

# Android ADK Challenge: Dance Party Leisure Reinforcement (DPLR)

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## Functionality Overview

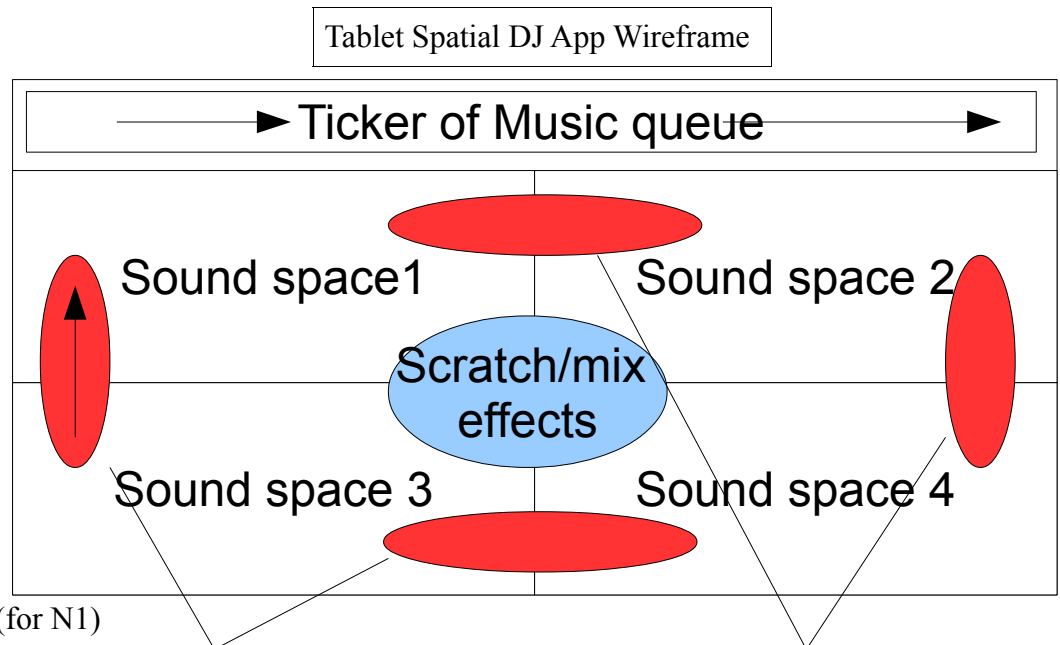
DPLR (pronounced Doppler) is a system of Android-connected audio and visual enhancements to the Dance party experience which “doubles” (*doppel*) the interactivity of the dance experience with light-simulated dancers who respond to both the music beats and human dance partners, as well as increasing the sense of movement by all dancers through a distributed multi-track sound system which mimics the Doppler effect with slight pitch changes in continuous sound movements around the dance floor. Additional

## Hardware Requirements

- 1 Android 3.1 tablet
- 6 Nexus One phones
- 1 Arduino ADK board
- 1 DMX Master Shield
- 1 XBee Shield
- 7 ZigBee/XBee adapters
- Zigbee Router
- Projector
- Sound System

## Software Requirements

- Standard ADK libraries
- Arduino OSC Library
- DMXSimple Library
- Spatial DJ app (for tablet)
- Video motion sensor app (for N1)



## System

### Swipe zones for “doppler” effect

DPLR uses the ZigBee wireless protocol to connect the DJ (using the tablet) to a spatially distributed sound system placed in (at least) the 4 corners of the room through the DMX shield, and managed through 4 N1s. The application on the DJ's tablet allows him to interact with input from the N1s which inform him of relative activity in each quadrant of the dance floor. Stereophonic syncing of sound output from one corner to the next can also be modified to produce a Doppler effect which will both encourage dancing (by inducing head turning due to the sound effect) and increase perception of existing movement. The DJ's tablet interfaces with the sound system through the DMX shield using the Open Sound Control libraries.

This stereophonic Doppler effect is enhanced further by meshed “bluejacking” (in this case with users' permission) of the Doppler effect sound transmitted to dancers within the relevant zone. This

means that when the swiped “Doppler” sound is sent over the zigbee network to the N1/speaker pair in a given corner, a viral message is then transmitted via bluetooth from the N1 to any bluetooth-enabled phones within range, which echoes that sound effect, and they pass it on as well (if they have agreed to beforehand).

The Second element of the DPLR system is the virtual dancers (*Doppelgangers*, if you will :) – 2 projected stick figures dancing on a wall. They react to the music (through the input they receive from the DJ to the other 2 N1s) and they also react to anyone who approaches to dance, sensing their body motions through a video motion sensor app. If an individual decides to “ask” a doppelganger to dance, they initiate a connection through Bluetooth with the N1 which is receiving communication about the Music from the DJ through the ZigBee connection. The N1 then shifts mode from simply receiving input from the DJ about the music to inform the projected doppelganger's dance moves, but also taking into account the dance moves of their “partner” through video recognition and mirroring of their movements.

These 2 doppelganger dancers help to enhance the dance experience by increasing the number of available dance partners, which is sometimes a problem, given the gender disparity of many tech events! (NB the number of projected dancers can be scaled beyond 2, it just may require more hardware).

### Summary of innovative features and Feasibility

The use of the DJ's android tablet as the USB host for Arduino hardware controlling the sound system through a ZigBee-networked DMX system is relatively straightforward, though still very useful and potentially an improvement in sound quality from previous systems of the same sort. By adding the video tracking of dancers, which allows the DJ to have his pulse on the finger of every dancer on the floor, a more integrated, seamless, and responsive experience is possible. The real innovation, however begins with the projected doppelganger dancers, who respond both to the music and to human dancing partners. The combination of ZigBee and Bluetooth network technologies should allow for non-interfering communication amongst the DJ, dancers, and component parts of the sound and lighting system. However, the ways in which these interact will need to be tested sufficiently to ensure there are no conflicts. Similarly with the ZigBee / Bluetooth communications for the Doppler effect sounds, the timings and directionality of the connections, particularly with the “bluejacking” sequence, will have to be tested, and may perhaps be iterated upon in a different fashion. Aside from these potential concerns, the feasibility of this project seems well within reach (despite the constraints on describing the architecture more fully here) for the upcoming Google Developer Day in Berlin, so I hope to see you there.

