

Video Game Sound Design and Curriculum Development

David Lauritsen

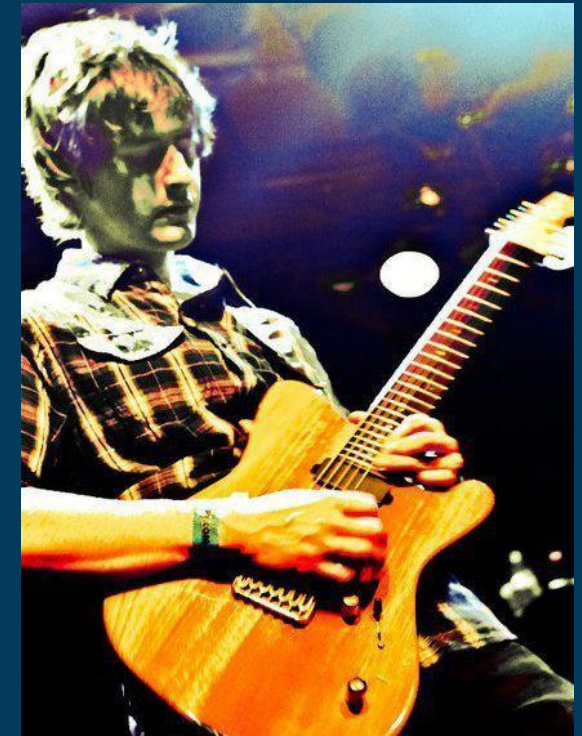
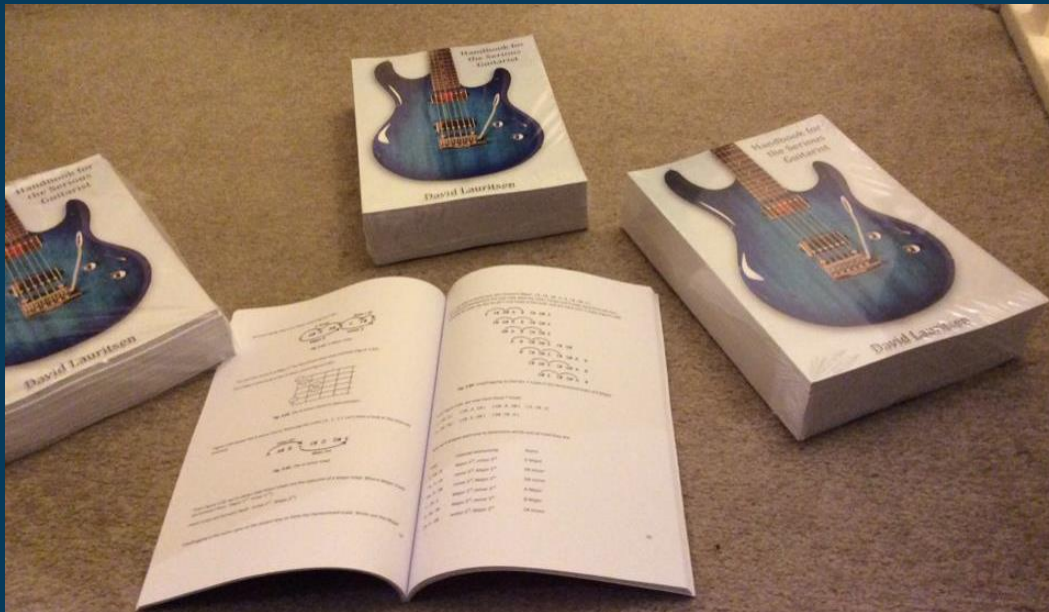
davidlauritsen1@gmail.com

13th November 2023

About me

About me

- Musician - Guitarist
- Played at the Big Day Out 2014
- Handbook for the Serious Guitarist (2016)



Picture 2011 – The Espy (I think). Guitar is hand-built in Melbourne

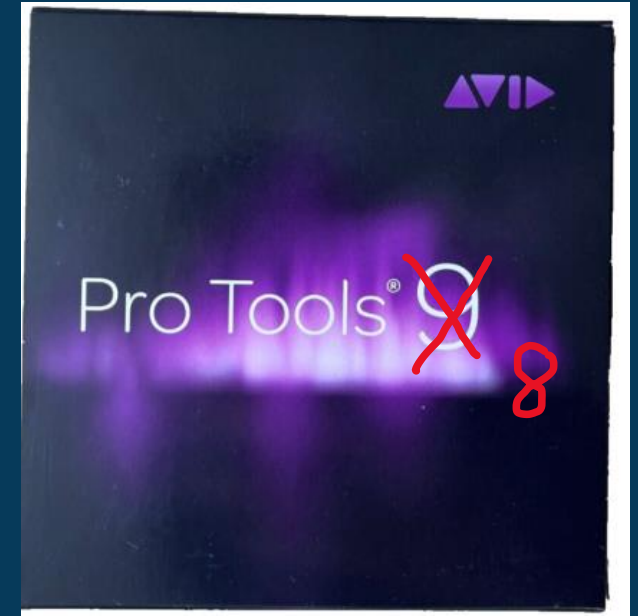
<https://shubguitars.com.au/>

About me

Music into audio ...



