Demo of UIWear: Easily Adapting User Interfaces for Wearable Devices

Jian Xu*, Qingqing Cao*, Aditya Prakash*, Aruna Balasubramanian*, Donald E. Porter§

Stony Brook University*   The University of North Carolina at Chapel Hill§

Stony Brook University
NetSys Lab

THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

Wearable Devices and Apps

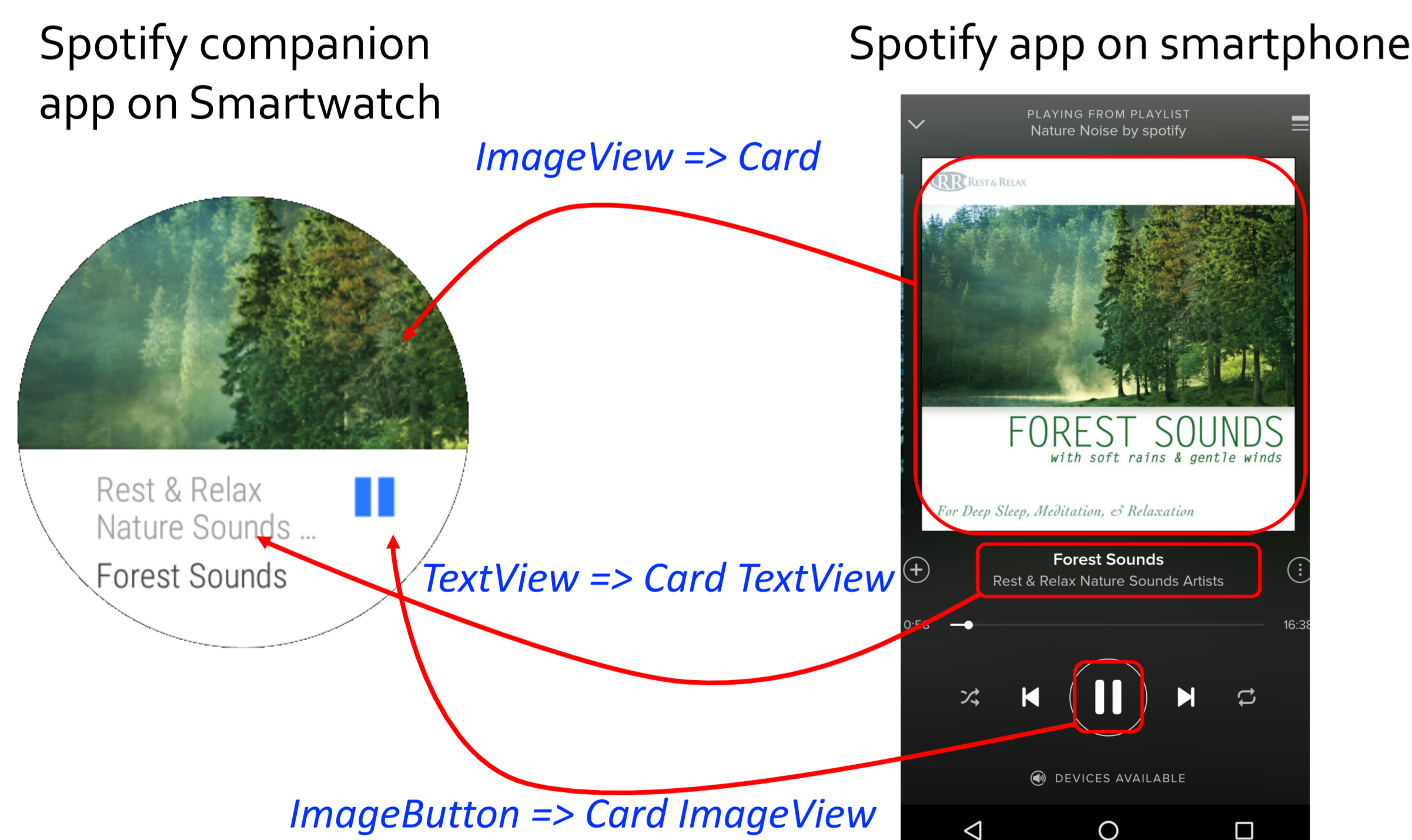**Wearable devices (i.e., smartwatches)**

are becoming a major growth sector for computing...

