Towards a Human–Centric Design Framework for AI Assisted Music Production

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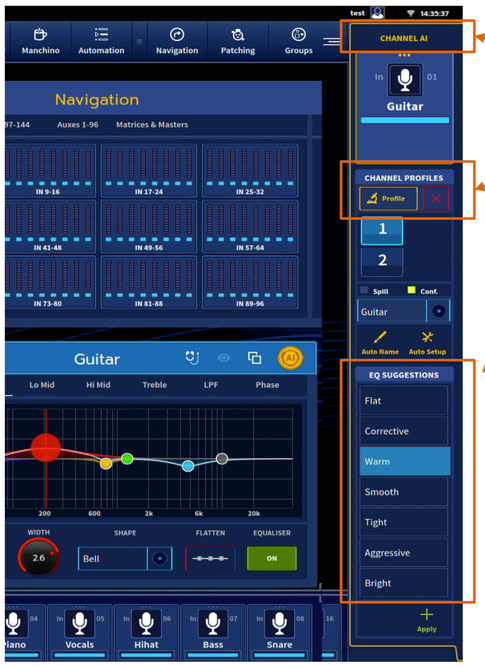
This research, aims to contribute to the discussion on how to best design human-centric MIR tools for live audio mixing by bridging the gap between research on complex systems, the psychology of automation and the design of tools that support creativity in music production. We present the design of the Channel-AI, an embedded AI system which performs instrument recognition and generates parameter settings suggestions for gain levels, gating, compression and equalization which are specific to the input signal and the instrument type. We demonstrate how a set of key design principles have been applied to inform the design of the interaction between expert live audio mixing engineers with the Channel-AI (i.e. a corpus of AI features embedded in the Midas HD Console.

Design Principles

Given that the Channel-AI is to be used mainly by highly skilled mixing engineers, we consider of paramount importance that the human-machine cooperation is balanced in terms of the level of user control, type and level of automation. A set of principles were collated and applied to guide the design of the Channel-AI and ensure that the models of interaction adopted mitigate the following risks :

- Automation making undesired, suboptimal, and non-rectifiable decisions.
- Removing engineers' authority and control to do their jobs in the best way they see fit.
- Forcing users to radically change existing workflows.



Purpose

- ❑ Explain the purpose of the AI.
- ❑ Make clear what the system can do and how well it can do it.
- ❑ Show the performance of the system choosing appropriate feedback strategies.
- ❑ Show when the system is not confident.
- ❑ Design for appropriate trust, not for higher trust.

Interaction

- ❑ Minimize the impact on the existing workflow
- ❑ Support efficient invocation.
- ❑ Support efficient correction.
- ❑ Support efficient dismissal.
- ❑ Make the level of automation adaptable.
- ❑ Design clear transitions between the different levels of automation.

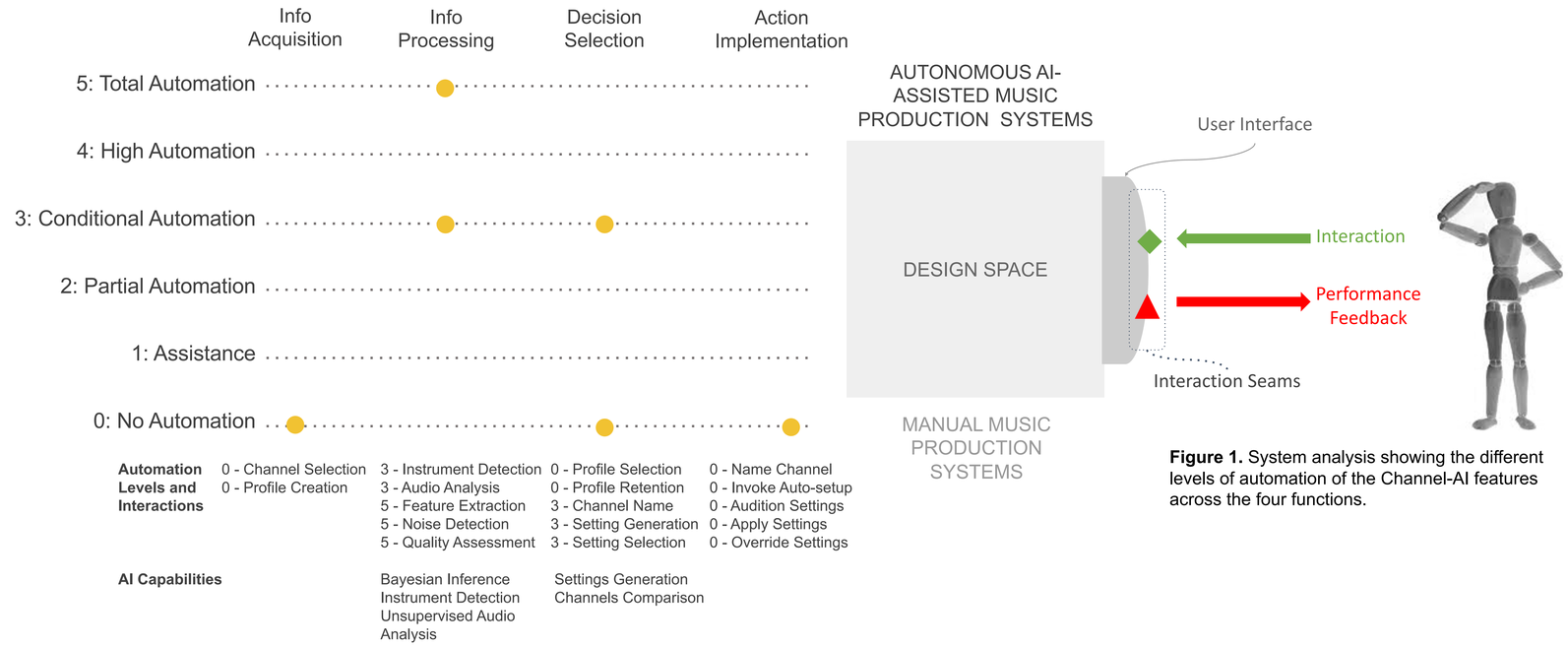


Figure 1. System analysis showing the different levels of automation of the Channel-AI features across the four functions.

System Analysis Framework

To understand where the Channel-AI stands in terms of human-machine cooperation and help our team identify risks and plan future system development, we performed a system analysis using the stage model suggested by [1]. The model consists of four functions that can be performed by either a human or an intelligent automation system, these are: i) Information Acquisition, ii) Information Analysis, iii) Decision and Action Selection, and iv) Action Implementation. Most complex MIR systems consist of many layers and each layer can exhibit different levels of automation, ranging from: No Automation to Complete Automation [2]. We combined models suggested by [1], [2] to analyse what level and type of automation each of the different components of the Channel-AI, as shown above.

Figure 2. MIDAS Heritage-D mixing console

Conclusions

In this poster we presented a method for analysing AI assisted music production systems, which in our experience is useful in both the design and evaluation phases. The proposed system analysis method aims to aid developers analyse complex system which consist of multiple MIR and ML components and incorporate different levels of automation in the different components of the system. This method is extremely useful since it allows to consider the system architecture in tandem with the human factors and optimise the human-AI cooperation prior to the development of the system. Moreover, this could be used for evaluation of existing systems.

Finally, we applied a set of design guidelines, which we demonstrated are well suited for designing human-centric intelligent music production systems. We showed how these principles where applied to guide the design of the Channel-AI and ensure that the human-machine cooperation is balanced, does not remove engineers' authority and level of control as well as enables the co-existence of the automation alongside the current user workflows.

Contact

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