2008

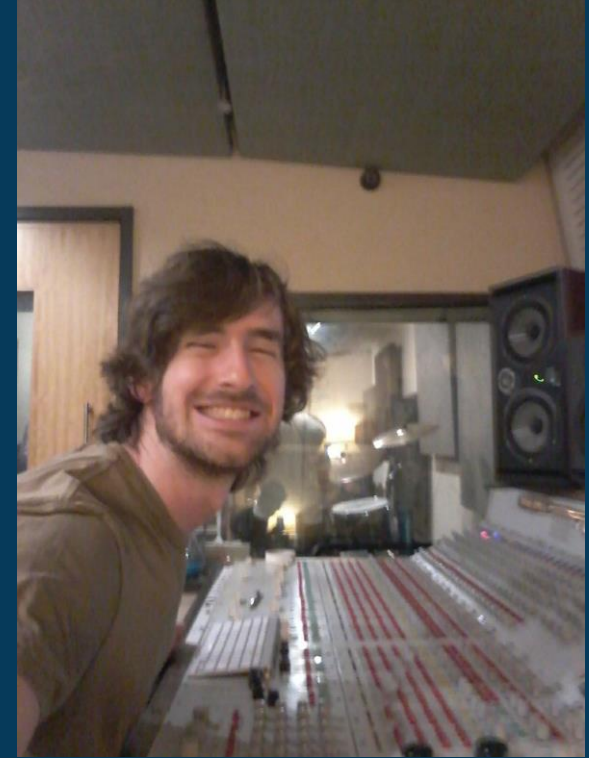


2008



About me

- Bachelor of Sciences (Mathematics) (2012)
- Bachelor of Audio Engineering (2015)
- Masters of Creative Industries (2021)



Coloursound Studios - 2014



Film Audio from
2014

About me

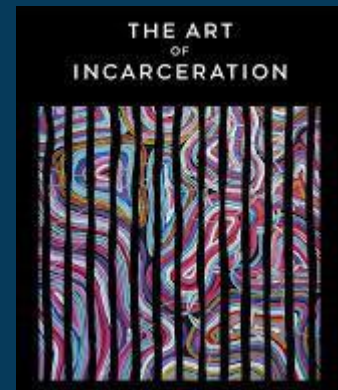
- Primary income from audio 2016
- Contract lecturing 2018 at JMC Academy
- Head Lecturer 2019
- Curriculum development in 2020 and 2021 (4ish units)
- Big Ant Studios 2022



Black Pearl Studios, 2017



2023



2018 (Sound Design)



2021 (Dialogue Editor)

The context of this presentation

- How to engage audio engineering students with the prospects of a career in game audio
- What does sound design for video games look like?
- What are the tools they need to develop?

The education of these skills in tertiary education


- Audio Engineering courses typically have at least one film and television sound unit, but not always a sound design for games unit
- Audio Engineering students often lean on music too heavily in ‘sound design’ tasks
- **The applicants who find work in game audio typically gain their skills outside of university**

The context of this presentation

- It's an area of audio with full time job opportunities
- {insert game valuation statistic here}
- Screen Australia have announced funding schemes for independent game productions

What "recording engineer" × Any Classification ▾ Where Enter suburb, city, or region SEEK

All work types ▾ paying \$0 ▾ to \$350K+ ▾ listed any time ▾




No matching search results

We couldn't find anything that matched your search.
Try adjusting the filters or check for spelling errors.

What "mastering engineer" × Any Classification ▾ Where Enter suburb, city, or region SEEK