Most wearable apps are companion apps

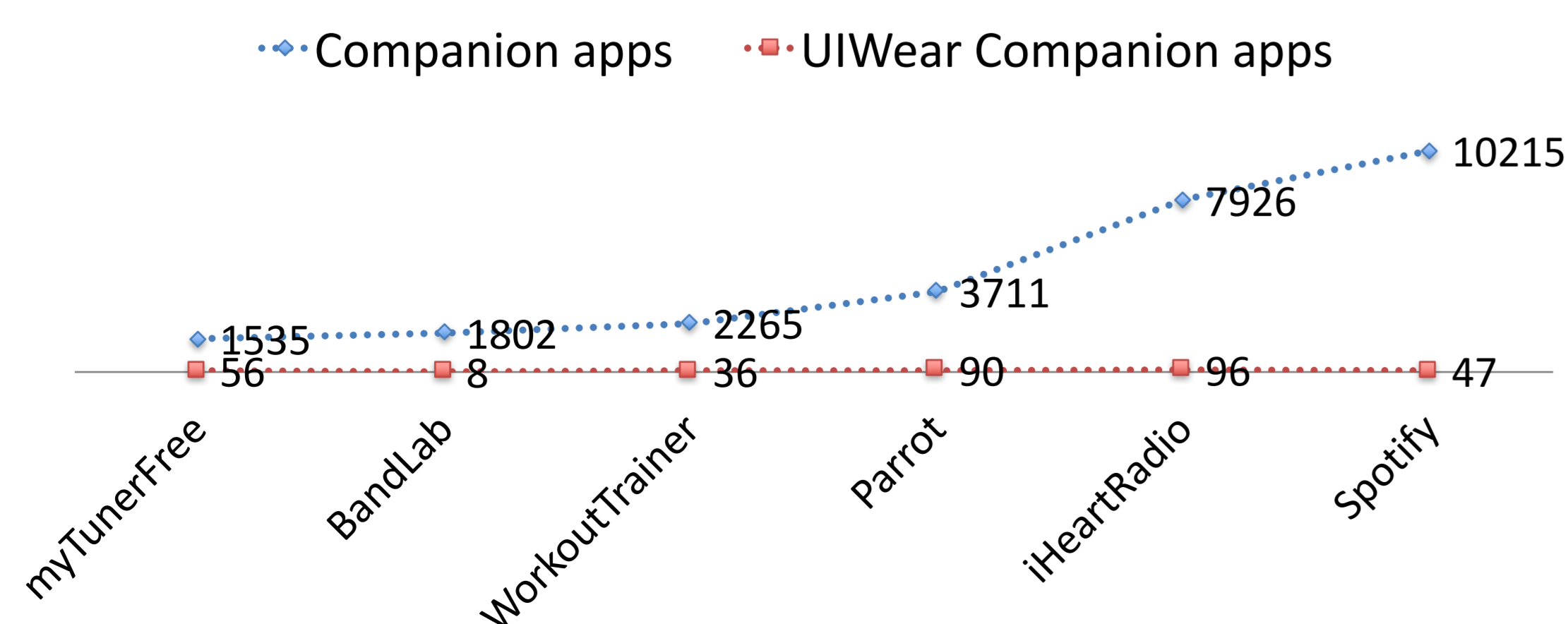78 of top 100 smartwatch apps in market are *companion apps* in our study

Spotify   iHeartRadio   BandLab

Companion App model

Spotify **companion app** retailors UI from the smartphone app

Spotify companion app on Smartwatch

Spotify app on smartphone

ImageView => Card

TextView => Card TextView

ImageButton => Card ImageView

Rest & Relax Nature Sounds ...
Forest Sounds

FOREST SOUNDS
with soft rains & gentle winds
For Deep Sleep, Meditation, & Relaxation

Forest Sounds
Rest & Relix Nature Sounds Artists

Writing a companion app is extremely tedious

Lines Of Code (LoC)

