End-to-End (E2E) solution. One that is robust, to some extent, to external in-

ii

complicated by itself.

and other possible micro-solutions, besides the ASR engine, which is very

and or microphone arrays, adaptive beamformer(s) for performance increase,

for robustness, noise cancelation and separation modules, multi-microphones

Such an E2E ASR solution may include, elements of speech enhancement

be compatible with new applications.

or for performance increase, and modular enough to conveniently reform and

terferences, flexible, in a way that it can be extended to adapt to new scenarios

**Abstract**

In time, the idea of ASR functionality evolved to a more comprehensive,

of challenges are what characterizes a realistic scenario for an ASR system.

ambient environment, multiple speakers, or faulty microphones. These kinds

be. That holds especially under some circumstances, such as having a noisy

ties performing decently, regardless of how sophisticated and advanced it may

and advanced that may be, will face difficulties performing decently, difficul-

scenarios, and applications. An ASR engine by itself will face as sophisticated

of speech into text, is on the rise today and is required for various use-cases,

Automatic Speech Recognition (ASR) functionality, the automatic translation

tween those metrics, plus the ability to forecast the impact of each variation in

iii

custom dedicated hardware acceleration in order to replace the traditional

changing algorithms and approximating complex computations, utilizing a

and robustness. Third, we present an approach of substituting architectures,

that can generalize and provide results of improved overall performance

we will present the effectiveness of applying machine learning techniques

Second,

as a result of a change in the system’s specifications or constraints.

emphasizing any bindings between the metrics and degree of impact derived

for each of the different domains, which spread over vast engineering subjects

limited devices. First, we describe the possible available evaluation metrics

designing a robust E2E-ASR system, possibly targeted for mobile, resources-

In this research, we present novel progress in the direction of optimally

one has on the others.

Being a comprehensive solution built of numerous micro-modules is tech-

Secondly, one needs to determine the extent of correlation be-

ASR system.

define the different metrics that are used for the evaluation of such an E2E

one should first

and the detection accuracy,

lowed for real-time analysis,

maximal computation time al-

SW (software) requirements or limitations,

To find the optimal trade-offs between performance, HW (hardware) and

connectivity to the cloud over the internet.

But that comes with the cost of giving up on real-time analysis and permanent

on the cloud, the system can fit more easily in less computing-capable devices.

limited mobile systems. By offloading the complex computations to a server

nologically challenging to implement and difficult to integrate into resource-

state-of-the-art SW based solutions,

and thus providing real-time analysis

capabilities to resource-limited systems.

iv