All work types ▾ paying \$0 ▾ to \$350K+ ▾ listed any time ▾

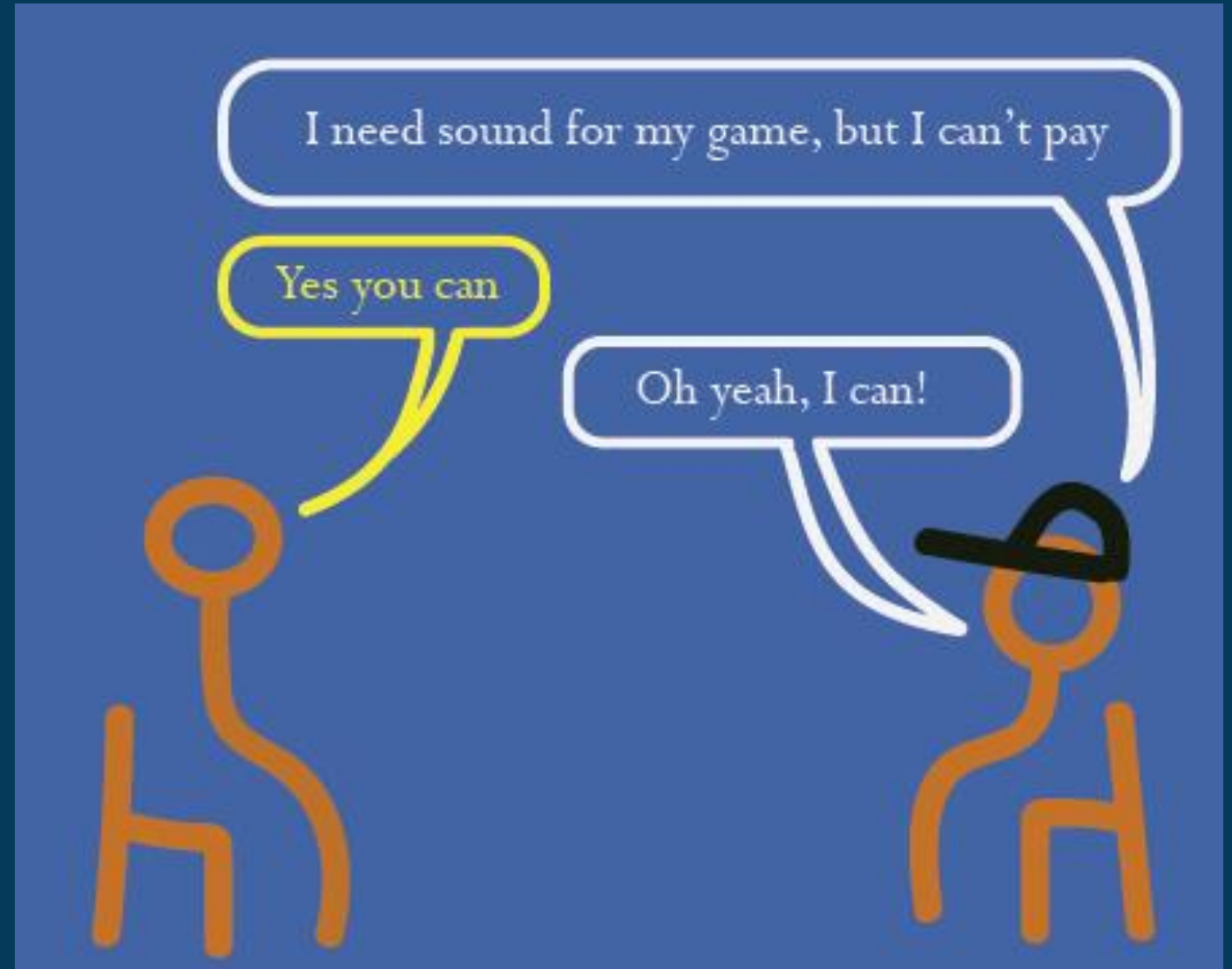


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The context of this presentation

- It's an area of audio with full time job opportunities
- {insert game valuation statistic here}
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Sound Design

Designing Sounds – a swooping generalization ...



1



2



3

Designing Sounds (3 approaches)

1. Record the same object
2. Find the same object in a sound library
3. Record, source or synthesize a 'sonically equivalent' sound



1



2



3

Sound Design for elements that don't have a real-world equivalent

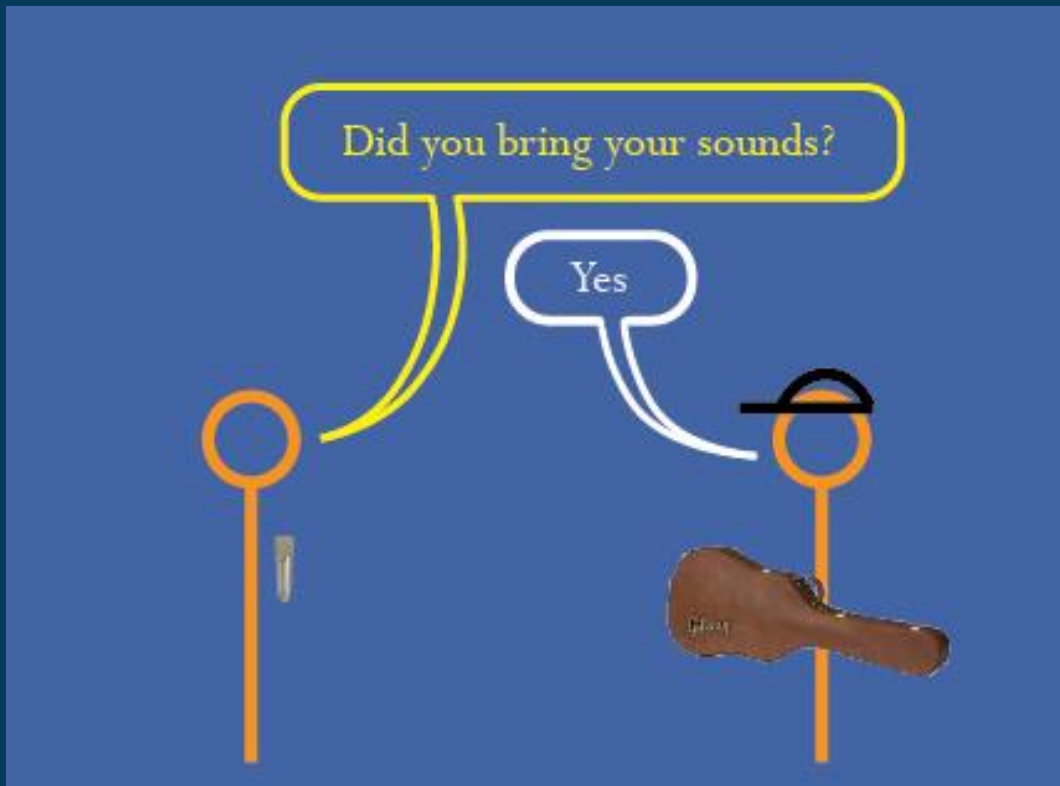
- Slow motion
- Science Fiction/Fantasy
- 'Emotionally equivalent' sound design



Sound Design requires a different mentality than other forms of Audio Engineering