- Companion apps
- UIWear Companion apps

1535	1802	2265	3711	7926	10215
56	8	36	90	96	47

myTunerFree   BandLab   WorkoutTrainer   Parrot   iHeartRadio   Spotify

UIWear

Goal

Easily build companion apps with **minimal** developer effort
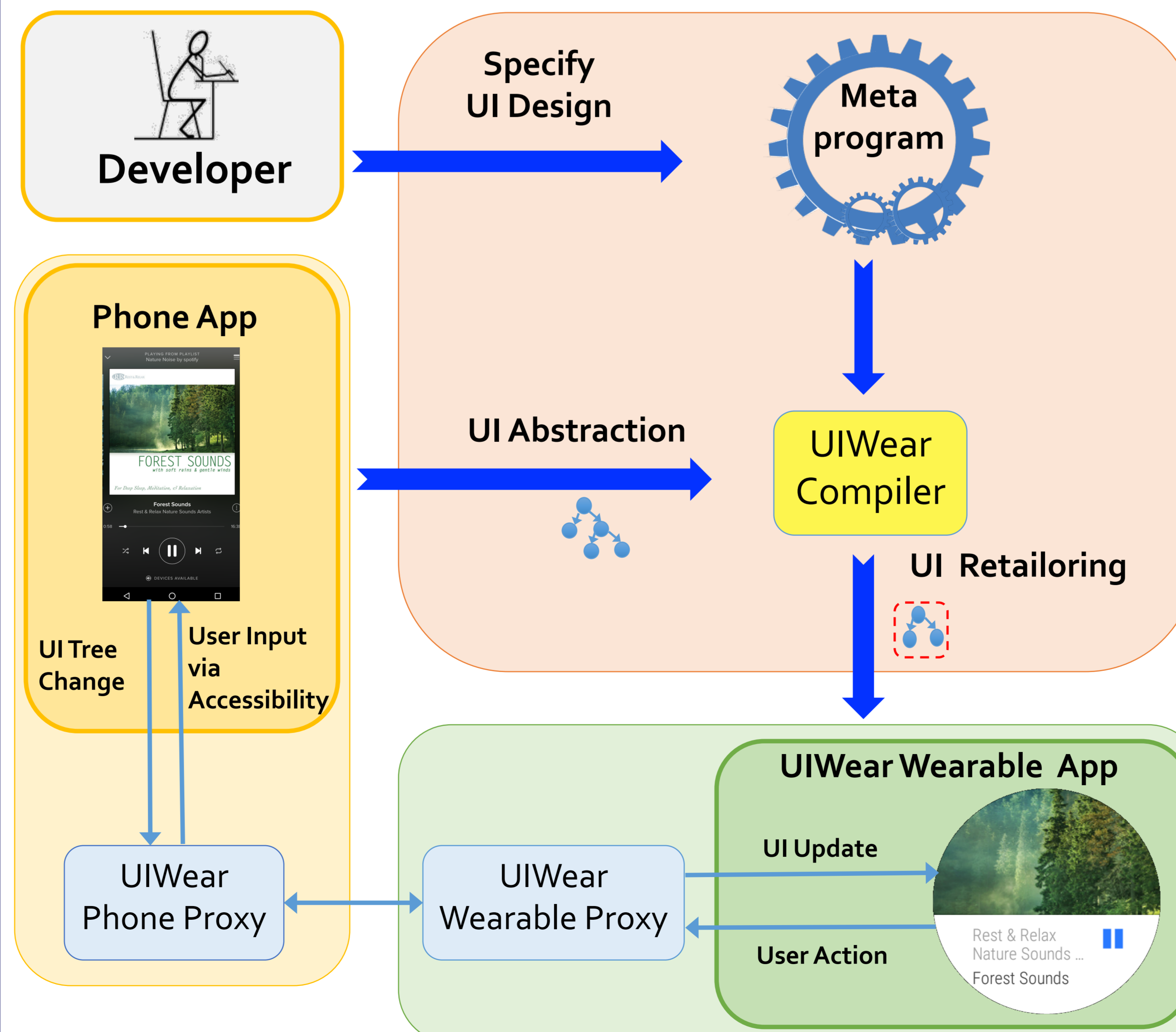
Challenges

