

MotionLayout

What is MotionLayout?

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- A layout to animate views and transition between layout states

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- Fully declarative

What is MotionLayout?

- Part of ConstraintLayout 2.0, introduced at Google I/O 2018
- A ConstraintLayout subclass to animate views and transition between layout states
 - Transitions driven by constraint sets
- Fully declarative – transition states in XML, no code required

MotionLayout

`<View>`

MotionLayout

<View>

res/layout/... xml

MotionScene

MotionLayout

<View>

res/layout/ ...

res/xml/ ...

MotionLayout

<View>

res/layout/ ...

MotionScene

<ConstraintSet>

<ConstraintSet>

res/xml/ ...

MotionLayout

<View>

res/layout/ ...

MotionScene

<ConstraintSet>

<ConstraintSet>

<OnTouch>

res/xml/ ...

MotionLayout

<View>

res/layout/ ...

MotionScene

<ConstraintSet>

<ConstraintSet>

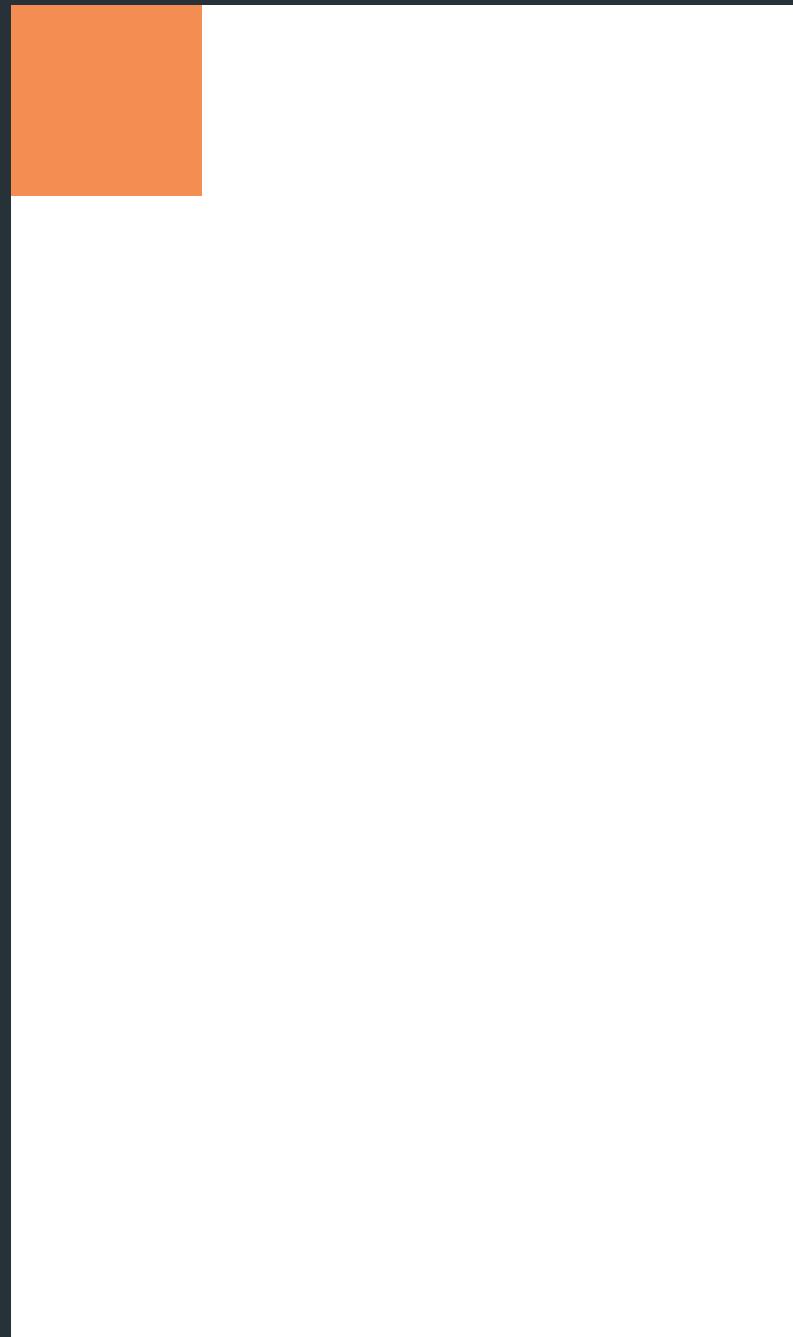
<OnTouch>

<OnSwipe>

res/xml/ ...

Layout XML

```
<android.support.constraint.ConstraintLayout  
    android:id="@+id/motionLayout"  
    android:layout_width="match_parent"  
    android:layout_height="match_parent">  
  
<View  
    android:id="@+id/square"  
    android:background="@color/colorAccent"  
    android:layout_width="64dp"  
    android:layout_height="64dp" />  
  
</android.support.constraint.ConstraintLayout>
```



Layout XML

```
<android.support.constraint.motion.MotionLayout  
    android:id="@+id/motionLayout"  
    app:layoutDescription="@xml/motion_scene"  
    android:layout_width="match_parent"  
    android:layout_height="match_parent">  
  
    <View  
        android:id="@+id/square"  
        android:background="@color/colorAccent"  
        android:layout_width="64dp"  
        android:layout_height="64dp" />  
  
</android.support.constraint.motion.MotionLayout>
```

Layout XML

```
<android.support.constraint.motion.MotionLayout  
    android:id="@+id/motionLayout"  
    app:layoutDescription="@xml/motion_scene"  
    android:layout_width="match_parent"  
    android:layout_height="match_parent">  
  
<View  
    android:id="@+id/square"  
    android:background="@color/colorAccent"  
    android:layout_width="64dp"  
    android:layout_height="64dp" />  
  
</android.support.constraint.motion.MotionLayout>
```

Motion Scene XML

<MotionScene>

</MotionScene>

Motion Scene XML

```
<MotionScene>
    <ConstraintSet
        android:id="@+id/start">
    </ConstraintSet>

    <ConstraintSet
        android:id="@+id/end">
    </ConstraintSet>
</MotionScene>
```

Motion Scene XML

```
<MotionScene>
    <ConstraintSet
        android:id="@+id/start">
        <Constraint
            android:id="@+id/square"
            motion:layout_constraintStart_toStartOf="parent"
            motion:layout_constraintEnd_toEndOf="parent"/>
    </ConstraintSet>

    <ConstraintSet
        android:id="@+id/end">
        <Constraint
            android:id="@+id/square"
            motion:layout_constraintStart_toStartOf="parent"
            motion:layout_constraintEnd_toEndOf="parent"/>
    </ConstraintSet>
</MotionScene>
```

Motion Scene XML

```
<MotionScene>
    <ConstraintSet
        android:id="@+id/start">
        <Constraint
            android:id="@+id/square"
            motion:layout_constraintStart_toStartOf="parent"
            motion:layout_constraintEnd_toEndOf="parent"/>
    </ConstraintSet>

    <ConstraintSet
        android:id="@+id/end">
        <Constraint
            android:id="@+id/square"
            motion:layout_constraintStart_toStartOf="parent"
            motion:layout_constraintEnd_toEndOf="parent"/>
    </ConstraintSet>
</MotionScene>
```



Motion Scene XML

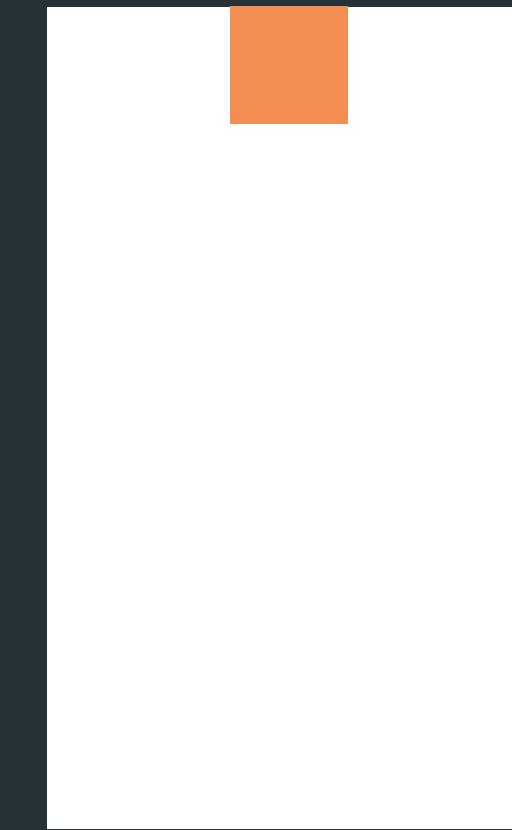
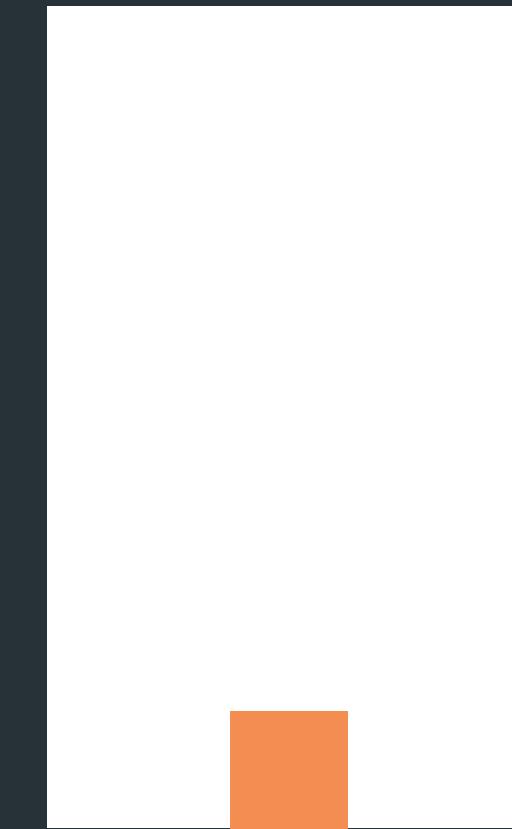
```
<MotionScene>
    <ConstraintSet
        android:id="@+id/start">
        <Constraint
            android:id="@+id/square"
            ...
            motion:layout_constraintBottom_toBottomOf="parent"/>
    </ConstraintSet>

    <ConstraintSet
        android:id="@+id/end">
        <Constraint
            android:id="@+id/square"
            ...
            motion:layout_constraintTop_toTopOf="parent"/>
    </ConstraintSet>
</MotionScene>
```

