



# SURF Student Colloquium

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**Grant Number**

70NANB16H

**Academic Institution:** Bowie State University

**Major:** Computer Science

**Academic Standing** Senior  
**(Sept. '17):**

**Future Plans** Pursuing a career in Software Engineering  
**(School/Career):**

**NIST Laboratory, Division, and Group:** Communications Technology Laboratory, Wireless Networks Division

**NIST Research Advisor:** Chunmei Liu

**Title of Talk:** Characterizing User Experience of Voice Application

**Abstract:**

In 2012, the Congress passed the Middle Class Tax Relief and Job Creation Act of 2012. The act calls for an establishment of a national public safety broadband network to expand high-speed wireless broadband and to improve communications interoperability among first responders. Among communications by first responders, voice is one of the most critical applications. Voice quality is crucial in a first responder’s line of work, and it could be a matter of life and death. Focusing on voice quality, this project is to investigate and implement mechanisms to translate network performance metrics, e.g. packet loss rate and delay, into quantifiable user experience levels.

Network operators have various methods and categories available to achieve a proper voice quality assessment. Specifically, there are the subjective versus objective methods and the listening-opinion versus conversation-opinion categories. Based on the goals for this project, the objective method that provides the conversation-opinion scores is desired, and this leads to the E-model (ITU-T G.107) to serve as a base for the research. The E-model is a common tool for assessing the combined effects of variations in transmission parameters that affect the conversational quality. The fundamental principle is that the psychological and physical system factors are additive and the primary output produced is called the R-factor, which is a scalar rating of the transmission quality.

Using the E-model, we developed a Python program to test different scenarios to illustrate the change in R-factor over the length of the transmission. The outcomes of the project are planned to be used as inputs into network control algorithms, such as admission control and preemption algorithms, with the goal of maximizing the amount of traffic the public safety network could serve, while ensuring that first responders receive services at the required level of quality.