- Extract the logical model of the UI for cross-device interactions
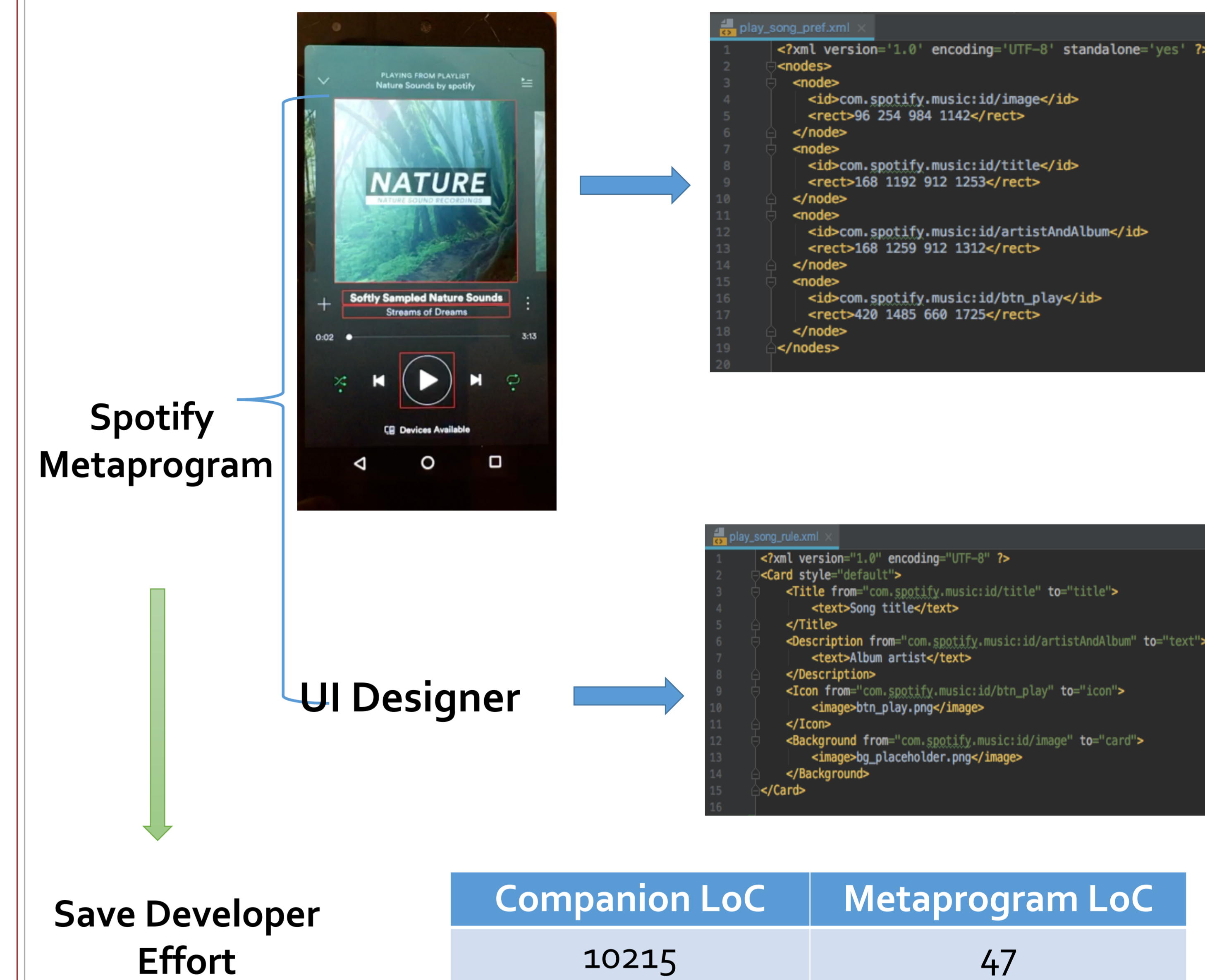- Perform UI synchronization even when the app is in the background

Idea

Decouple UI design from UI management

Developer writes a simple *meta program* for UI placement

UIWear creates a new companion app!

Developer → Specify UI Design → Meta program

UI Abstraction

Phone App

UIWear Compiler

UI Retailoring

UI Tree Change

User Input via Accessibility

UIWear Wearable App

UI Update

User Action

UIWear Phone Proxy

UIWear Wearable Proxy

Rest & Relax Nature Sounds ...
Forest Sounds

MobiCom Demo

Spotify Metaprogram

UI Designer

Save Developer Effort

Companion LoC	Metaprogram LoC
10215	47

Spotify UIWear Wearable APP

Android
app
manifests
AndroidManifest.xml
java
com.spotify.music
MainActivity
res
drawable
layout
activity_main.xml
play_song_layout.xml
recently_played_item_layout.xml
recently_played_list_layout.xml
mipmap
values
uiwearlib

Metaprogram

UIWear Stub

NATURE
Streams of Dreams
Softly Sampled Nature Sounds — Original

NATURE
Softly Sampled Nat...
Streams of Dreams — UIWear

User Study for 20 wearable apps	
Functionality	Look and Feel
78%	74%

UIWear Better or Equal