Motion Scene XML

```
<MotionScene>
    <ConstraintSet
        android:id="@+id/start">
        <Constraint
            android:id="@+id/square"
            ...
            motion:layout_constraintBottom_toBottomOf="parent" />
    </ConstraintSet>

    <ConstraintSet
        android:id="@+id/end">
        <Constraint
            android:id="@+id/square"
            ...
            motion:layout_constraintTop_toTopOf="parent" />
    </ConstraintSet>
</MotionScene>
```



Motion Scene XML

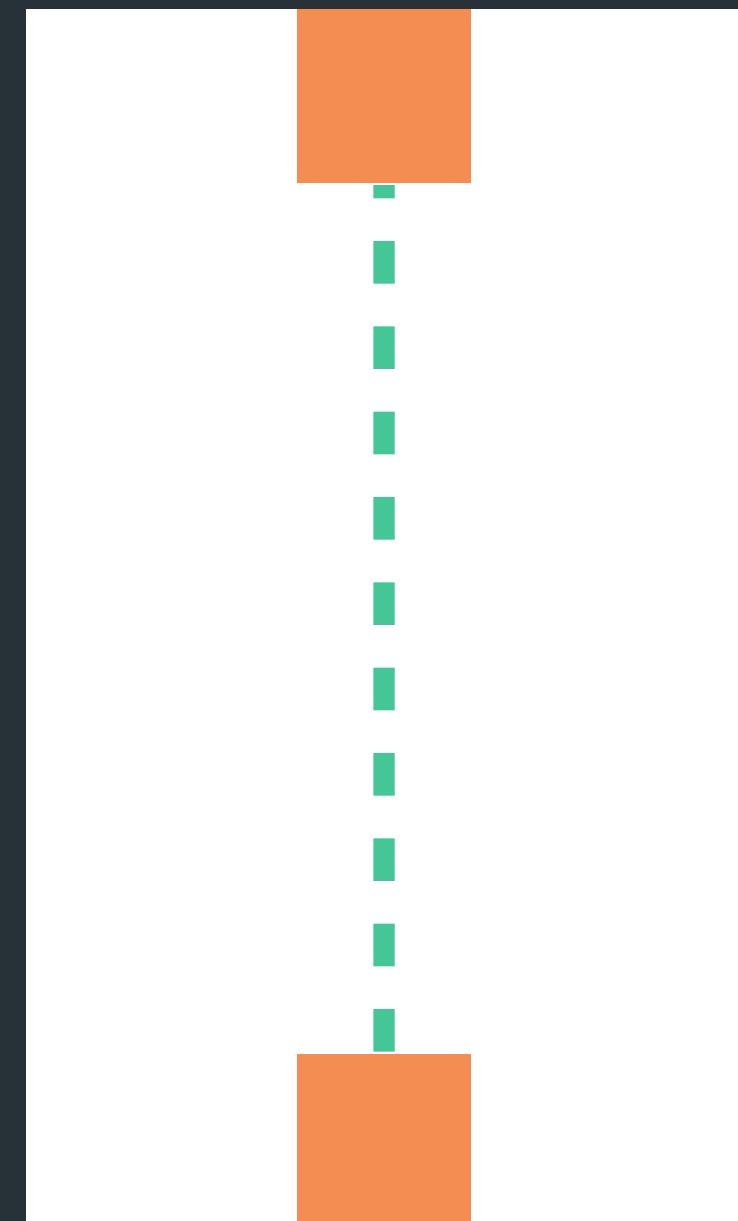
```
<MotionScene>
    <Transition
        motion:constraintSetStart="@+id/start"
        motion:constraintSetEnd="@+id/end"
        motion:duration="1000"
        motion:interpolator="easeInOut">
    </Transition>

    <ConstraintSet
        android:id="@+id/start">
        <Constraint
            . . .>
    </ConstraintSet>
    <ConstraintSet
        android:id="@+id/end">
        <Constraint
            . . .>
    </ConstraintSet>
</MotionScene>
```

Motion Scene XML

```
<MotionScene>
    <Transition
        motion:constraintSetStart="@+id/start"
        motion:constraintSetEnd="@+id/end"
        motion:duration="1000"
        motion:interpolator="easeInOut">
    </Transition>

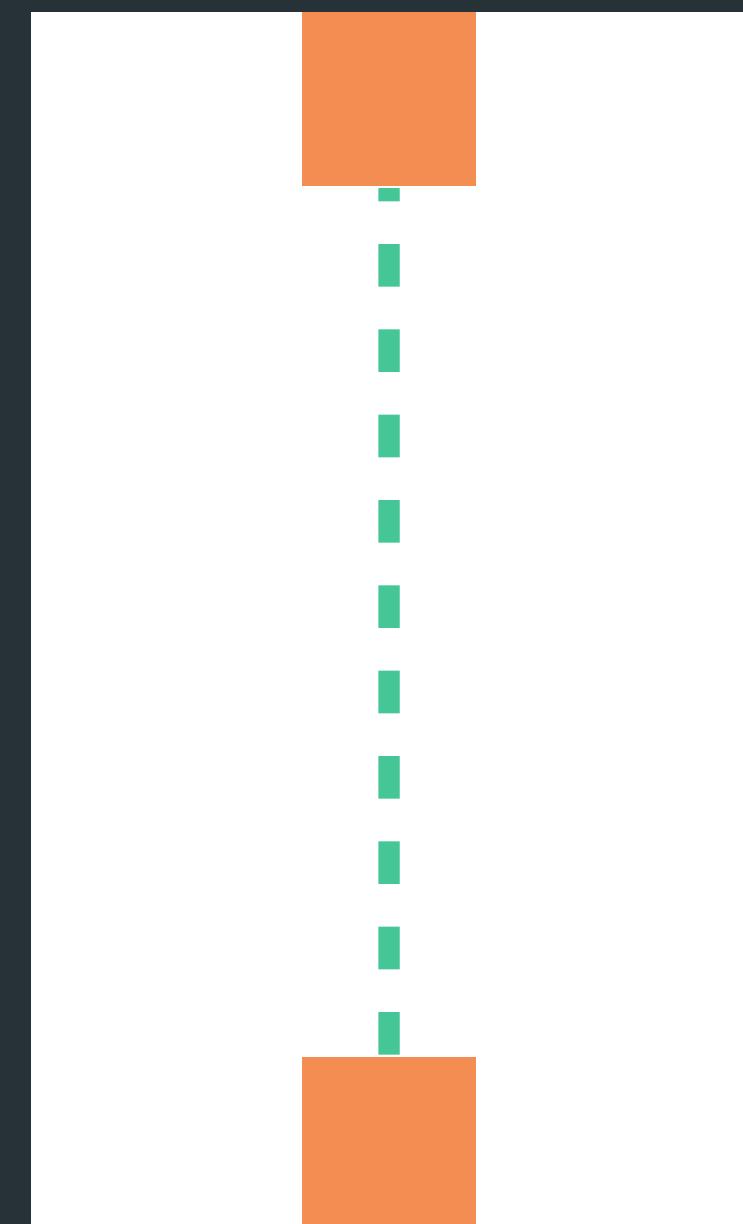
    <ConstraintSet
        android:id="@+id/start">
        <Constraint
            . . .>
    </ConstraintSet>
    <ConstraintSet
        android:id="@+id/end">
        <Constraint
            . . .>
    </ConstraintSet>
</MotionScene>
```



Motion Scene XML

```
<MotionScene>
    <Transition
        motion:constraintSetStart="@+id/start"
        motion:constraintSetEnd="@+id/end"
        motion:duration="1000"
        motion:interpolator="easeInOut">
    </Transition>

    <ConstraintSet
        android:id="@+id/start">
        <Constraint
            . . .>
    </ConstraintSet>
    <ConstraintSet
        android:id="@+id/end">
        <Constraint
            . . .>
    </ConstraintSet>
</MotionScene>
```



1 second

Triggers

Triggers

`motionLayout.transitionToStart()`

Triggers

`motionLayout.transitionToStart()`

`motionLayout.transitionToEnd()`

Triggers

```
motionLayout.transitionToStart()
```

```
motionLayout.transitionToEnd()
```

```
motionLayout.setProgress(1) // Or any value 0..1
```

Triggers

```
motionLayout.transitionToStart()
```

```
motionLayout.transitionToEnd()
```

```
motionLayout.setProgress(1) // Or any value 0..1
```

```
motionLayout.setTransition(R.id.start, R.id.end)
```

Triggers

Triggers

// Transition from a closed start, to a half_open end

Triggers

```
// Transition from a closed start, to a half_open end  
motionLayout.setTransition(R.id.closed, R.id.half_open)
```