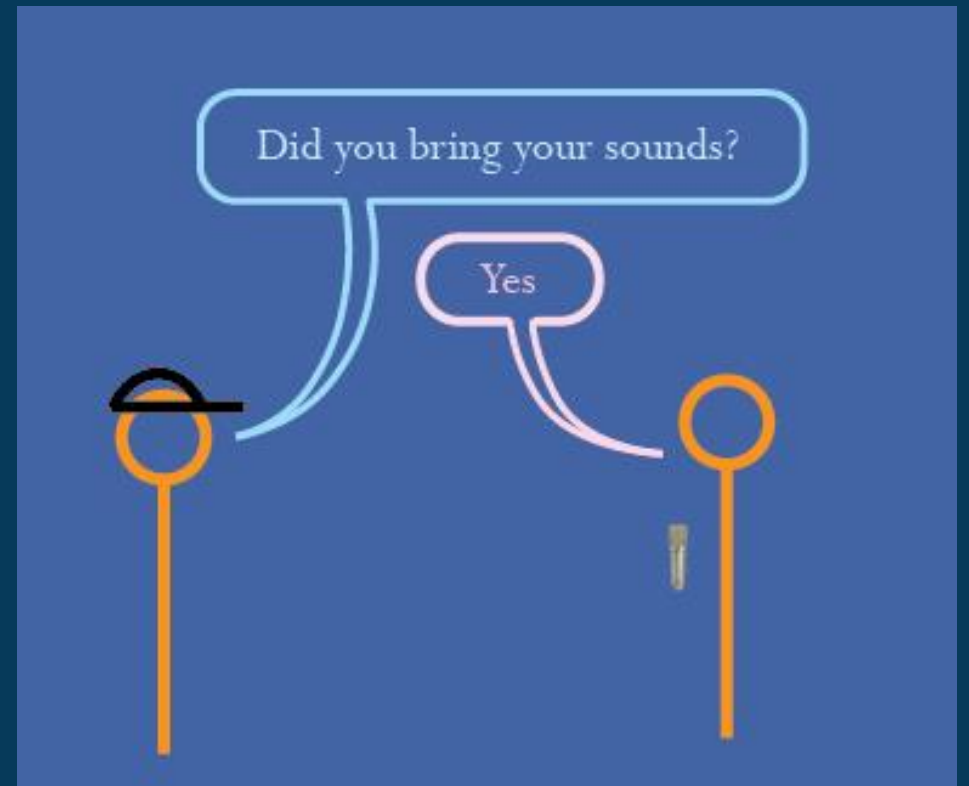
Audio Engineering

- Source material comes **to** you



Sound Design

- Source material comes **from** you



Sound Design for Games (unique considerations)

- Systems design
 - In collaboration with Technical Sound Designers and Audio Programmers
- ‘making sure the sounds play at the correct time’
- Computer science/software development element

Cricket24 Example

'Guy walks through a door'

Where do we start playing the sound sequence?

- When we load the scene?
- When we start playing the cutscene?
- When the character's animation begins?



Cricket24 System Design Commentary Examples

pre_delivery - SUCCESS

(press end to toggle conditions/lines, o.c. press unraise to continue, p.c.)

!bowler_is_captain
!prev_ball_dismissal
!previous_shot_edge
bowler_type_pace
consecutive_no_balls_#1
consecutive_no_balls_#2+
consecutive_no_balls_#3+
excitement_#0-10
excitement_#20+
excitement_#40+
excitement_#50+
excitement_#70+
excitement_#80+
excitement_#90+
first_ball_innings_prebowl
free_hit
has_crowd
innings_#1
innings_overs_completed_#10-15
innings_wickets_taken_#1+
last_ball_runs_#4
momentum_batting_team
momentum_bowling_team
prev_2ball_boundary
prev_ball_boundary
prev_ball_legal
prev_no_ball_front_foot
previous_shot_edge
random_chance_#5
striker_balls_faced_#0
striker_runs_#20-29



LENGTH DELIVERY

DELIVERY VARIATION RT

[commentary/id3_davidgower/id3_pre_delivery_37](#)

We are about ready to get underway and already the crowd is up and about - this is looking to be a great day of cricket.

