Call up #8 against Standing Offer W7711-037898
CR 2008-158

Simulation of the CF Land Vehicular Command Post

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Contract #W7711-037898/001/TOR

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Abstract

This report describes work performed by Trellis Consulting on Callup #8 against Standing Offer #W771-037898 during the months of May to July of 2008. Technical assistance relating to acoustical signal processing was provided throughout this period in the Noise Simulation Facility at DRDC Toronto. A special project involved the design of an interface box between single ended signals and balanced signals. This will give the system more flexibility to accept more input signals from different sources. Preliminary examinations of the Bison vehicle were undertaken.

Résumé

Le présent rapport décrit les travaux effectués par Trellis Consulting, selon la commande n^{o} 8 subséquente à l'offre à commandes n^{o} W771-037898, de mai à juillet 2008. Une assistance technique liée au traitement des signaux acoustiques a été fournie tout au long de la période dans l'installation de simulation de bruit de RDDC Toronto. Un projet spécial portait sur la conception d'une boîte d'interface entre les signaux asymétriques et les signaux symétrique. Le système sera ainsi plus souple et pourra accepter plus de signaux d'entrée venant de diverses sources. Des examens préliminaires du véhicule Bison ont été effectués.

Executive Summary

During this eighth call up against Standing Offer W7711-037898, numerous small tasks relating to acoustic signal processing were undertaken and completed. Technical assistance was provided on interfacing a CD player with an audiometer in support of studies on central auditory processing. To promote studies on speech communication in noise, a demonstration was attended to acquire familiarity with a newly acquired spectrum analyzer and laptop computer. Assistance in sorting out computer hardware issues was given for a study in progress on Vigilance. An interface box to connect single ended signals with the balanced signals required in the Noise Simulation Facility at DRDC Toronto was built. The Bison C3I command post vehicle was examined at NRC in Ottawa and initial design thoughts for a simulator were considered.

Sommaire

Pendant la réalisation de la commande n^{o} 8 subséquente à l'offre à commandes n^{o} W771-037898, de nombreuses petites tâches liées au traitement de signaux acoustiques ont été entreprises et accomplies. Une assistance technique a été fournie pour interfacer un lecteur de CD avec un audiomètre, afin d'appuyer les études sur le processus auditif central. Afin de promouvoir les études de la communication orale dans le bruit, on s'est familiarisé avec un analyseur de spectre et un ordinateur portatif nouvellement acquis en assistant à une démonstration des appareils. On a reçu de l'aide pour dégager les problèmes de matériels informatiques en vue d'une étude courante de l'expérience Vigilance. Une boîte d'interface pour connecter les signaux asymétriques et les signaux symétriques nécessaires dans l'installation de simulation de bruit de RDDC Toronto a été construite. Le véhicule de poste de commandement C31 a été examiné au CRNC à Ottawa et les premières idées conceptuelles pour un simulateur ont été étudiées.

Table of Contents

1 Introduction

This document describes the work carried out by Trellis Consulting while working on Call up #8 against Contract # W7711-017898/001/TOR. This call up covered the 3-month period from 1 April 2008 to 31 July 2008.

The Statement of Work called for:

a. Noise recording and calibration of levels to simulate the ambient of the CF Land vehicular command post.

b. Study of the requirements, purchase and assembly of equipment in support of a project on auditory overload strategies in CF land operations.

c. Cross checking of acoustics devices against DAs.

d. Maintenance and calibration of existing computer and acoustics devices in the Noise Simulation Facility, Auditory Perception Laboratory and Hearing Research Laboratory.

2 Tasks Performed

The following sections describe the work performed under this Call up.

2.1 Technical Assistance

At various times during the call up, there were requirements for some technical assistance with experiments that were either underway or planned. The first case involved interfacing a CD player with the audiometer in support of new studies on central auditory processing. This was completed successfully and the research assistants involved in the studies were instructed on its use.

Personnel at DRDC Toronto encountered computer hardware problems with a system used for studies of vigilance requiring the simultaneous performance of auditory detection and visual motor tasks. The slave computer supporting the visual motor component lost required settings. A procedure was developed for correcting this defect and training was provided to those involved with running the experiment.

A new spectrum analyzer was obtained for planned studies of communication in noise. The contractor attended a demonstration given by the supplier in order to gain familiarity with the new device and practiced using the various options for later use.

2.2 Interface Box

Equipment used to control the presentation of continuous noise in the Noise Simulation Facility (NSF) of DRDC Toronto required the addition of an interface box to convert single ended signals to balanced signals. The NSF uses balanced audio signals throughout it's signal path. With the exception of high-end audio components, most audio equipment generates a single ended signal. The interface box gives researchers the ability to connect almost any device that generates an audio signal (balanced or single ended) to the NSF without concern about compatibility. The interface box will allow more accurate calibrations and give researchers more flexibility in their choice of audio sources.

3 Bison C3I Command Post

A mock up of the Bison C3I Command Post located at the Centre for Surface Transportation Technology (CSTT) at the National Research Council in Ottawa was investigated with the goal of creating a simulation in the Noise Simulation Facility at DRDC Toronto which would mimic the acoustic environment in which the vehicle is used as well as controlling the workload of the operators. This would allow researchers to examine for strategies to relieve auditory overload and thus improve performance. This is the first step in a long term study towards modeling the environment.

4 Recommendations for Future Technical Work

In order to continue with the lines of experimentation detailed above and based on an assessment of the work completed to date, the following requirements are foreseen:

1. Expansion and validation of currently available software in the Noise Simulation Facility to model auditory overload in a CF vehicular command post.

2. Noise recording and calibration of levels as required.

3. Consultation on the purchase of equipment for the measurement of noise and computer hardware/software in support of psychoacoustic experimentation and signal processing.

4. Cross checking of acoustics devices against DA's

5. Expansion of the interface box to allow for signal selection, without changing cables. The current equipment/computer setup in the Noise Simulation Facility at DRDC Toronto requires plugging and unplugging of cables to select the proper noise source. The interface box can be used to select the source, rather than having to switch the cables. This would alleviate the workload and guard against errors.

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