Triggers

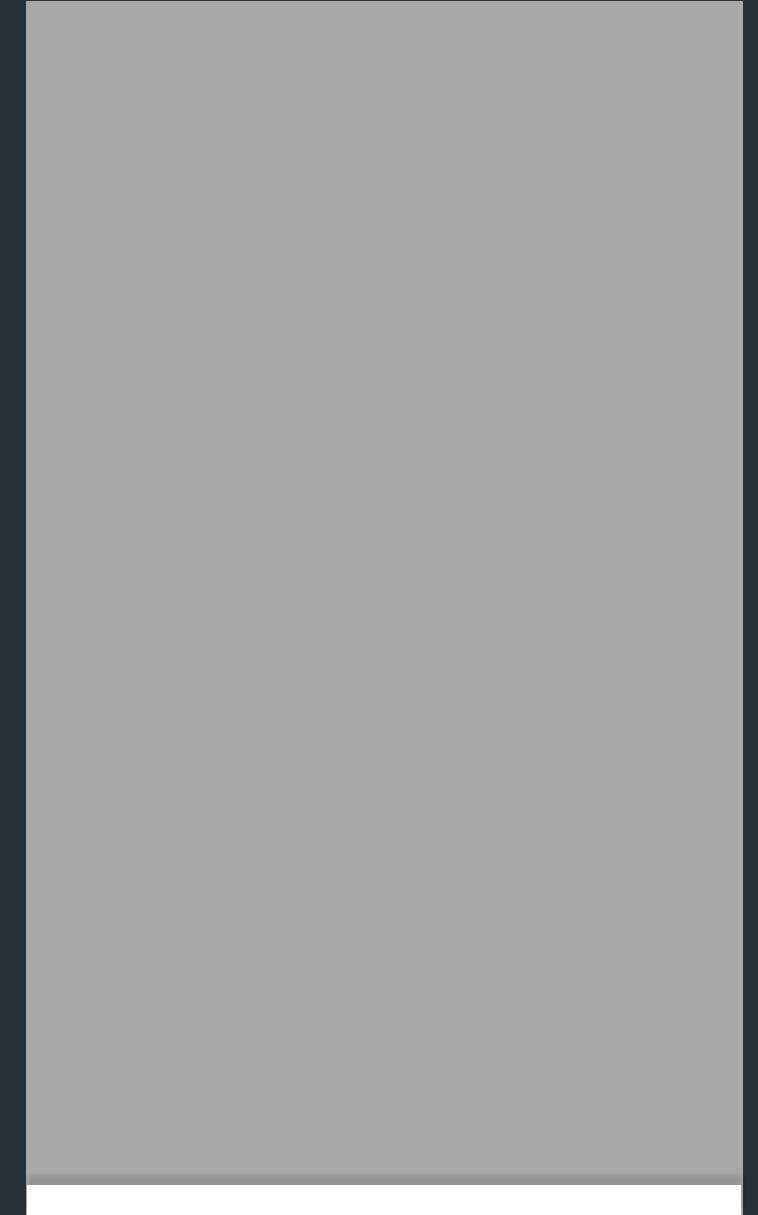
```
// Transition from a closed start, to a half_open end  
motionLayout.setTransition(R.id.closed, R.id.half_open)  
motionLayout.transitionToEnd()
```

Triggers

```
// Transition from a closed start, to a half_open end  
motionLayout.setTransition(R.id.closed, R.id.half_open)  
motionLayout.transitionToEnd()
```

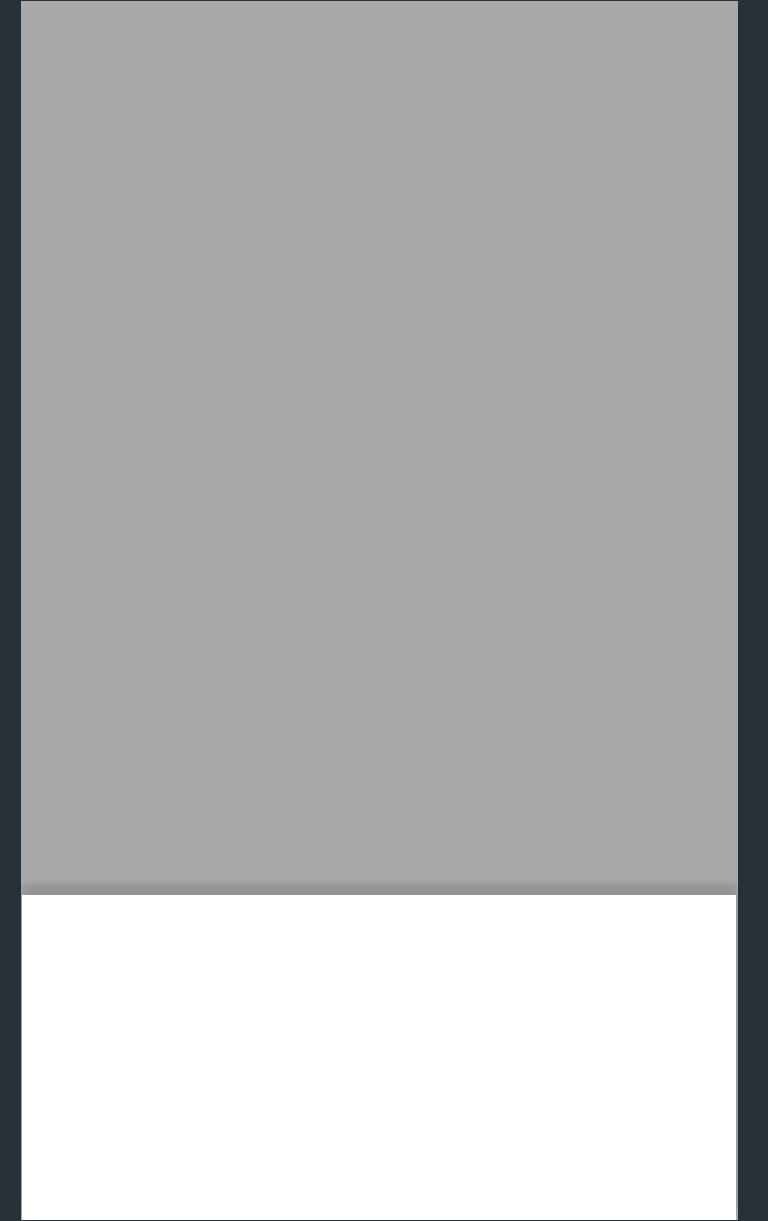
Triggers

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// Transition from a closed start, to a half_open end  
motionLayout.setTransition(R.id.closed, R.id.half_open)  
motionLayout.transitionToEnd()
```



Triggers

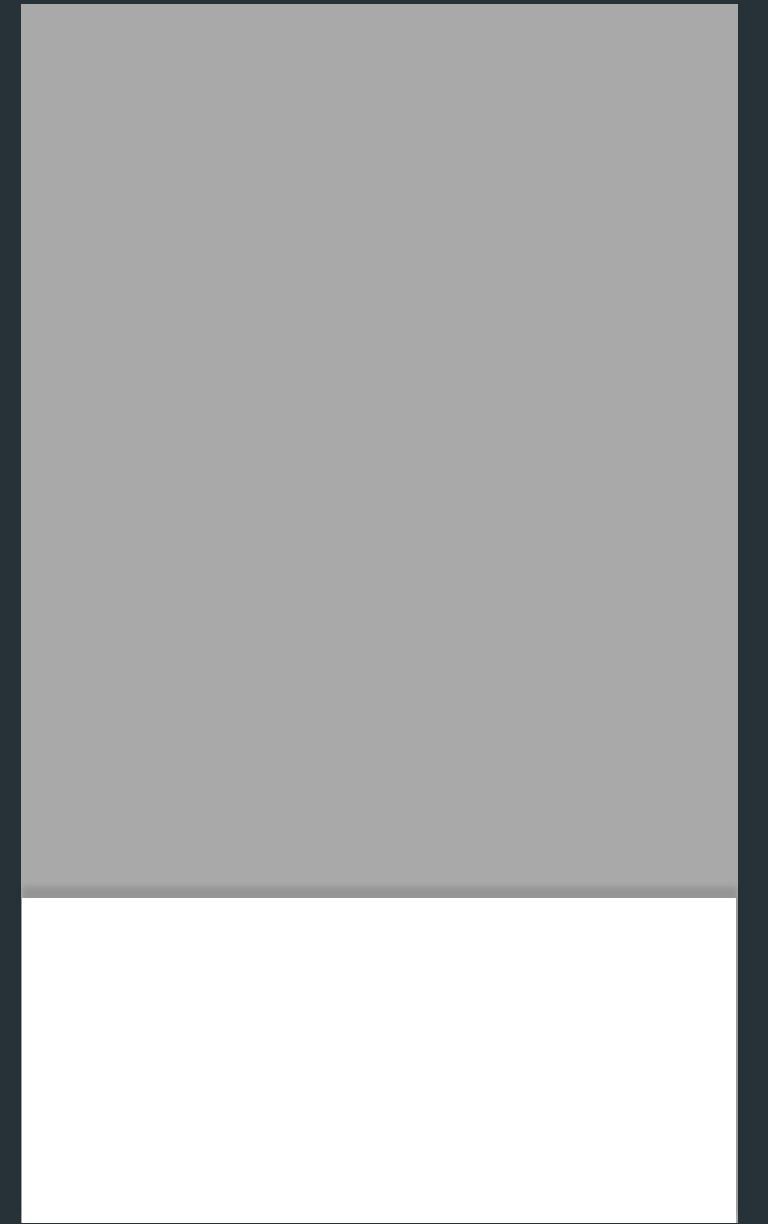
```
// Transition from a closed start, to a half_open end  
motionLayout.setTransition(R.id.closed, R.id.half_open)  
motionLayout.transitionToEnd()
```



Triggers

