GyroUtils and the usage of the android compass

This application requires thehardware compass.

The application uses the built in android compass to change the speed of the game. This is done through a libgdx method called getPitch(), which uses the hardware compass to get the device's orientation around the x-axis. getPitch() returns a float number between -180 and 180, representing the degree of the angle between the native orientation of the device and it's current orientation.

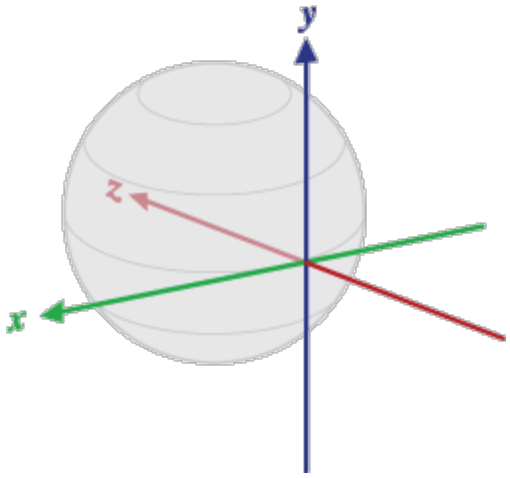

Fig. 1: An illustration, from the libgdx wiki, showing the axis relative to the earth. The same wiki defines the pitch as the angle of the device's orientation around the x-axis. The positive x-axis roughly points to the west and is orthogonal to the z- and y-axis. [1]

The native orientation of the device can either be portrait , most common for smartphones, or landscape, commonly found in tablets. This is important to the application because the native orientation decides which angle is at zero degrees. The getPitch() method is going to return 90.0f when held at its native orientation. Because the application should be runnable on all android devices, the checkDeviceOrientation method was implemented to take a pitch and return it modified as if the device's orientation around the x-axis is zero degrees when held in the landscape orientation.

The application uses the pitch in the gyroSteering method to return a percentage, which is used in InGameController to set change the speed of the game. The change in speed represents the character going downhill or uphill. The maximum change of speed is set to 45 degrees in either direction. The hard limit was implemented to make sure that formula that calculates the speed change never becomes negative, which would make the game go backwards, and to avoid unpleasantries when the device is held upside down.

The value returned by gyroSteering is in the form of **y** = 1 - (**a*****x***0.01). Where **a** is a constant that changes the effect the angle has on the speed and **x** is the angle of the pitch. Because the angle goes positive when going uphill, but the ingame representation of going

uphill is a speed decrease, the expression contains a subtraction. The angle is multiplied with 0.01 to get the change as a percentage.

Gdx.input.isPeripheralAvailable(Peripheral.Compass) returns a boolean that is true if the device has a compass and false if it does. This is used in gyroSteering to avoid complications on devices don't have a compass.

Sources:

1. https://code.google.com/p/libgdx/wiki/InputCompass (131018)