Intermediate

Core Graphics

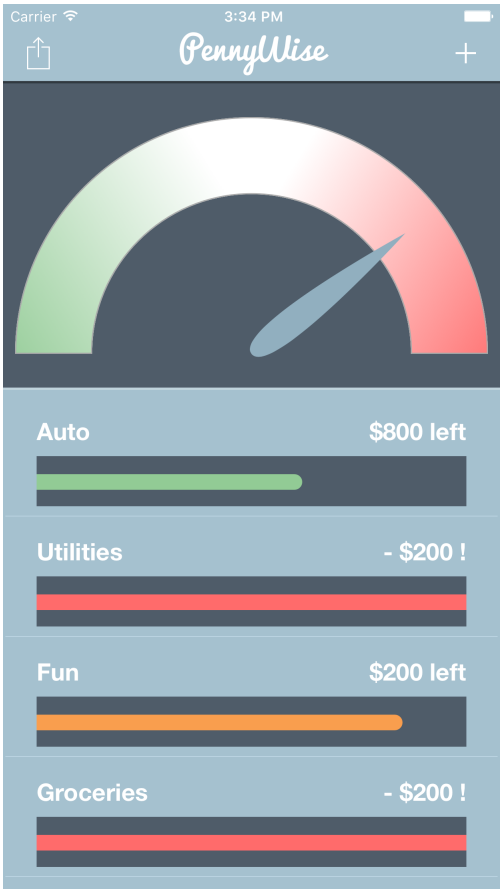
Part 2: Transforms

Core Graphics Hands-On Challenges

Challenge: CALayer Transforms

Transforms are not only for Core Graphics - they're used by views and Core Animation layers too.

In this challenge you're going to rotate the pointer layer for the summary view.



Whenever an expense is made, the pointer will move further around. When your total budget has been spent, the pointer will be all the way to the right.

You're going to set the transform of the pointer to be the correct rotation angle for the amount spent.

`MainViewController` is the delegate for `ExpenseViewController`. Whenever an expense is saved, `MainViewController` executes the delegate method `expenseViewController(_:didExpenseCategory:amount:)`. This saves the expense and calls `calculateBudget()` to update the budget.

`calculateBudget()` then updates `SummaryView`'s `percentSpent` property.

Whenever `percentSpent` changes, you will call a method to rotate the pointer.

In `SummaryView`, create a method:

```
func rotatePointer() {
}
```

Change the class property from:

```
var percentSpent:Float = 0
```

to

```
var percentSpent:Float = 0.5 {
  didSet {
  rotatePointer()
  }
}
```

Now every time that `percentSpent` is updated, `rotatePointer()` will be called.

In `rotatePointer()`, add:

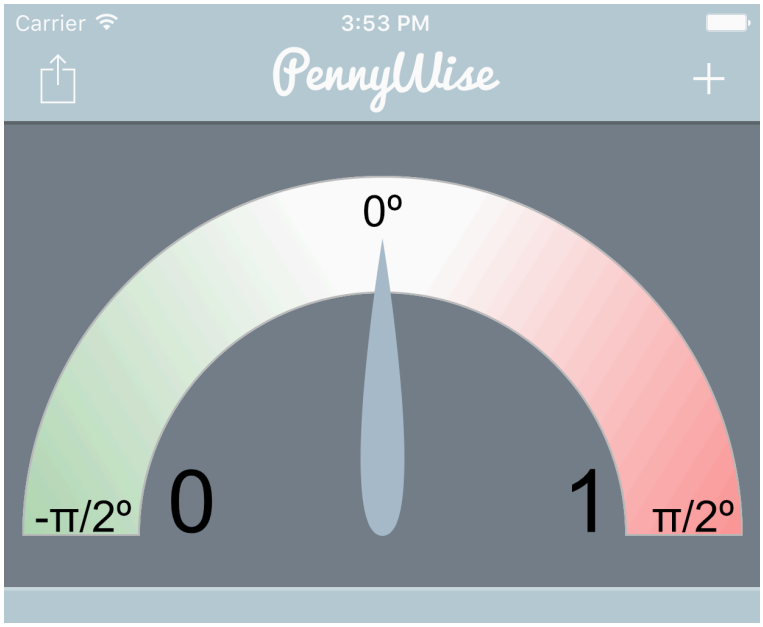
```
if percentSpent > 1 {
  percentSpent = 1
}
```

`percentSpent` is a value between 0 and 1. When `percentSpent` is 1, the pointer will point furthest to the right. You never want it to be more than 1 even if the budget has blown out.

Now to work out the rotation.

When the pointer layer is in its default position, the rotation angle is 0º, pointing straight up. When the pointer layer is pointing to the right, it will be 90º, and when pointing to the left, -90º. So when the percent spent value is 0, the rotation angle will be -90º and when the percent spent is 1, the rotation angle will be 90º.

The radian equivalent of 90º is π/2.



So taking that into account, this is the rotation calculation for the transform. (Remember, it's option+P to type π.)

```
let transform = CGAffineTransformMakeRotation(-π/2 + π *
                                    CGFloat(percentSpent))
```

This creates a CGAffineTransform variable with the calculated rotation angle.

Assign it to the layer's transform:

```
pointerLayer.setAffineTransform(transform)
```

Run the app, try putting in various expenses and see the pointer move. Because layers have built in animation, the rotation of the pointer is even animated for free.