```
// Transition from a closed start, to a half_open end  
motionLayout.setTransition(R.id.closed, R.id.half_open)  
motionLayout.transitionToEnd()
```

```
// Later...
```



Triggers

```
// Transition from a closed start, to a half_open end  
motionLayout.setTransition(R.id.closed, R.id.half_open)  
motionLayout.transitionToEnd()
```

```
// Later...  
motionLayout.setTransition(R.id.half_open, R.id.open)
```

Triggers

```
// Transition from a closed start, to a half_open end  
motionLayout.setTransition(R.id.closed, R.id.half_open)  
motionLayout.transitionToEnd()
```

```
// Later...  
motionLayout.setTransition(R.id.half_open, R.id.open)  
motionLayout.transitionToEnd()
```

Triggers

```
// Transition from a closed start, to a half_open end  
motionLayout.setTransition(R.id.closed, R.id.half_open)  
motionLayout.transitionToEnd()
```

```
// Later...  
motionLayout.setTransition(R.id.half_open, R.id.open)  
motionLayout.transitionToEnd()
```

```
// Or...
```

Triggers

```
// Transition from a closed start, to a half_open end  
motionLayout.setTransition(R.id.closed, R.id.half_open)  
motionLayout.transitionToEnd()
```

```
// Later...  
motionLayout.setTransition(R.id.half_open, R.id.open)  
motionLayout.transitionToEnd()
```

```
// Or...  
motionLayout.setTransition(R.id.half_open, R.id.closed)
```

Triggers

```
// Transition from a closed start, to a half_open end  
motionLayout.setTransition(R.id.closed, R.id.half_open)  
motionLayout.transitionToEnd()
```

```
// Later...  
motionLayout.setTransition(R.id.half_open, R.id.open)  
motionLayout.transitionToEnd()
```

```
// Or...  
motionLayout.setTransition(R.id.half_open, R.id.closed)  
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// Transition from a closed start, to a half_open end  
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```

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motionLayout.setTransition(R.id.half_open, R.id.open)  
motionLayout.transitionToEnd()
```

```
// Or...
```

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```
// Transition from a closed start, to a half_open end  
motionLayout.setTransition(R.id.closed, R.id.half_open)  
motionLayout.transitionToEnd()
```

```
// Later...  
motionLayout.setTransition(R.id.half_open, R.id.open)  
motionLayout.transitionToEnd()
```

```
// Or...  
motionLayout.setTransition(R.id.half_open, R.id.closed)
```

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```
// Transition from a closed start, to a half_open end  
motionLayout.setTransition(R.id.closed, R.id.half_open)  
motionLayout.transitionToEnd()
```

```
// Later...  
motionLayout.setTransition(R.id.half_open, R.id.open)  
motionLayout.transitionToEnd()
```

```
// Or...  
motionLayout.setTransition(R.id.half_open, R.id.closed)  
motionLayout.transitionToEnd()
```

Triggers: Motion Scene XML

```
<MotionScene>
    <Transition
        motion:constraintSetStart="@+id/start"
        motion:constraintSetEnd="@+id/end"
        motion:duration="1000"
        motion:interpolator="easeInOut">
    </Transition>

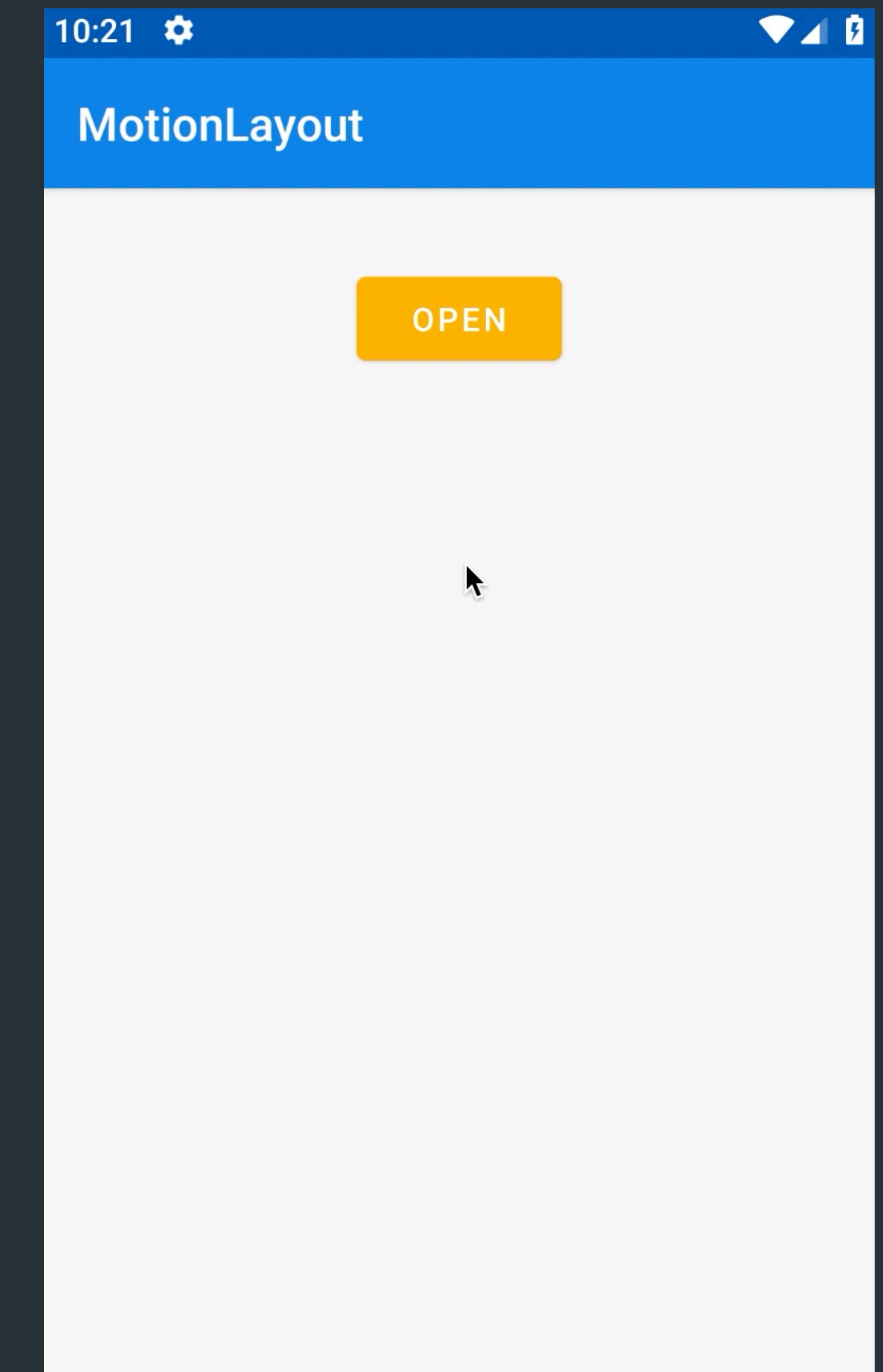
    <ConstraintSet />
    <ConstraintSet />
</MotionScene>
```

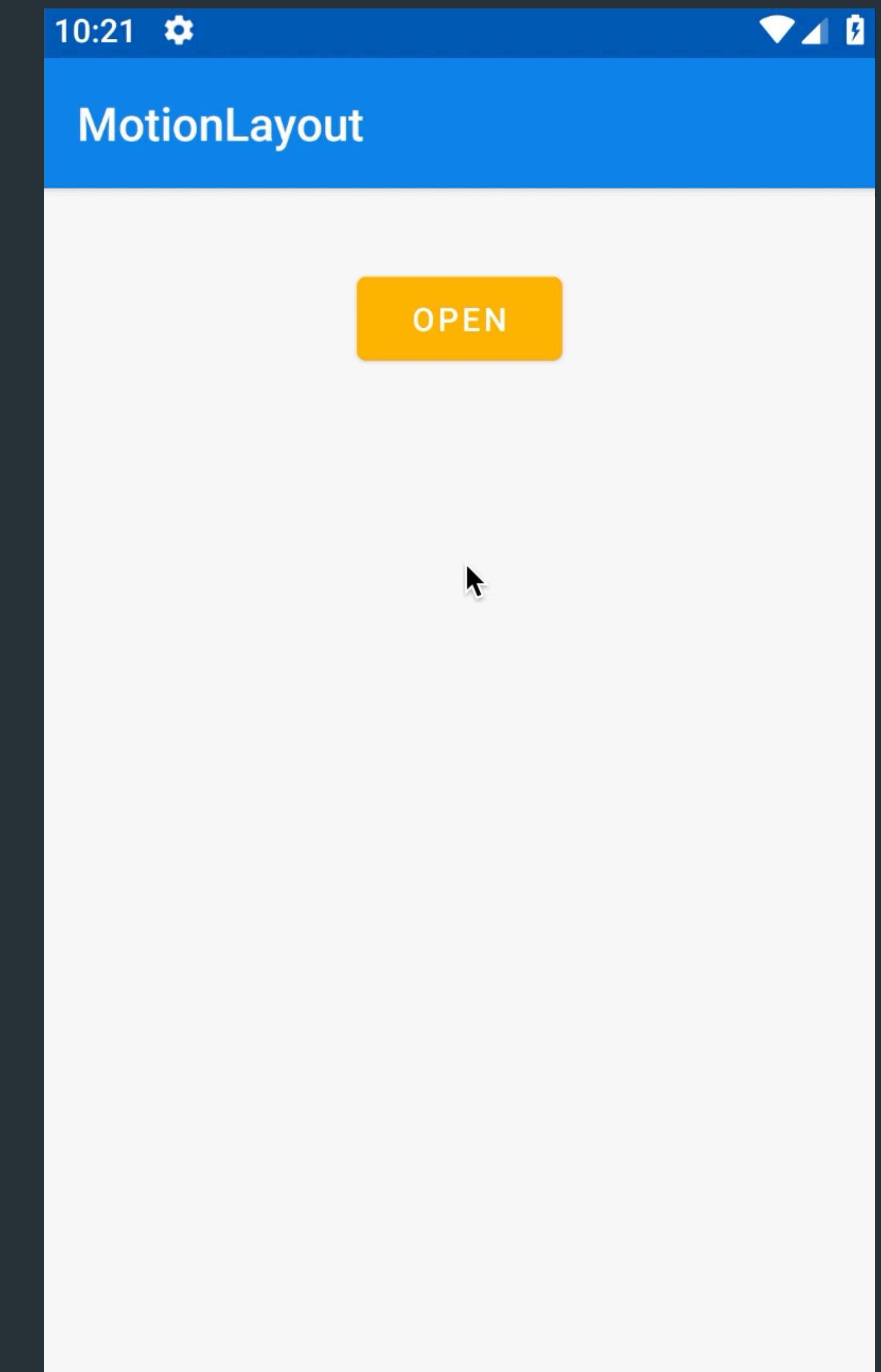
Triggers: Motion Scene XML

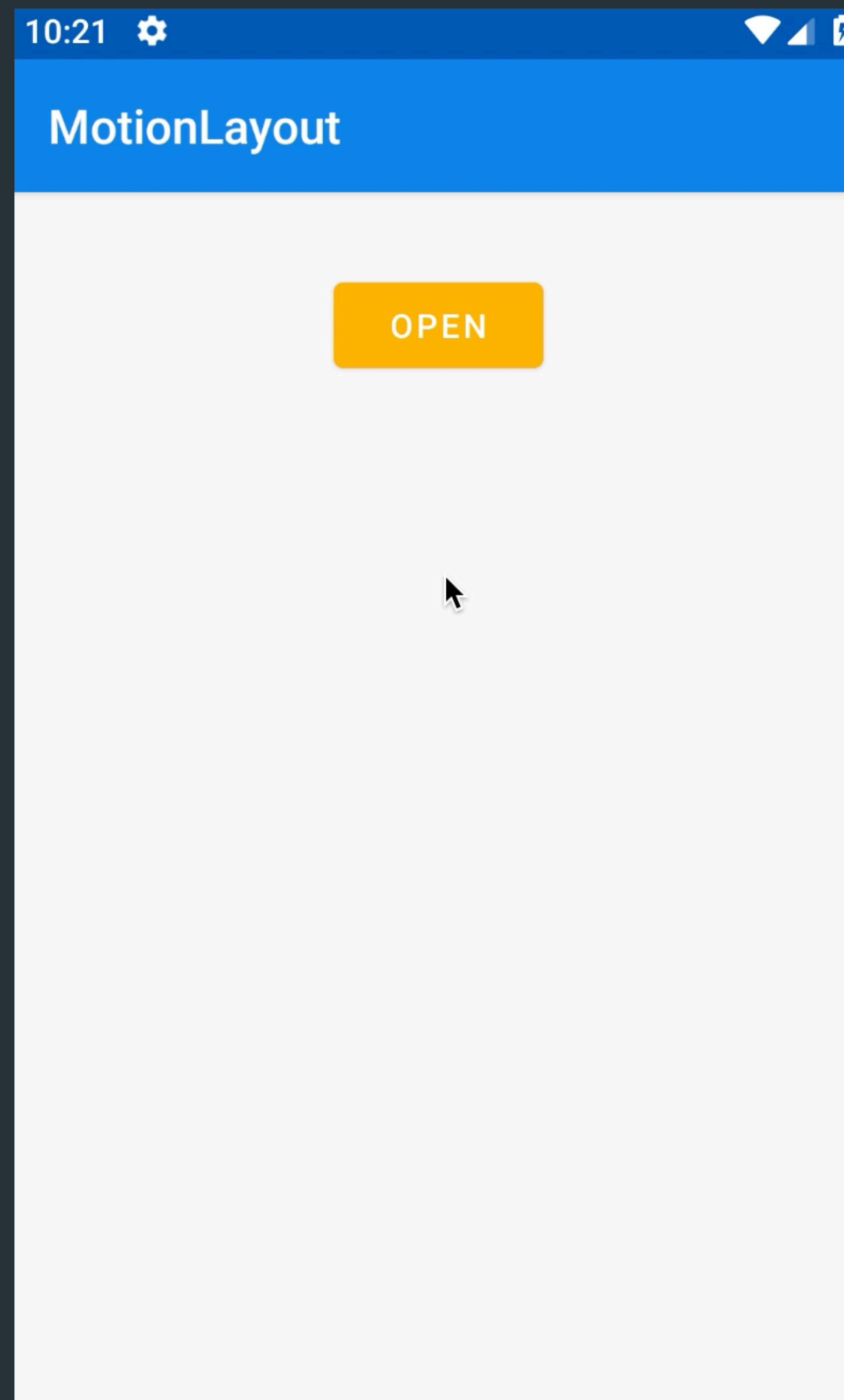
```
<MotionScene>
    <Transition
        motion:constraintSetStart="@+id/start"
        motion:constraintSetEnd="@+id/end"
        motion:duration="1000"
        motion:interpolator="easeInOut">
        <OnSwipe
            motion:touchAnchorId="@+id/square"
            motion:touchAnchorSide="top"
            motion:dragDirection="dragUp" />

