DigiBall User Manual

Contents

Overview

The DigiBall® is a patented electronic cue ball that automatically detects the exact tip location when hit. Because it uses gravity as a reference there is no need for manual alignment (unlike traditional training balls). Information is sent wirelessly via Bluetooth® to an Apple or Android device. All balls are perfectly balanced, perfectly round, weigh the same as a regulation ball and made from Aramith® resin. The DigiBall uses a shock-resistant automotive-grade IMU on a custom circuit board that is further encapsulated and ruggedized; break-shots are no problem. Each ball comes with a proprietary charging pad which provides 16 hours of play time per charge.

The purpose of the DigiBall is to provide players/students immediate feedback on the accuracy of their stroke when hitting the cue ball. Accuracy is very important for both pocketing the object ball and imparting the correct spin on the cue ball to travel to the desired position for the next shot. Knowledge of tip position accuracy helps guide the player in choosing where to make fundamental corrections, be it aiming, stroke, alignment, focus, or conceptual.

Website

Additional information about this product can be found at www.digicue.net

Apps

Applications are available for the DigiBall at either the Goole Play store or the Apple Store. The app will work on most modern Apple and Android devices, as well as Mac computers with Apple Silicon processors.

Apple Store:
https://www.google.com/url?q=https%3A%2F%2Fapps.apple.com%2Fus%2Fapp%2Fdigiball-app%2Fid1661855313&sa=D&sntz=1&usg=AOvVaw3IpDuTrQPIp3F7dif6ErdZ

Google Play Store:

https://play.google.com/store/apps/details?id=net.digiball.flutterApp

Quick Start Guide

The DigiBall is a wireless billiard ball that allows the user to measure spin, ball speed and precise tip position when striking the ball. No manual alignment of the ball is necessary between shots.

The DigiBall will be in Ship Mode when first purchased. This mode disconnects the internal battery for long-term storage or for transportation. Place the DigiBall on the wireless charger, black-dot-facing-down, to exit Ship Mode. The DigiBall can be placed back into Ship Mode at any time by holding the ball black-dot-facing-up and temporarily placing the charger on top of the dot (like a hat.)

Charge the DigiBall with the included wireless charging pad, black-dot facing down. Charging takes less than 4 hours. A fully-charged ball will provide 16 hours of continuous play. The Time indicator on the Shooting page will show the charging status.

The DigiBall will automatically go to sleep after 5 minutes of inactivity. Wake the DigiBall by rotating it 90 degrees in any direction, shooting a shot, or by placing it on the charger.

Go to the devices page and select a detected DigiBall from the scan list. The devices closest to your mobile device will display a RSSI number closer to zero (dBm).

Go to the settings page to modify the app settings and to change units, display elements, ball configurations, etc.

Start shooting! The app will show a picture or diagram of a cue ball with your tip location, as well as spin in rotations per second (RPS), tip position in percent from center (PFC), ball speed, and the number of seconds that the ball has remained motionless after it has come to rest.

Shots are saved to internal storage on your device. You can create a Session to categorize and track groups of shots and can view them later on the history page.

Press the Share button to send your internal storage file to another location for backup, or to import it elsewhere for personal analysis.

Shooting Instructions

Ball View

Shown here is a picture of the cue ball as seen from the perspective of the player. The ball has a grid drawn on it as a visual aid. When the DigiBall is struck with a cue, the exact tip location of contact is shown as a blue dot. A larger dark circle is also drawn to show the outline of the cue tip diameter. The grid type, cue tip diameter, cue tip curvature radius, as well as the addition of an angle line, can be configured in the Settings page. Optional: For a more precise speed measurement, press and hold the Speed indicator and drag left and right to change the measured distance between the cue ball and object ball (or target).

Spin

The Spin indicator shows the magnitude of the spin applied to the ball at the moment of impact with the cue tip. The unit is measured in Rotations Per Second (RPS).

Tip

The Tip indicator shows the distance that the tip contact point was from the center of the ball. The unit is measured in Percent From Center (PFC) where the percentage is referenced to the ball radius.

Speed

The Speed indicator shows the approximate speed of the ball immediately after contact. The unit is measured in either kilometers per second (km/h), miles per hour (mph) or feet per second (fps). Optional: Optional: For a more precise speed measurement greater than 12km/h (9mph), press and hold the Speed indicator and drag left and right to change the measured distance between the cue ball and object ball (or target).