NZ 0/0
0.0 OVERS

A simple choice really on these types of deliveries, get it on the batter's toes and limit the chance of a six - easier said than done.	pre_delivery	free_hit
Good opportunity for some free runs here - you really need to get the ball pitched up on the toes, but if the batter reads it you could be watching the ball sail	pre_delivery	free_hit
<surname_bowl> to get us underway - Nice to see some pace first up - This new ball should give some movement early on to make the batter's life difficult.	pre_delivery	innings_#1, first_ball_innings_prebowl, bowler_type_pace
Ok, everything looks set to get this match underway, I think this new ball will get some movement that the openers will need to be wary of.	pre_delivery	innings_#1, first_ball_innings_prebowl, bowler_type_pace
The umpire signals that we are ready to go - First ball of the innings about to be bowled.	pre_delivery	innings_#1, first_ball_innings_prebowl, bowler_type_pace
We are about ready to get underway and already the crowd is up and about - this is looking to be a great day of cricket.	pre_delivery	innings_#1, first_ball_innings_prebowl, bowler_type_pace, excitement_#20+
Right, so we are ready to get underway, always something special about that first delivery, it really can set the tone for the match.	pre_delivery	innings_#1, first_ball_innings_prebowl
Here we go with the first ball of the match - nothing better than getting a match started and hearing the sound of leather on willow.	pre_delivery	innings_#1, first_ball_innings_prebowl
<surname_bowl> has the privilege of bowling with the new ball - umpires have signalled they are ready, let's get this match started.	pre_delivery	innings_#1, first_ball_innings_prebowl
We are nicely settled in the commentary box and looking forward to this match getting underway - The first ball is about to be bowled.	pre_delivery	innings_#1, first_ball_innings_prebowl
A ball hasn't even been bowled yet and this crowd is already making it hard for me to be heard.	pre_delivery	innings_#1, first_ball_innings_prebowl, excitement_#40+, has_crowd
Match looks about ready to get underway and already the crowd is making a hell of a racket. Not sure how long they can keep this up for.	pre_delivery	innings_#1, first_ball_innings_prebowl, excitement_#40+, has_crowd
The crowd are making a heck of a lot of noise even before the first ball has been bowled - let's see how long they can keep that up for.	pre_delivery	innings_#1, first_ball_innings_prebowl, excitement_#40+, has_crowd
Seems we are ready to get the match underway - hopefully we see the crowd pick up, they are very quiet at the moment.	pre_delivery	innings_#1, first_ball_innings_prebowl, excitement_#0-10
The crowd are very subdued for the start of this match - I'm sure though once the action starts we will hear some noise.	pre_delivery	innings_#1, first_ball_innings_prebowl, excitement_#0-10
I don't feel there was too much wrong with that last delivery, just need to keep getting the ball in the right spots and the reward will come.	pre_delivery	prev_ball_boundary
This delivery just needs to be pitched up on a length - too short and you'll get punished on this pitch.	pre_delivery	prev_ball_boundary
Yes, it can be very disheartening seeing good deliveries smacked around - sometimes though you just have to accept it and move on.	pre_delivery	prev_ball_boundary
Can't afford to go too full again - it helps to switch up your deliveries - just to keep them guessing.	pre_delivery	prev_ball_boundary
<surname_bowl> shouldn't be too worried about that last ball, they've got them playing their shots, just need to tighten their areas now.	pre_delivery	prev_ball_boundary
<surname_striker> has gotten the big shot away this over. Now they can focus on playing the next ball on its merits.	pre_delivery	prev_ball_boundary

ball_result - SUCCESS

(press end to toggle conditions/lines... press unpause to continue...)

!balls_remaining_in_over_#1
 !batter_contact
 !bowl_line_good
 !close_edge
 !delivery_poor
 !delivery_wide
 !first_ball_innings_postbowl
 !first_session_of_innings
 !hit_into_gap
 !running_aborted
 !runout_was_close
 !shot_aggressive
 !shot_defensive
 !shot_edge
 !very_wide

anim_dive
 appeal_out_edge
 appeal_out_low
 balls_remaining_#2+
 balls_remaining_#3+
 bat_timing_bad
 bat_timing_early
 bat_timing_goodorideal
 bat_timing_ideal
 bat_timing_late
 bat_timing_ok

batsman_career_runs_#1000
 batsman_career_runs_#10000
 batsman_career_runs_#2000
 batsman_career_runs_#20000
 batsman_career_runs_#3000
 batsman_career_runs_#5000

batter_contact
 batter_contact_bat
 batter_out_crease_other_end
 bowl_line_good
 bowler_type_pace
 bowler_type_seamer
 bowler_type_spin
 byes_#1
 byes_#2
 byes_#3+

cancelled_fielder_hasball
 cancelled_run_#1
 cancelled_run_#2
 cancelled_run_#2+
 cancelled_run_#3
 cancelled_run_#3+
 cancelled_run_#4

close_edge
 close_stumps
 close_wide

consecutive_dot_balls_#3
 delivery_fast_ball
 delivery_length_full
 delivery_length_mid
 delivery_length_short
 delivery_length_yorker
 delivery_poor
 delivery_slow_ball
 delivery_wide

edge_thick
 edge_thin
 final_over
 first_ball_innings_postbowl
 first_run_of_session
 first_runs_scored_player
 first_runs_scored_team

free_hit
 hit_into_gap
 innings_overs_completed_#3+
 legbyes_#1
 legbyes_#2
 legbyes_#2+

match_type_limited_overs
 more_extras_than_runs
 nearing_match_end
 no_appeal
 no_ball

outside_leg_stump
 outside_off_stump
 overs_#3+
 partnership_runs_#20+
 player_strikerate_#50-70
 player_strikerate_#80+

possible_lbw
 potential_runs_#1
 potential_runs_#2+
 prev_ball_boundary
 previous_score_not_1_above_90
 regular_delivery
 running_mix_up
 runout_was_close

runs_#0
 runs_#1
 runs_#1+
 runs_ran_#1
 runs_ran_#1+
 runs_ran_#1-2
 runs_ran_#2
 runs_ran_only

runs_reached_#100
 runs_reached_#150
 runs_reached_#200

runs_reached_#300
 runs_reached_#50
 runs_reached_#90
 runs_required_#4-
 runs_required_#4-10
 shot_advance
 shot_aggressive
 shot_back_foot
 shot_defensive

shot_front_foot
 shot_none
 shot_angle_cut
 shotttype_drive
 shotttype_legglance
 shotttype_pull
 spun_far

striker_balls_faced_#1
 striker_balls_faced_#10+
 striker_runs_#70+
 striker_runs_#90-99
 striker_runs_#99





swing_and_miss
 swing_in
 time_from_hit_to_dead_ball_#4-6
 time_from_hit_to_dead_ball_#6-8
 timing_perfect_bowl