        <OnClick
            motion:target="@+id/a_different_button"
            motion:mode="toggle" />
    </Transition>

    <ConstraintSet />
    <ConstraintSet />
</MotionScene>
```





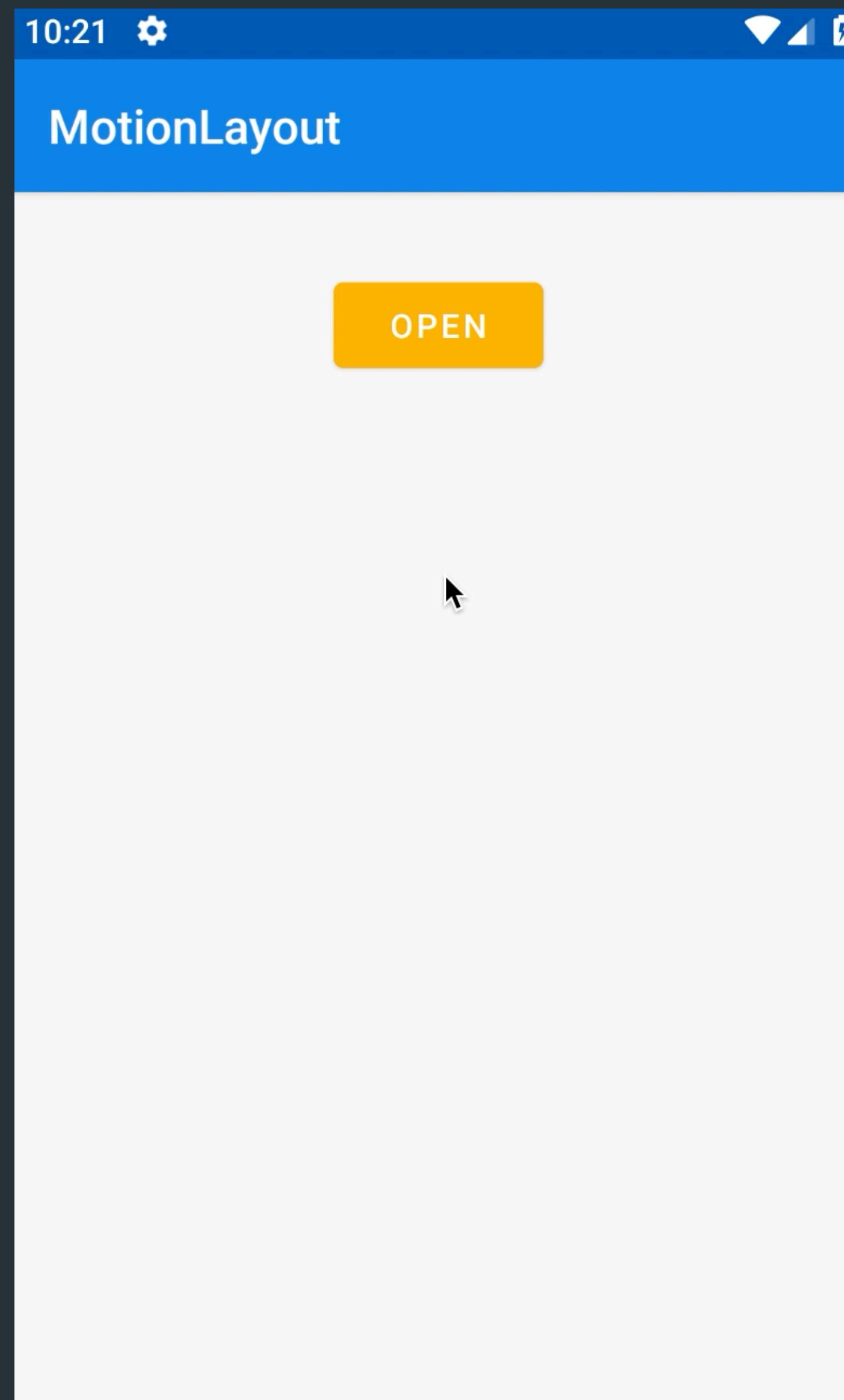


Layout XML

```
<android.support.constraint.motion.MotionLayout>
    <!-- Toggle button -->
    <Button
        android:id="@+id/toggle_button" />

    <!-- Dark overlay view, covering the layout -->
    <View
        android:id="@+id/overlay"
        android:background="#000"
        ... />

