1. You know who your readers are, what they know, and why they should care about your problem.

    My readers are cognitive science students and anyone who is remotely related to HCI. Music technology readers will also find it interesting. All these categories will definitely know something of digital music environments, especially something like MIDI, as everyone is heavily exposed to it now. Studied music and tech people might have an idea about something like "hyperinstruments."

    All of these classes will benefit to learn something from my problem, as most will have some reference point into music technology from either science fiction or real life. It should give them more information into the current sector which is traditionally seen as static except for tsunami instances like Leo Fender.

2. You know the kind of ethos or character you want to project.

I'm projecting an undergrad student researcher who is interested in leveraging computers to aid in music activity. I want to continue exploring this medium, but another edge is that many of the concepts on the computational side in the music domain can be transferred to or from other domains. I also want to propose around the middle of the practical conceptual scale some designs and models that might be implemented.

3. You can sketch your question and its answer in two or three sentences.

    What and how might we use and design cognitive augmentations for engaging with music in any capacity?

    The future for many of our technology apparatuses is more fluid interfaces balanced against their invasiveness, but the desire for new experiences can be opened up tremendously by these technologies. Widening the field will level centralization effects we see happening due to the digital distribution of music hitting its stride alongside a pandemic shutting every in person experience. Whether it is by giving a new way to listen to music, experience it, interact with instruments and so forth it is the future, and it should be in the hands of the creators themselves versus centralized digital distribution companies.

4. You can sketch the reasons and evidence supporting your claim.

    Claim: Musicians will have to innovate on their cognitive abilities utilizing computers.

    Reason 1: Music education is rapidly advancing as we find other domains VR/machine learning/etc is applicable to.

    Evidence:

Source 8 - Evaluating the effectiveness of mixed reality music instrument learning with the theremin

The authors found that real-world training and XR training resulted in equivalent performance on the steadiness test and both outperformed the group that received no training. This work provides strong evidence in support of positive learning transfer with XR training environments but in a contrived scenario. Research in surgical training provides some practical results on the use of XR training for psychomotor skills. (p. 305)

Source Secondary 3 - Another Perspective: Music Education in the Age of Innovation

Most of us in senior positions grew up in an era of analog media and verbal literacy in which writing essays, penmanship, and manipulating words were considered to be core skills. These days, many students have a new concept of literacy. Some even actively avoid the effort of learning to write in cursive, preferring instead to work on keyboards. This is an era in which new artificial intelligence capabilities can enable a student to write a perfectly composed ten-page paper instantaneously when a topic is typed into a search bar.16 Perhaps it is “search and curation” rather than composition that should be seen as the new literacy. And in the context of music education, one wonders whether notation is becoming the equivalent of cursive while new graphical user interfaces enable new approaches to musical learning and performance. (s. From Symbols to Experiences)

Reason 2: Live music is going to be rapidly changing in the vacuum of the pandemic, especially as the demand for new experiences goes up in the overflowing area of digital music where anyone can publish anything globally.

Evidence:

Source 3 - Enheduanna—A Manifesto of Falling" Live Brain-Computer Cinema Performance: Performer and Audience Participation, Cognition and Emotional Engagement Using Multi-Brain BCI Interaction

More specifically, the majority of the audience participants and the performer participant across the majority of the events were able to successfully identify whether their brain-activity was interacting with the live visuals or not, and highlighted as main factors the changing colours of the visuals, part 2 “You/We” of the performance, the explanatory vignettes and the dramaturgical use of lights. (s. summary)

Source 1 - The Cyborg Philharmonic: Synchronizing interactive musical performances between humans and machines

Since, human performances are perfected through rigourous training and practice, it might be difficult to find musicians for varied instruments (e.g., for niche traditional instruments, and dependence on musician’s skill level or their time schedule) that is associated with ensemble settings. In this scenario, the use of robotic musicianship might reduce such dependences, enabling “musical performance on demand”

5. You know the questions, alternatives, and objections that your readers are likely to raise, and you can respond to them.

Music is meant to stick with traditional analog/acoustic instruments and recording methods!

Many orchestral tracks are usually composed in MIDI before the score being printed (from the MIDI) for live play, many hit tracks might have parts or wholes composed in Max/MSP, recording is destined to become more fluid as we gain more HCI/BCI interfaces. Although I do agree that classic/vintage constraints lead to a certain tone that is impossible or tedious to recreate with all the digital tools in the world.

Won't certain classes of people have more access to these technologies than others?

While musical instruments have become incredibly cheap and accessible, unless you are looking for something very special, it is an issue that the most cutting edge of technologies will be weaponized in the market. Although these ideas are usually off in conceptual land, the kinds of "take a pill and learn how to play the piano like chopin" in any of their derivatives are mildly threatening. It is unlikely for an augmentation to be so good while expensive at the same time it causes disruption, but this is a rich area to debate alongside computer composition.

How does this fit into the narrative of AR technologies and their gimmicky use? Aren't these miscellaneous tools typically novelties that go nowhere or find very limited application?

I think that there is something to be said about being careful when using words like augmentation because we barely see any common day use of the last round of AR tech. Most applications of AR I have used were indeed novelty. I think the only thing that I made use of is using google translate to translate text on the fly from a phone camera, which really falls more into computer vision and language processing. In regards to music as the digital market is more flushed with everything and anything to stand out will require unique sounds and experiences. It is really hard to innovate on Leo Fender and ripping 12 inch speakers, but I think to combat the digital distributors centralization of talent making use of computers will be a must. Spotify has been advancing their research lab rapidly, and they want to use anything to market their big hitters while the small musician is left in the dust of the vast digital void.

Doesn't this stuff already exist, what's the point of this paper?

The music market changed wildly during COVID-19, and musicians are left with closing venues, constraints on who can show up, and being outdone by full time social media musicians at the moment. This leaves a vacuum for the physical experiences when they truly resurge to have rapid reorganization, and injecting it with accessible technology will guide the next generation of live musicians. Streaming music is great, but fully taking away the physicality of it will leave humans unsatisfied. Not to mention music education is changing in regards to technology, which will influence the ways in which musicians learn. And that is important - the

more lower quality musicians there are(as you might find looking at a phone and not the instrument can be a detrimental experience), the more the market is flooded, the more dissatisfaction every musician will face. It is moving fast with streaming services out for blood.