



Fundamentals of Audio Mixing

Nimal Skandhakumar

Faculty of Technology
University of Sri Jayewardenepura

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Partially based on:

- Christopher Ariza. 21M.380 Music and Technology: Recording Techniques and Audio Production. Spring 2012. Massachusetts Institute of Technology: MIT OpenCourseWare, <https://ocw.mit.edu>. License: [Creative Commons BY-NC-SA](#).
- Digital Audio Production IT3038PA, NITEC Digital Audio & Video Production. 2013. Institute of Technical Education College West.

Audio Mixing



- Balance the relative volume, frequency and dynamical content of a number of sound sources:
 - done live by a sound engineer at musical performances
 - done in studios as part of a multitrack recording as part of an album, film, or television program
- E.g. in film/video projects, the mixers must balance the various elements: dialogue (and ADR), music, sound effects and foley effects.

Mixing Terminology



- Static mix:
 - fader and panning positions are relatively fixed
- Dynamic mix:
 - alters fader and panning positions (and other parameters) during the mix
- Non-linear mix:
 - changes the temporal arrangement of components
- Automation:
 - ways of recording the movement of faders or knobs (in hardware)
 - in DAWs automation is dynamic parameter data

Mixing Terminology



- Destructive:
 - what you see is what you get
 - Examples: Peak, Audacity
- Non-Destructive:
 - what you see is one representation of what you have, generally in Digital Audio Workstations (DAWs)
 - Examples: Pro Tools, Cubase, Audacity

General Mixing Procedure

1. Time align tracks at beginning
2. Crop tracks at start and end
3. Listen to each track alone and process
4. Apply channel strip processing*
5. Apply fades to remove tacet portions, control start and end positions
6. Set basic pan positions
7. Mix groups of instruments organized by microphone capture, ensemble role, or other factors
8. Start with loudest instrument and mix downward

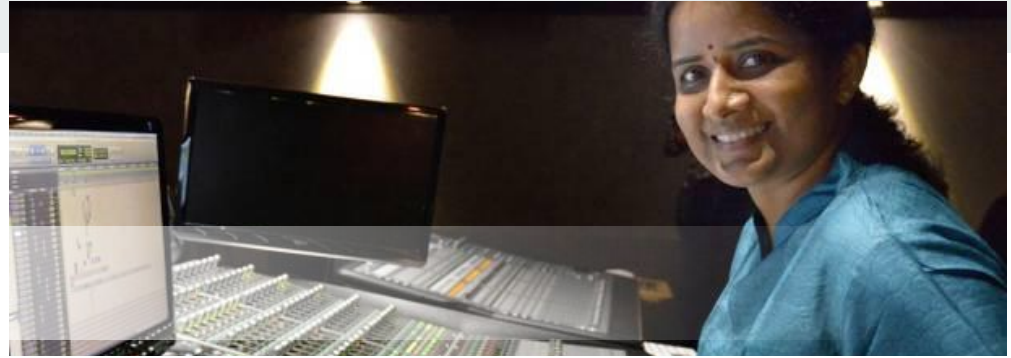


Channel Strip Processing



- Optimize each channel or bus-group while maintaining gain staging
- Use filters to isolate necessary frequencies
- Use dynamic effects to remove leakage
- Use moderate to deep compression to raise average level
- Use shallow limiting to control extreme dynamics

Tonal Balance



- Overall tonal balance of a mix should not be too 'bassy' or 'trebly'
- No imbalanced emphasis on low or high frequencies
- Emphasis of any one frequency band can cause listening fatigue

Panning Mono



- Generally avoid 100% hard-panning (95% is a good maximum)
- Low frequencies (bass, kick) are generally toward the center
- Vocals are generally toward the center
- Avoid center build-up with slight offsets out of center (+/- 5%)
- Time keepers (high hat, ride, snare) are often off-center
- Often similar musical roles are balanced left and right (guitars, keys)
- Often aim for overall left-right balance

Panning Stereo



- If coincident or near coincident, generally pan hard left and hard right
- If not coincident, may explore mixture
- Listen to mono mix to check for phasing distortion
- If combining near and far captures, must pan close microphones to match distant stereo positions

Levels



- Generally 1 dB is the smallest amount of perceivable change
- Always avoid channel, bus, or master clipping
- Amplitudes are relative: find ways to cut rather than boost
- May need to adjust levels by musical sections (boost for a solo)

Double Tracking



- Using two copies of the same audio file panned hard left and hard right
- Hard panning helps removing potential phasing problems
- Delay a second copy by less than 30 ms
- Delay processor must be at 100%
- Alternatively, can use two similar takes of the same material

Bussing



- For sensible organization of tracks & computational efficiency
- Group multiple microphones of the same source
 - Example: drum kits
- Grouping musical parts or sections
 - Example: rhythm sections or background vocals

Creative Mixing



- By knowing what to listen for, you can improve your artistic judgments during recording and mixdown.
- To train your hearing, analyze recorded sound into its components and concentrate on each one in turn.
- To achieve a realistic tonal balance in your mix, it is important for you to critically listen to the natural balance of the sounds in real life.
- As in any creative domain, there are exceptions to the standard rules of what makes a good mix.

Mixing and Listening



- A good mix often goes unnoticed
 - In a well balanced mix, nothing sticks out and nothing is hidden
- Listen at multiple output volumes
 - Consider both mono & stereo mixes
- Listen on multiple playback devices and headphones
 - Not only high-end studio monitors, also cheap radio
- Take breaks... and revisit...

Assignments & Exams

- ✓ Class Project 1 (individual, take-home)
- ✓ Class Project 2 (group, take-home)
- ✓ Class Project 3 (individual, project)
 - Class Project 4 (group, in-class DAW workshop)
 - Final Exam (individual, in-class DAW practical)

Practicals