    <!-- Bottom drawer sheet -->
    <LinearLayout
        android:id="@+id/bottom_sheet">
        ...
    </LinearLayout>
</android.support.constraint.motion.MotionLayout>
```



Layout XML

```
<android.support.constraint.motion.MotionLayout>
    <!-- Toggle button -->
    <Button
        android:id="@+id/toggle_button" />

    <!-- Dark overlay view, covering the layout -->
    <View
        android:id="@+id/overlay"
        android:background="#000"
        ... />

    <!-- Bottom drawer sheet -->
    <LinearLayout
        android:id="@+id/bottom_sheet">
        ...
    </LinearLayout>
</android.support.constraint.motion.MotionLayout>
```

Motion Scene XML

```
<MotionScene>
    <Transition
        motion:constraintSetStart="@+id/sheet_collapsed"
        motion:constraintSetEnd="@+id/sheet_expanded"
        motion:duration="@android:integer/config_shortAnimTime"
        motion:interpolator="easeInOut">
        <OnSwipe
            motion:touchAnchorId="@+id/bottom_sheet_content"
            motion:dragDirection="dragUp" />

        <OnClick
            motion:target="@+id/toggle_button"
            motion:mode="toggle" />
    </Transition>

    <ConstraintSet android:id="@+id/sheet_collapsed">
        <Constraint
            android:id="@+id/overlay"
            android:alpha="0.0" />
        <Constraint
            android:id="@+id/bottom_sheet_content"
            motion:layout_constraintTop_toBottomOf="parent"/>
    </ConstraintSet>

    <ConstraintSet android:id="@+id/sheet_expanded">
        <Constraint
            android:id="@+id/overlay"
            android:alpha="0.24" />
        <Constraint
            android:id="@+id/bottom_sheet_content"
            motion:layout_constraintBottom_toBottomOf="parent" />
    </ConstraintSet>
</MotionScene>
```

Motion Scene XML

```
<MotionScene>
    <Transition
        motion:constraintSetStart="@+id/sheet_collapsed"
        motion:constraintSetEnd="@+id/sheet_expanded"
        motion:duration="@android:integer/config_shortAnimTime"
        motion:interpolator="easeInOut">
        <OnSwipe
            motion:touchAnchorId="@+id/bottom_sheet_content"
            motion:dragDirection="dragUp" />

        <OnClick
            motion:target="@+id/toggle_button"
            motion:mode="toggle" />
    </Transition>

    <ConstraintSet android:id="@+id/sheet_collapsed">
        <Constraint
            android:id="@+id/overlay"
            android:alpha="0.0" />
        <Constraint
            android:id="@+id/bottom_sheet_content"
            motion:layout_constraintTop_toBottomOf="parent"/>
    </ConstraintSet>

    <ConstraintSet android:id="@+id/sheet_expanded">
        <Constraint
            android:id="@+id/overlay"
            android:alpha="0.24" />
        <Constraint
            android:id="@+id/bottom_sheet_content"
            motion:layout_constraintBottom_toBottomOf="parent" />
    </ConstraintSet>
</MotionScene>
```

Motion Scene XML

```
<MotionScene>
    <Transition
        . . .
        <OnSwipe
            . . . />

        <OnClick
            . . . />
    </Transition>

    <ConstraintSet android:id="@+id/sheet_collapsed">
        <Constraint
            android:id="@+id/overlay"
            android:alpha="0.0" />
        <Constraint
            android:id="@+id/bottom_sheet_content"
            motion:layout_constraintTop_toBottomOf="parent" />
    </ConstraintSet>

    <ConstraintSet android:id="@+id/sheet_expanded">
        <Constraint
            android:id="@+id/overlay"
            android:alpha="0.24" />
        <Constraint
            android:id="@+id/bottom_sheet_content"
            motion:layout_constraintBottom_toBottomOf="parent" />
    </ConstraintSet>
</MotionScene>
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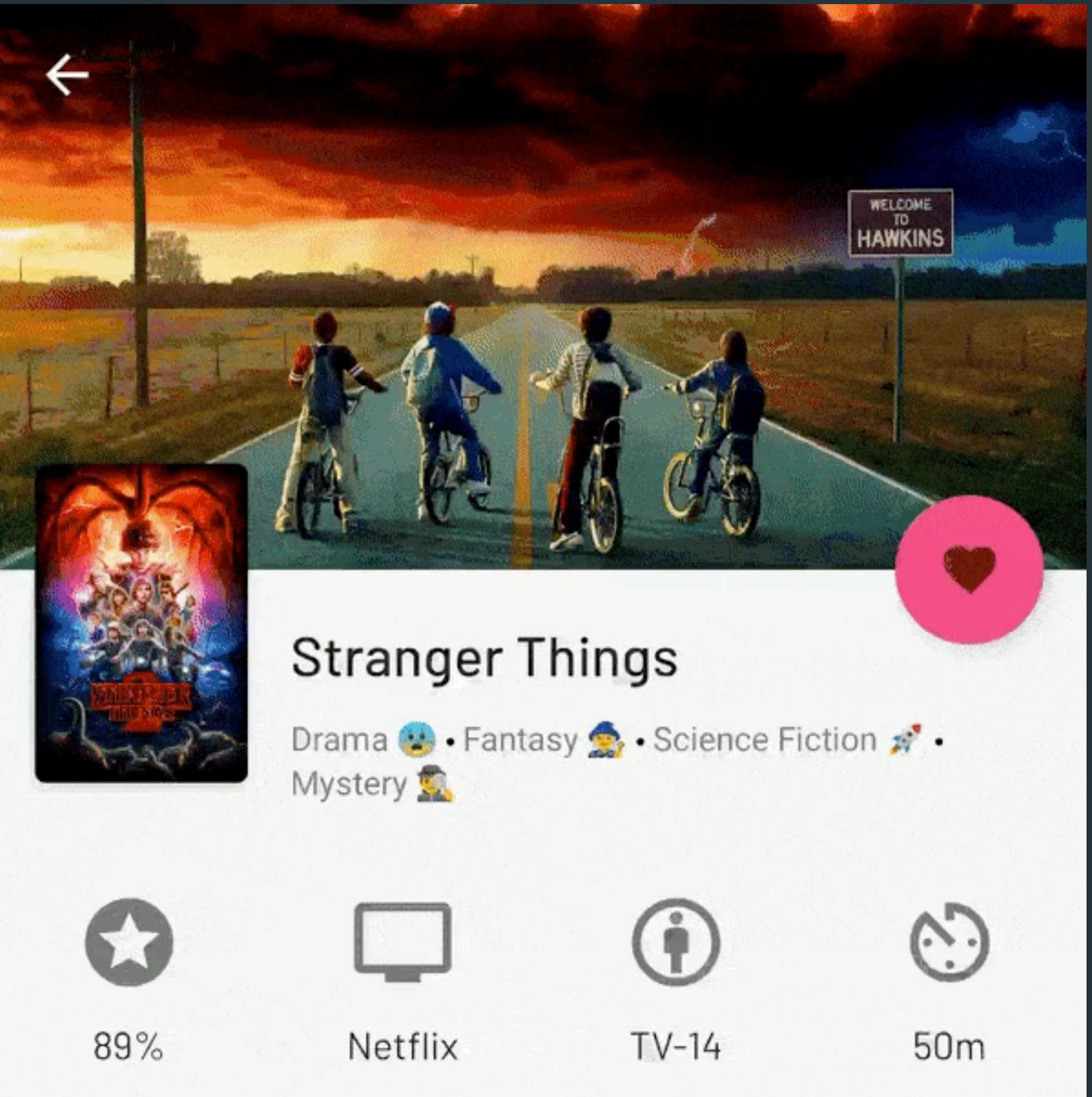
Motion Scene XML

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<MotionScene>
    <Transition
        motion:constraintSetStart="@+id/sheet_collapsed"
        motion:constraintSetEnd="@+id/sheet_expanded"
        motion:duration="@android:integer/config_shortAnimTime"
        motion:interpolator="easeInOut">
        <OnSwipe
            motion:touchAnchorId="@+id/bottom_sheet_content"
            motion:dragDirection="dragUp" />

        <OnClick
            motion:target="@+id/toggle_button"
            motion:mode="toggle" />
    </Transition>

