

**SHARETRACE: PROACTIVE CONTACT TRACING  
WITH ASYNCHRONOUS MESSAGE PASSING**

by

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Submitted in partial fulfillment of the requirements for the  
degree of Master of Science.

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# ShareTrace: Proactive Contact Tracing with Asynchronous Message Passing

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## **Abstract**

Contact tracing is a non-pharmaceutical intervention that aims to control the spread of disease by identifying and quarantining infected individuals and those with whom they came in close contact. Numerous approaches to digital contact tracing have been proposed in the context of the coronavirus disease 2019 pandemic. Decentralized digital contact tracing limits the sharing of personal data, but no prior work has utilized non-diagnostic information *and* indirect contacts to effectively estimate infection risk. This work improves on prior efforts of ShareTrace by providing an asynchronous message-passing algorithm that permits a fully decentralized deployment. A reference implementation is provided and evaluated for accuracy, efficiency, and scalability.