.

- The title of the selected preset is displayed above the graphical display.
- The shooting positions are displayed as white circles.
- The current head position is displayed as a blue circle
- The next shooting position is displayed as a filled green circle.
- If you set up and activated a Max Pitch value on the first screen then a red shaded area will be displayed that represents the restricted zone above the Max Pitch limit.
- Shooting positions defined in the preset that fall within the restricted zone will be ignored when shooting to avoid damage to your equipment, and are marked as small white crosses instead of the normal white circles.

Extended modes of shooting

PandroidWiz offers three shooting modes, normal mode and two extended modes.

If some of the shooting positions defined in the preset are located within the restricted zone, then you have the opportunity to select Extended modes by pressing the **Ext.** button ⁽¹⁾.

There are two extended shooting modes, Minimal mode and Overshoot mode, which add shooting positions to those defined in the preset close to the Maximum pitch boundary so that the panorama will cover as much as possible of the panorama field of view planned with the preset without exceeding the Maximum pitch limit.

Minimal mode : A minimum number of shooting positions is added on the Maximum pitch boundary. These additional shooting positions are calculated taking into account the coordinates of the other shooting positions located outside the restricted zone. The calculation aims to add as few shooting positions as possible without leaving gaps between images. Not useful with mosaic presets.

Overshoot mode : The additional shooting positions, added at the Maximum pitch boundary line, are simply a duplicate of the first row defined in the preset that are located outside the restricted zone. This very simple method, unlike the Minimal mode, always guarantees that there will be no gap between the photos taken at the added shooting positions. But this method means that more photos will be taken than are absolutely necessary, which is why it is called OverShoot mode.

Normal mode : The original shooting positions defined in the preset with no additions; as displayed by default.

A status line is displayed below the graphical display of shooting positions and above the row of control buttons. The current shooting position and total number of shooting positions outside the restricted zone is shown - for example 1/29 – followed, in brackets, by the number of shooting positions 'lost' in the restricted zone and if selected the number of shooting positions added by your choice of Extended mode- for example (-1+8). The selected shooting mode is also displayed – Normal, Minimal extended mode, or OverShoot extended mode.

Shooting

When you have selected your desired shooting mode you are ready to start shooting the panorama.

Press the **Start** button ⁽²⁾ to start shooting.

During the shoot you can **Pause** ⁽⁴⁾ and restart the shoot, or **Stop** ⁽³⁾ the shoot before it finishes:

- **Stop** ⁽³⁾: When you press the Stop button the shooting process will stop, the mount movement will stop immediately, and the shooting process put into a pause state. If you press the Stop button a second time, PandroidWiz will ask you to confirm that you really want to stop the shoot.
- **Pause** ⁽⁴⁾: When you press the **Pause** button the shooting process will be put into a pause state, but unlike the **Stop** function, the mount will complete the current movement before the shooting process is paused. While the shooting process is paused you can use the << and >> buttons to relocate the current shooting position. This allows you to pause the shooting process to avoid shooting people or things moving in the scene or to reshoot some shooting positions. You can resume the shooting process by pressing the Pause button a second time.

When the shooting process finishes because images have been taken at all the shooting positions defined in the preset, or because the process was terminated before it completed normally, a XML format data file which records all the shooting positions at which images were taken during the shoot is written to the XMLAutoPano directory. You may use this file later when stitching your panorama using Autopano Pro, Autopano Giga or PTGui Pro to help the stitching software to place 'featureless' images (such as shots of plain blue sky, or plain white walls or ceilings) that might otherwise be omitted from the stitch.

Closing the PandroidWiz program

When you have finished using PandroidWiz, press the **Exit** button on the first screen ⁽⁸⁾. This will disable Bluetooth, re-enable the ability to enter a deep sleep mode, and exit the program.

You cannot exit while the program is busy shooting a panorama. You will have to stop the shoot explicitly first from the third screen before you can return to the first screen to Exit the program.

The magic of PandroidWiz – sleep mode and multitasking

PandroidWiz is designed to continue control of the shooting process even if it is not actively displayed on the screen.

If for some reason PandroidWiz is minimized it will still continue to control the shooting process. You will see its icon in the status/notification/taskbar of your Android device.

So, for example, if you press the Home button on your Android device, PandroidWiz will continue to run in the background; and usually you can use any other application on the device while the shooting process continues.

If you are using PandroidWiz on an Android phone you should be able to receive a phone call in the middle of a shoot.

You can also leave your Android device alone while a shoot is in progress and let it go into sleep mode, or force it by pressing the power button briefly. PandroidWiz prevents your Android device from entering deep sleep mode while it is active so there is no risk of the shooting process being terminated prematurely.