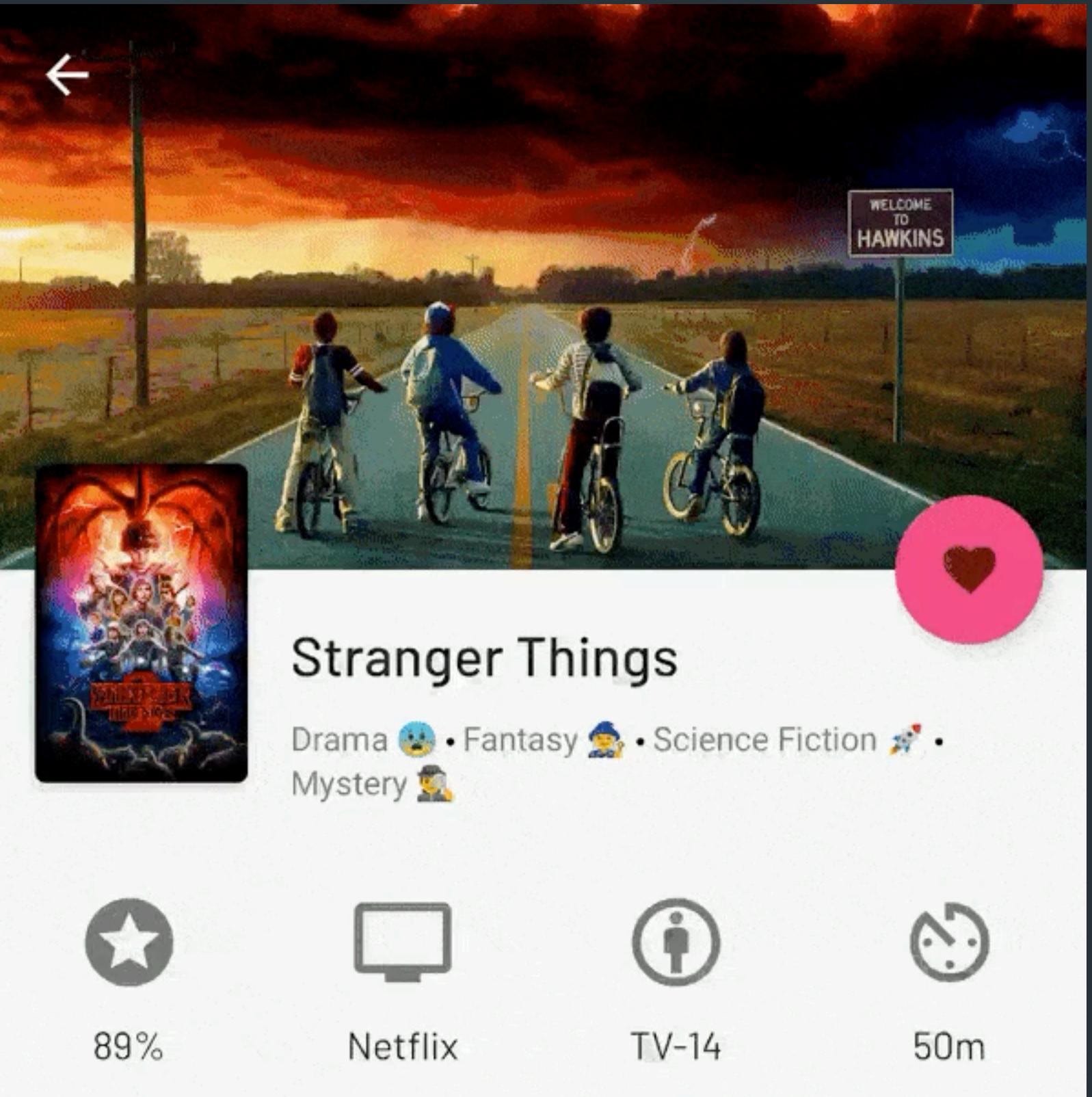
    <ConstraintSet android:id="@+id/sheet_collapsed">
        <Constraint
            android:id="@+id/overlay"
            android:alpha="0.0" />
        <Constraint
            android:id="@+id/bottom_sheet_content"
            motion:layout_constraintTop_toBottomOf="parent"/>
    </ConstraintSet>