total_innings_runs_#1+
 very_wide

commentary/id1_michaelatherton/id1_comm2_ball_result_168

Not a great ball, got it full and lucky not to concede a boundary

NZ 0/1
 0.5 OVERS

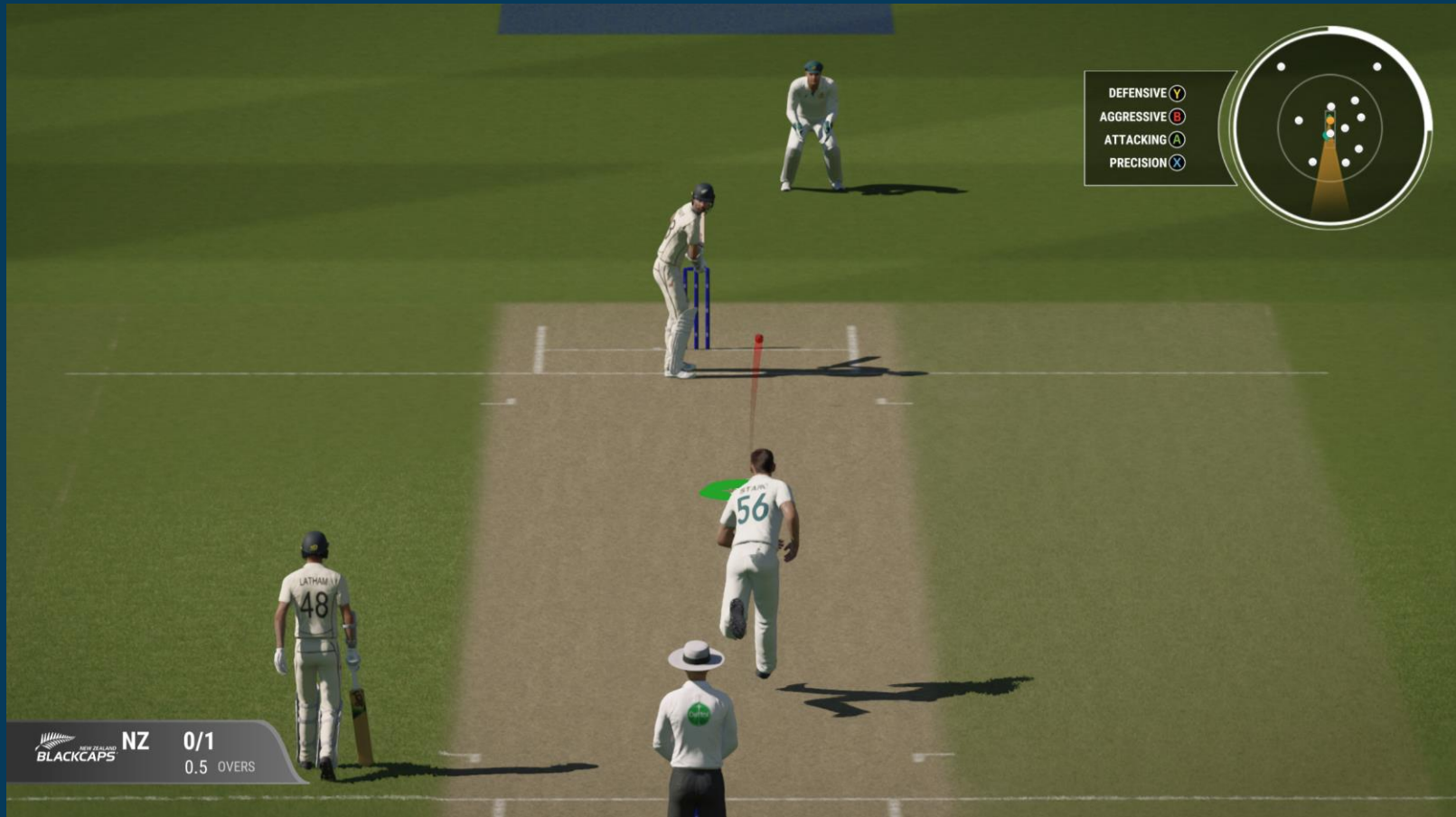
Great bowling. Really hitting their straps now	ball_result		runs_#0, timing_perfect_bowl, bowl_line_good, delivery_length_mid, regular_delivery
<surname_endofball_bowler> is looking good, found some rhythm. Really challenging the batter now.	ball_result		runs_#0, timing_perfect_bowl, bowl_line_good, delivery_length_mid, regular_delivery
Asking plenty of questions. Good line and length, but can't tempt them to play shots	ball_result		runs_#0, timing_perfect_bowl, bowl_line_good, delivery_length_mid, shot_none, regular_delivery
Thought about having a dabble there.	ball_result		runs_#0, timing_perfect_bowl, bowl_line_good, delivery_length_mid, shot_none, regular_delivery
Good spot there, making it difficult to get away	ball_result		runs_#0, bowl_line_good, delivery_length_mid, bat_timing_goodorideal, batter_contact_bat
Good cricket all 'round. A good delivery, and timed well to the fielder.	ball_result		runs_#0, bowl_line_good, delivery_length_mid, bat_timing_goodorideal, batter_contact_bat, regular_delivery, !shot_edge, !shot_defensive
Excellent bowling, not far away from producing an edge.	ball_result		runs_#0, bowl_line_good, delivery_length_mid, bat_timing_ok, batter_contact_bat, regular_delivery
<surname_striker> was maybe a bit too eager. The ball wasn't really there to play that shot	ball_result		runs_#0, bowl_line_good, delivery_length_mid, bat_timing_early, !shot_defensive
Waited to let it come onto the bat, the bat was late coming down on that.	ball_result		runs_#0, bowl_line_good, delivery_length_mid, bat_timing_late
Floated that one up, hit well, but couldn't beat the field	ball_result		runs_#0, bowl_line_good, delivery_length_full, bat_timing_goodorideal, batter_contact_bat, !shot_defensive
Right in the slot, probably hit it too hard. Crunched it straight to the fielder.	ball_result		runs_#0, bowl_line_good, delivery_length_full, bat_timing_goodorideal, batter_contact_bat, !shot_edge, !shot_defensive
Not a great ball, got it full and lucky not to concede a boundary	ball_result		runs_#0, !bowl_line_good, delivery_length_full, bat_timing_goodorideal, batter_contact_bat, !shot_edge, !shot_defensive, delivery_poor
<surname_striker> really shaking his head. It was there to hit, couldn't make the most of it.	ball_result		runs_#0, !bowl_line_good, delivery_length_full, bat_timing_goodorideal, !shot_defensive, delivery_poor
A bit of shape on the ball, but very full. Not often you see loose deliveries like that not being punished.	ball_result		runs_#0, bowl_line_good, delivery_length_full, shot_none, delivery_poor
Very full, sprayed the ball a bit, but they're happy to leave it alone.	ball_result		runs_#0, !bowl_line_good, delivery_length_full, shot_none
Didn't get all of it. Couldn't get the timing right	ball_result		runs_#0, bowl_line_good, delivery_length_full, bat_timing_ok
The loose full one goes unpunished.	ball_result		runs_#0, !bowl_line_good, delivery_length_full, bat_timing_ok
Let it come right under their eyes, but didn't time it well.	ball_result		runs_#0, bowl_line_good, delivery_length_full, bat_timing_late
Didn't hit that well, very late playing that shot.	ball_result		runs_#0, !bowl_line_good, delivery_length_full, bat_timing_late
Rolled the wrists well to keep it down, couldn't find the gap though.	ball_result		runs_#0, bowl_line_good, delivery_length_short, bat_timing_goodorideal, batter_contact_bat, !shot_edge, !hit_into_gap, !shot_defensive
Good shot for no runs. Quick to get onto the back foot and cracked it to the fielder	ball_result		runs_#0, bowl_line_good, delivery_length_short, bat_timing_goodorideal, batter_contact_bat, !shot_edge, !shot_defensive
Misses out there on the short and wide one.	ball_result		runs_#0, !bowl_line_good, delivery_length_short, bat_timing_goodorideal, delivery_wide

