

Symbolic Music Event Data Through the Internet of Musical Things

Positioning MIDI for a Secure Internet

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Abstract

The paradigm of Networked Musical Performance (NMP) is a growing research area at the intersection between the emerging fields of The Internet of Musical Things (IoMusT) and Ubiquitous Music (Ubimus) and the more established fields of The Internet of Things (IoT) and Ubiquitous Computing (UbiComp). Currently, the principal method of collaboration within both the NMP and IoMusT is audio streaming using VoIP, video call apps or hardware devices. There is scope for discussion for a symbolic musical event data standard to be integrated into these fields for remote musical collaborative purposes. Doing so would facilitate remote networked musical interactions beyond audio. This thesis will investigate what is necessary for a secure, encrypted method of symbolic musical event data transmission over the contemporary internet. Musical Instrument Digital Interface (MIDI) will be the test case for our symbolic musical data standard due to its ubiquity, robust support and long history of being at the forefront of electronic music creation and music production in general.

The research has investigated, defined and proposed an updated method to extend MIDI for secure use over the contemporary Internet. Technical work merged the standard transmission protocols which are the backbone of the Internet, such as AES encryption, SSL secure certificate validation and TCP data transmission, at the same time as utilising the ubiquity and stability of MIDI. The project has brought together the aforementioned topics by summarising the academic literature in each respective field that focuses on human-computer interaction, internet enabled networked musical performances and general musical performance. The research will also define remote networked symbolic musical event data interactions and standardise a protocol for creating such connections and collaborations. In addition, a discussion will be made about the impact extending MIDI devices, both legacy and contemporary, could have on the future of IoMusT.