Time

The Time indicator shows the number of seconds that the DigiBall has remained motionless since it last came to rest. The ball will automatically go to sleep after 5 minutes (300 seconds). This indicator can be changed to a downwards-counting shot clock in the Settings page. This indicator will also change to display the battery status when charging. Optional: Press and hold the Time indicator and drag left and right to select the time of collision of the DigiBall and your target. By default a plot with a blue line shows the change in spin magnitude over time. If the distance has been set with the Speed indicator slider, then a precise speed will be calculated and displayed instead. A vertical red line shows an estimation of when the first collision was detected. Parameters controlling collision detection and data sampling rate can changed in the Settings by Syncing the DigiBall.

Vertical Flip

The DigiBall does its best job to differentiate between top and draw, but occasionally it may make a mistake. Tap this icon to flip the tip contact point vertically.

Save Shot

Tap the checkmark icon save the current shot to History under the current Session. Tap the X icon to save the current shot as a miss to History under the current Session. Tap the trash can icon to remove the shot.

Settings

Sessions
Press Start Session and enter a Category name to group all future shots under, or select a Category name already used. Press End Session when finished. The name of the Category currently open is shown at the bottom of the shooting screen. The Category name can be a person's name, a particular drill, a match, a type of game, or anything else you find helpful to organize your data. If a Session is not open then the data will automatically be saved under the Category name 'Open'.

Share Shot Data
Press the Share Shot Data button to send a copy of your saved shots to another location for your personal analysis or for storage.

Keep Screen Awake
Enable this open to prevent your screen from going into sleep mode. Keeping the screen awake may be required for continuous Bluetooth operation.

Auto Save Every Shot
Automatically save every shot to file. Equivalent to pressing the Success button.

Draw Cue Ball
Show a picture of a cue ball in the ball display view.

Draw Ghost Tip
Draw an outline of the location of the billiards cue tip in the ball display view.

Draw Tip Angle Line
Draw a red line from the center of the ball, and in the direction that the tip contacted the surface of the ball.

Ball Grid
Select the type of grid for the ball display view.

Shot Clock
Select the time limit of the shot clock. The shot clock will begin counting down when the ball is motionless for at least 1 second. If the shot clock is turned off then the time that the ball is motionless in seconds will be displayed instead.

Table Size
Select the size of the table playing surface.

Distance Unit
Select the units used to make distance measurements. Diamonds (D) will depend on the selected table size. Cue Lengths (cl) will depend on the selected cue length.

Speed Unit
Select linear ball speed unit.

Cue Length
Select the length of the billiards cue used.

Tip Curve Radius
Select the curvature radius of the billiards cue tip.

Ball Configuration
The following settings control the properties of the plotted data shown in the Time slider on the Shooting page. These settings must be saved into memory on the DigiBall by performing a Sync gesture (see Appendix A):

- **Resolution**: Choose the resolution of the time series data. Higher resolutions will take longer to load.
- **Show Accel**: Acceleration magnitude time series data will be shown in the time slider view on the Shooting page. This is useful for analyzing collisions and impacts.
- **Delay**: The delay in seconds after the shot that the DigiBall starts monitoring for the first collision. Change to a lower value for break shots.
- **Threshold**: Change the minimum magnitude threshold for auto collision detection.

Product Details

Product	DigiBall Wireless Sensor
Model	170683C
Model Version	A
Power Supply	3.7V lithium-ion battery
Operation Frequency	2.402 – 2.480 GHz
Software Version	Build 61
Hardware Version	170683C
Digital Clock Frequency	32 MHz
Additional information	Bluetooth Low Energy
Trademark	DigiBall
Trademark Ser. No.	US90723805, US90723960
Patent	US11731007B2

Power Consumption

Mode	Current into CPU (mA)	Current out of Battery (mA)
Charging	-	-10.0 max
Waiting for shot / advertising data	0.75	1.6
Processing shot	2.2	3.3
Sleeping	0.017	0.018
Advertising for connection	0.75	0.75
Connected	0.59	0.59
Hold in reset	0.4	-

Labeling and Location

DigiBall
Model: 170683C
FCC ID: 2BP4A-170683C

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
-- Reorient or relocate the receiving antenna.
-- Increase the separation between the equipment and receiver.
-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-- Consult the dealer or an experienced radio/TV technician for help.
This device has been evaluated to meet general RF exposure requirements. This device can be used in portable exposure conditions without restriction.

Figure 1: FCC ID Label

Figure 2: FCC ID Label will be placed on the transmitting product

Appendix A: Configuration Gesture

Perform the following gesture to sync the DigiBall to your device: First, verify that the DigiBall is on and transmitting data. Next, hold the ball in such a way that allows you to partially rotate back and forth while keeping the black dot stationary. Hold the ball still for 3 seconds, and then rotate back and forth 5 times within 3 seconds. A BLE device with “DigiBall” will become available for connection.