Challenges with game sound design

- *Non-linearity*
- *Anything can happen at any time*
- For e.g. if character dialogue, music crescendo, sword swing and bird squeak in the ambience all happen at the same time, what do you do?
- *Large combinations of outcomes – often too many to test*
- Prioritising certain sounds to take precedence over others

Cricket24 Example

- Subcontinental stadium, 'Broadcast Camera 1', Bat Sound masked due to a combination of the loud ambience and the further distance to the camera



Cricket24 Particles Effects Example

```
function SoundListenerSfx:createParticleEffectsReferences()
    local flame01_01 = effectMachine_flame01_01_fx.particleSpawnPlacements.events
    local flame01_02 = effectMachine_flame01_02_fx.particleSpawnPlacements.events
    local flame01_03 = effectMachine_flame01_03_fx.particleSpawnPlacements.events
    local flame01_04 = effectMachine_flame01_04_fx.particleSpawnPlacements.events

    for i, v in ipairs(flame01_01) do
        local name = v.eventName
        self.particleObjects[name] = { sound = v.sound, effectName = v.effectName } -- effectName is carried across for debugging only
    end
    for i, v in ipairs(flame01_02) do
        local name = v.eventName
        self.particleObjects[name] = { sound = v.sound, effectName = v.effectName }
    end
end
```

Problem:

- We can't guarantee which effects will be able to see
- Too many instances of effects occur

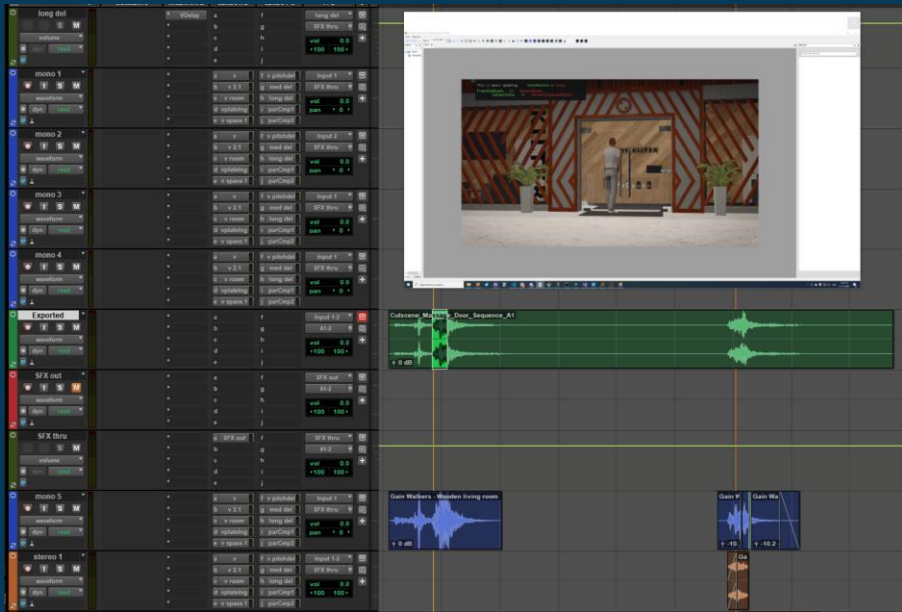
Solution:

- Selected particle instances are 'imported' when we load the game
- Distance from particle effect to camera results in attenuation over distance
- Some particle effects are muted in certain camera angles

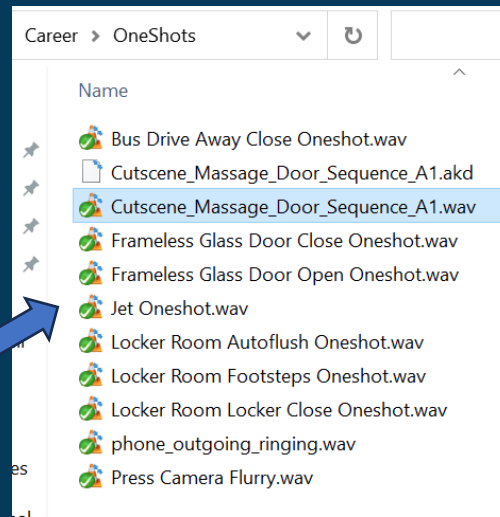


```
function SoundListenerSfx:onCutsSceneParticleEvent(event, params, gamers, services, guidManager, match, gamestate,
    local cutsceneEvent = event.cutsceneEvent
    local particleEvent = cutsceneEvent and cutsceneEvent.particleEvent -- returns something like 'FM01_FJB_A'
    local placement = event.placement[next(event.placement)]
    if placement and placement.positionAtEvent then
        local pos = placement.positionAtEvent
        local eventName = self.particleObjects[particleEvent]
        if eventName then
            if eventName.posAdjustment and (eventName.posAdjustment == 'high_vertical') then
                pos = native.vec3(pos.x, pos.y + 100, pos.z)
            end
            local soundKey = eventName.sound
            local soundObject = self.particleEmitterObjects[self.currentParticleEmitterObject]
            if soundKey then
                queueEvent(self, soundKey, {
```

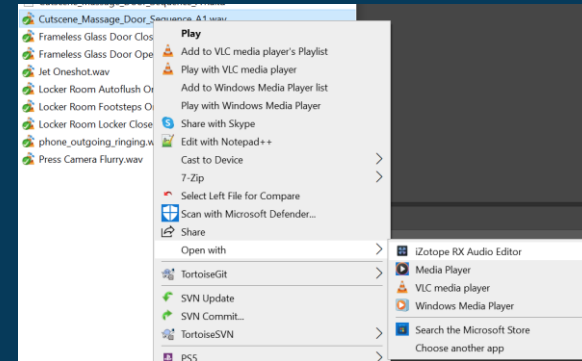

Audio Pipeline



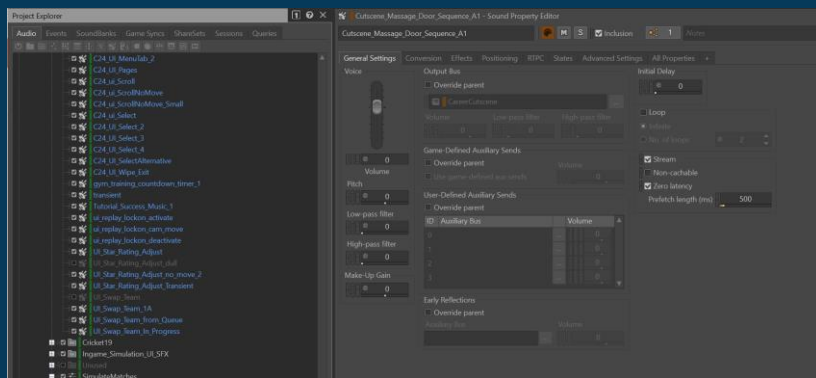
DAW



Assets Folder



Apply edits if needed



Middleware/Audio Management Software

```
cuts = {  
  {  
    { camera = 'cs_camera02', frame = 0, transition = 'cut' },  
  },  
},  
soundEvents = {  
  { frame = 0, playEvent = 'rejuvenation_room_door_sequence' },  
},  
}
```

Game Code

The expectations from Game Studio Employers

- Job Applications for sound design roles have become quite **standardized**
- CV, Coversheet
- 1 minute design showreel
- Technical showreel
- Often listed as bonus
 - Knowledge of game engines
 - Knowledge of coding languages
 - Knowledge of version control software (git, SVN, Perforce)

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Is it possible to cram the job-readiness required for a junior position into a single unit of study?

Is that the number 1 priority of a unit of study?

Triaging of topics for curriculum design

- Sound Design mentality and practice
- Industry knowledge – expectations of employers
- Middleware practice
- Awareness of other industry tools
- Providing students with a roadmap of ‘where-to-from-here’ if they wish to pursue game audio

Thankyou