Of course, it is recommended that you avoid heavy use of other applications while you are using PandroidWiz to reduce the drain on the battery, and to avoid the risk of the PandroidWiz being terminated by the Android operating because of memory demands from other applications. In such circumstances PandroidWiz will probably be one of the last applications to be terminated by the operating system, but there is no guarantee that it won't happen.

Experiment with your Android device to determine its limits.

Tips & Tricks – Did you know?

- PandroidWiz stores the Home position and other data, so when you start the application next time again it will remember them, and if you did not switch off the mount in between, then it will still show the correct position and you can go directly to the shooting screen. However the mount does not store the Home position, so if you have powered down the mount between PandroidWiz sessions you will need to reset the Home position using PandroidWiz before shooting another panorama.
- If you end a shoot prematurely by pressing Stop twice in the shooting screen, an incomplete XML format data file will still be created. By design, the XML format data file is always generated once the shoot ends whether the shoot ends normally or is stopped prematurely using the Stop button.
- If PandroidWiz discovers only one active Bluetooth device when you start the application, it will connect to that Bluetooth device automatically.
- If you are losing preset shooting positions because they are located in the restricted zone above the Maximum pitch limit, PandroidWiz will propose, on the fly, two alternative extended modes which add shooting positions in an attempt to maintain the intended panorama field of view as far as possible.
- When you pause a shoot, you can change the next shooting position using with the << and >> buttons, then press the Pause button again to resume the shoot. This can be useful if, for example, you noticed one of the photos was not taken and want to try to shoot it again, or if you want to shoot a subset of the preset shooting positions, and so on.
- While shooting, you have two different ways to pause the shoot. By pressing the Pause button, the mount will complete the current move and then the application will pause at the next shooting position before taking the shot. When you restart the shoot by pressing the Pause button a second time the first action will be to take a shot at the current shooting position at which the mount paused. Pressing the Stop button once will stop the head movement immediately and pause the shooting.
- A shoot will continue even if you let the Android device go into sleep mode, or close it by pressing the power button briefly, or if you press the device's Home button to do something else, and probably even if you receive a phone call during the shoot. Of course, the shoot will be terminated if you perform a complete shutdown.
- If on the first screen the connecting dialog seems to stall in an infinite loop, you should press the Back button to cancel the operation; after which you should restart PandroidWiz and try to set up a connection again.
- After completing a shoot, if you don't intend to use the application again within a few minutes then close PandroidWiz using the Exit button. Closing PandroidWiz disables Bluetooth and restores the ability of the Android device to go into a deep sleep mode. This will ensure maximum battery life.
- When the mount is not moving, after a few seconds the application will pause the polling of the head position through the Bluetooth connection and won't refresh the preset graphic in order to reduce power consumption and prolong battery life.

- If you set a Max Pitch limit, then when you use the arrow buttons on the first screen to move the mount manually you should not be able to exceed the Maximum Pitch specified. Your Android device will vibrate to warn you that you are approaching the Max Pitch limit and will automatically stop the move of the head. This should help you to prevent your camera from colliding with the mount. Allow a safety margin when setting a Max Pitch limit.
- You need to be connected to the mount to set a Maximum pitch limit, because you have to move the head to that position before you set the limit.
- If mount becomes positioned within the restricted zone, you won't be able to move it at all with the arrow buttons until you disable the Max Pitch setting temporarily. This can happen if you have just switched on the head; the application will use the last stored Home position and may think it is inside the restricted zone.
- If you only want to look at your presets, then do not allow PandroidWiz to activate Bluetooth when it starts. Then proceed to the Preset and Shooting screens.

Disclaimer

PandroidWiz is offered to Panogear/Merlin/Orion and Android users without charge.

You use PandroidWiz at your own risk.

The developers of PandroidWiz accept no responsibility for any damage or losses of any sort that may result from the use of the application; but if used as intended you should not experience any problems.

Tested Devices

Phones :

- HTC Wildfire A3333 - Android 2.2.1 – The application was developed on that one.
- Samsung Galaxy Y - GT-S5360 – Android 2.3.6
- Samsung Galaxy Music - GTS-6010 – Android 4.0.4

Tablets :

- Asus EEEPad Transformer Prime TF201 – Android 4.1.1
- Archos 101 Internet Tablet A101IT-V5 – Android 2.2.1 – Sometimes connection was not working.
- Samsung Galaxy Note 10.1 – GT-N8000 – Android 4.0.4
- Samsung Galaxy Tab 2 – GT-P5110 – Android 4.0.3 (this version has a bug in Bluetooth stack asking for password for already paired with success device and then failing to connect, fallback to unsecure socket was use as workaround, updating to official 4.1.1 version solve the problem as well) all 4.0.3 Samsung has potentially this problem.
- Asus Google Nexus 7 - Android 4.2.2

Special thanks

Thanks to my father for pushing me into this adventure ^^

Thanks to all our beta testers ;)

Thanks to Andrew Stephens for help with writing this manual.