    <ConstraintSet android:id="@+id/sheet_expanded">
        <Constraint
            android:id="@+id/overlay"
            android:alpha="0.24" />
        <Constraint
            android:id="@+id/bottom_sheet_content"
            motion:layout_constraintBottom_toBottomOf="parent" />
    </ConstraintSet>
</MotionScene>
```



@ChrisBanes

<https://twitter.com/chrisbanes/status/1029619278863945728?lang=en>

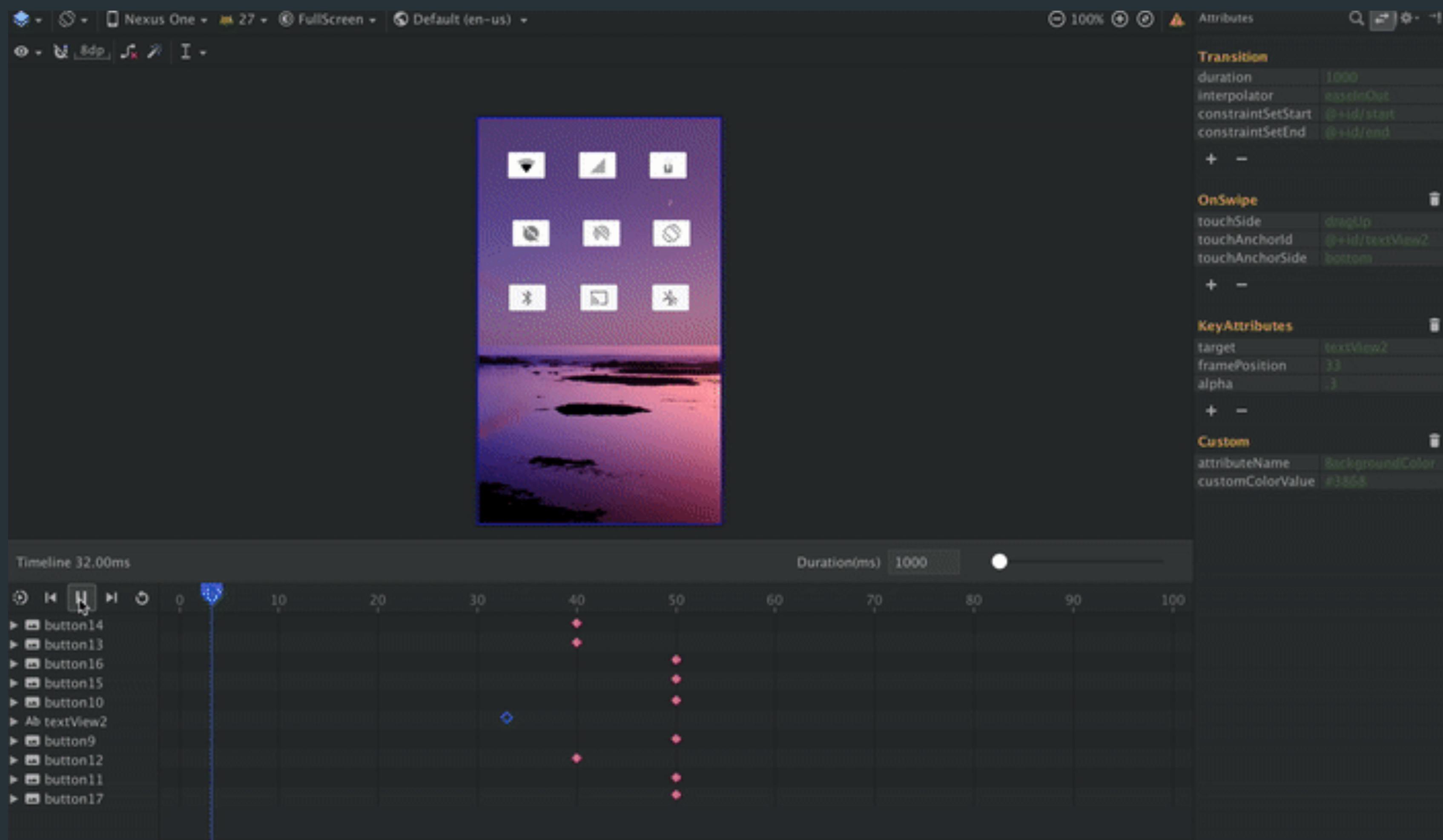


@ChrisBanes

<https://twitter.com/chrisbanes/status/1029619278863945728?lang=en>

Android Studio Motion Editor

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While we are actively working on this tool, it's not available yet.
It will likely be available once the library reaches stable / beta.

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–Introduction to MotionLayout (Part I), Google Developers

Limitations

Limitations

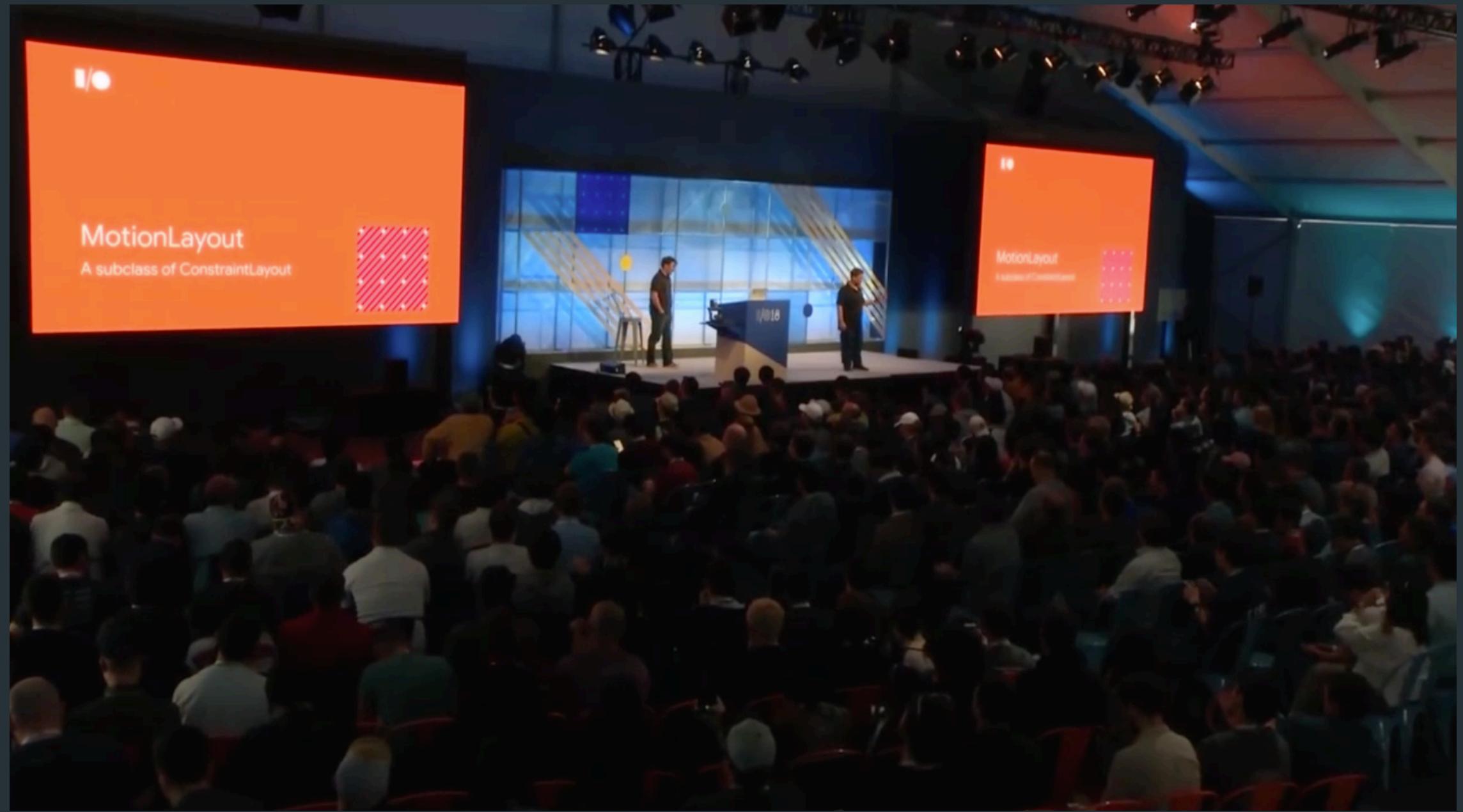
- Direct children only – no nested layout descendant

Limitations

- Direct children only – no nested layout descendent
- 1 OnSwipe & 1 OnClick transition listener out of the box

Limitations

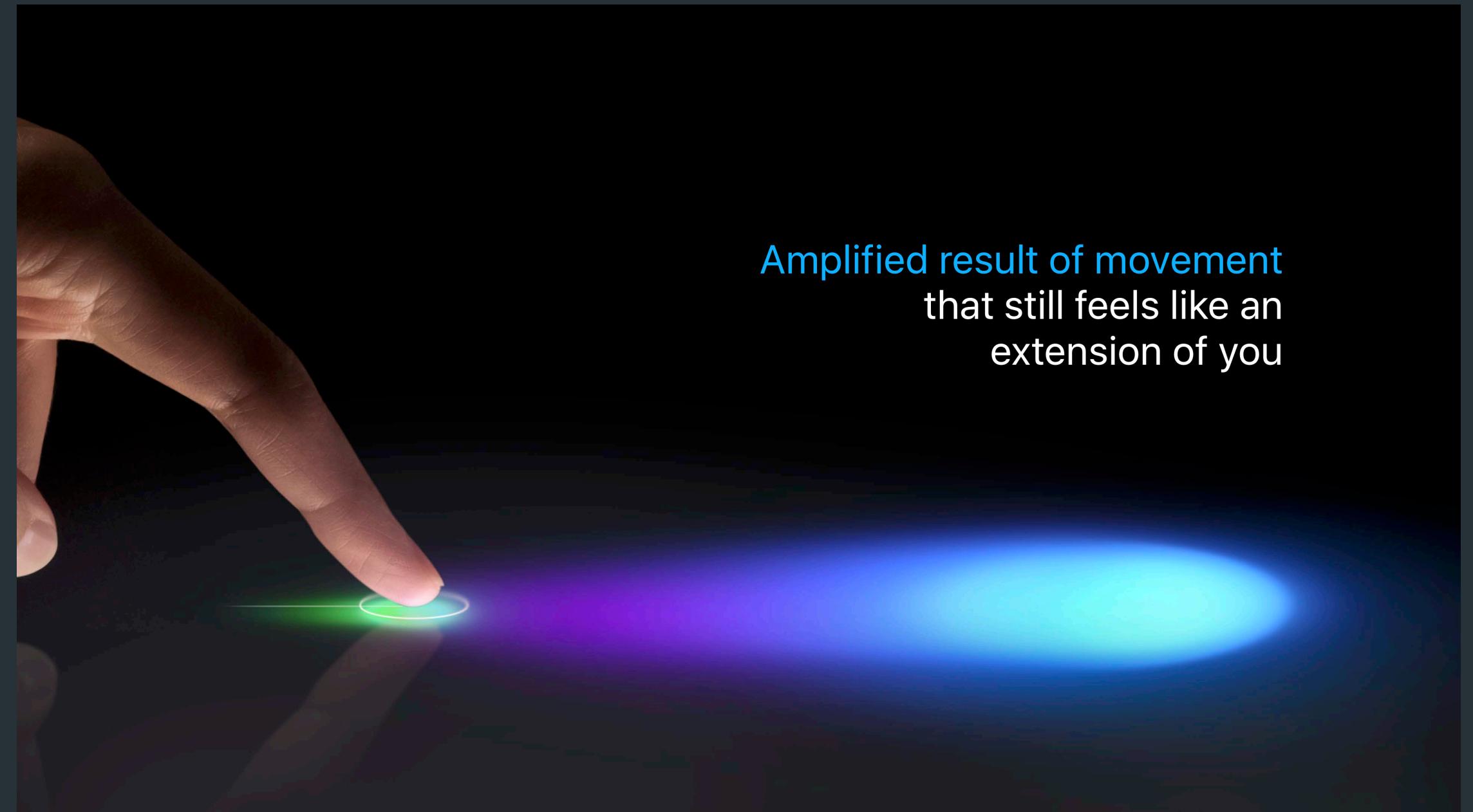
- Direct children only – no nested layout descendent
- 1 OnSwipe & 1 OnClick transition listener out of the box
- All views inside the MotionLayout must be animated from one state to another at the same time, or staggered – one Transition per MotionScene





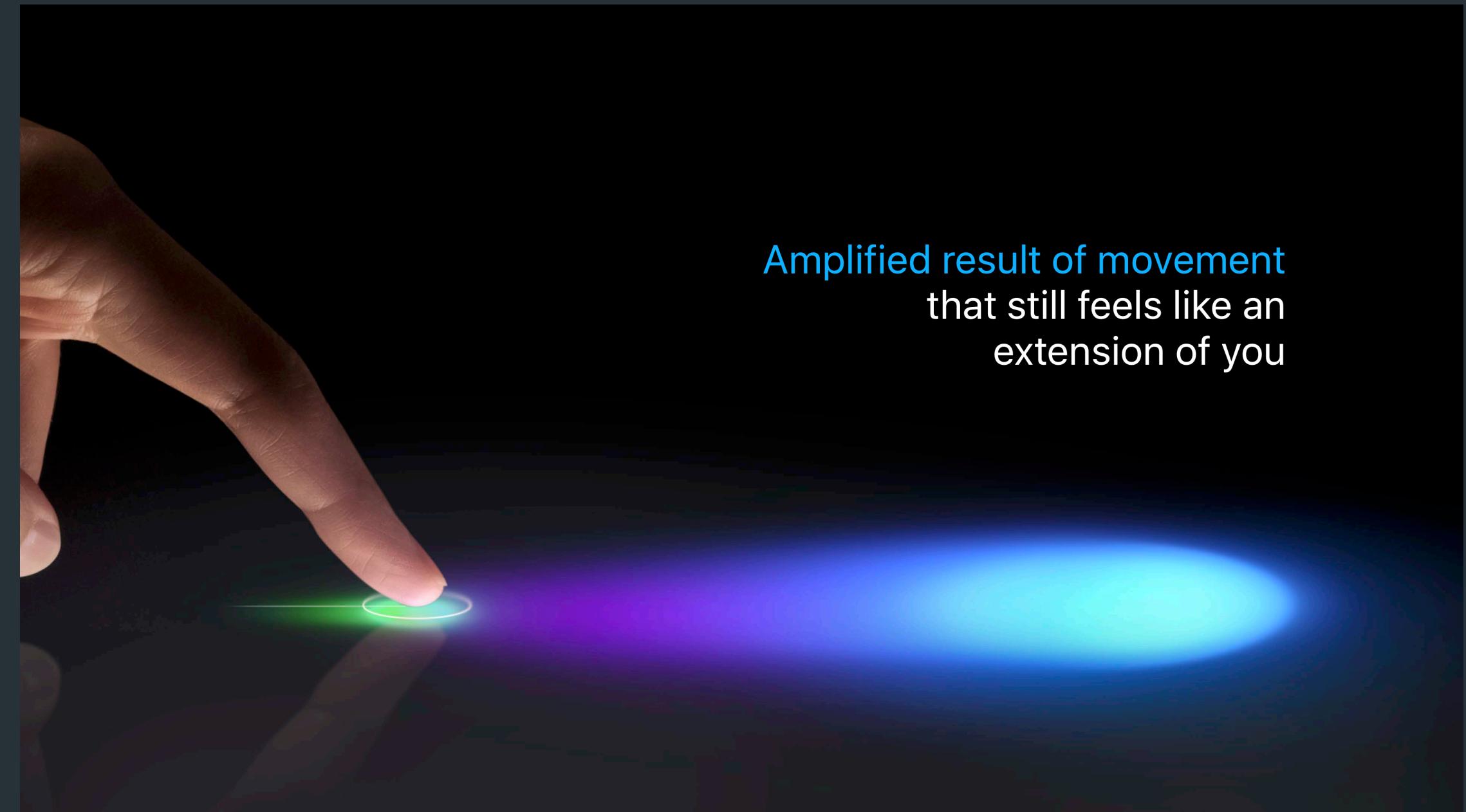
What's New with ConstraintLayout and Android Studio Design Tools

Google I/O 2018



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Google I/O 2018



What's New with ConstraintLayout
and Android Studio Design Tools

Google I/O 2018

Designing Fluid Interfaces

WWDC 2018