Carleton University

GENERIC HUMAN INTERFACE DEVICE (GHID)

CUSEF Budget Proposal

To:
CUSEF Boards Allocators
Office of the Dean of Engineering
Room 3010 Minto Centre
Carleton University

Date:
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From:
GHID Team – Fourth Year
Biomedical Project

Contact Person:
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Abstract

The Generic Human Interface Device (GHID) is a fourth year biomedical engineering project that started in the fall 2013 term supervised by Dr. Adrian Chan. GHID is a generic device aimed to act as a development platform to allow control of mouse cursor/joystick (wired or wireless) through various interfaces (example, wireless watch, force plates). This project will help the people in rehabilitation center. This proposal is a request for financial support to purchase the parts required in building the GHID. We, the team, have already finalized and purchased from personal finances the parts required for the GHID to start off. The receipts are attached in the appendix.

Group Introduction

The GHID team consists of 5 members, a supervisor and four students. Dr. Adrian Chan is the project supervisor and the students are Mohamed Abdalla, Francis Papineau, Mohamed Abdelazez and Sugal Daher. The team members are all fourth year biomedical students with coop designation and expected to graduate in winter 2014.

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Overview of the Project

In a rehabilitation environment, patients are requested to interact with a computer to stimulate different body systems such as the sensory system, muscular system, or the skeletal system. The patients interact with the computers using devices which are called Human Interface Devices. Human interface devices include keyboards, touch screens, mouse, joysticks, force plates, accelerometers, etc.

The common human interface devices, such as keyboards, mouse and joysticks support the plug and play feature which enables the devices to be recognized by a computer with no intervention from the user. For example, when a user connects a mouse to a computer, the computer will recognize that the newly connected device is a mouse and will configure the device as such so the user can start using it immediately.

However, a question arises. What if a doctor wants to stimulate a body system of a patient that will require a custom device that does not support the plug and play feature? For example, a doctor might want to stimulate the bicep of a patient by developing a game that will be controlled by the force of the contraction of the muscle. To achieve that, a custom human interface device will have to be developed and programmed to allow a computer to recognize the

new device and configure it accordingly. Writing the software can consume time and hinders the development of the patient.

The objective of the project is to develop a device that will support the plug and play feature while providing a customizable interface. The proposal will introduce a solution, discuss its feasibility, implementation plan, and budget.

Request

This section discusses in details the expenses and the purchases to be made for the project implementation. The table displays the parts and devices needed to be purchased along with the quantities, unit cost (cost without the tax) and total cost (including the tax). The costs are noted down in Canadian dollars. Moreover, the role of each component and reason of purchasing is listed in below.

Table 2 Budget Table

Hardware Cost	**Qty.**	**Unit Cost($)**	**Total($)**
EZ430-Chronos-915	3	67.56	**202.68**
RFBee V1.1	2	48.07	**96.14**
Arduino Fio	1	96.14	**96.14**
Lithium Polymer Ion Battery (3.7V 850mAh)	1	12.66	**12.66**
FTDI Cable	1	22.83	**22.83**
Arduino ADK	1	76.64	**76.64**
AVR MKII ISP	1	42.82	**42.82**
Arduino Wireless SD Card Shield	1	30.68	**30.68**
Total (Funds requested from CUSEF)			**538.59**

Parts Details

EZ430-Chronos-915: The EZ430-Chronos-915 will act as a router to wireless sensors for remote data collection. The Chronos is a smart watch that can be easily worn by everyone and can also wirelessly communicate with the Arduino ADK.

Arduino ADK: The Arduino ADK will act as the base station. It has many digital I/O ports and has a USB host interface.

Arduino Fio: The Arduino Fio is another microcontroller board and it can be used for wireless applications.

FTDI Cable: The FTDI cable is used to upload sketches from the Arduino Fio. This cable uses a TI low-power sub-1GHz transceiver.

AVR MKII ISP: The AVR MKII uses SPI to load the firmware on the Arduino ADK. It is upgradable to support future devices.

Arduino Wireless SD Card Shield: The Arduino wireless SD card shield uses a wireless module that allows the Arduino ADK to communicate wirelessly. This module has an on-board switch that allows it to communicate with the microcontroller.

RFBee V1.1: The RFbee wireless transceiver will be used to facilitate wireless communication between the Chronos smart watch, Arduino ADK, and sensor node. Data can be easily transmitted between devices.

Lithium Polymer Ion Battery: The Lithium Polymer Ion battery is used to power the sensor node.

Who will be affected by the purchase and how?

The fourth year students involved in the project to be able to implement the project. The parts have been purchased from the personal finances of the students. So, it will benefit them by refunding the money. Executing the project will benefit the students by learning more on how to integrate the different parts together to reach to the desired goal; so it will affect us academically, design, and software and communication skills. It will also benefit, academically and technically, the proceeding 4th year students in the years after to carry on and build upon the GHID. In case of success implementation of the project in the 8 months span until April 2014 – a prototype could be produced.

Expected lifetime of equipment purchased:

The parts are expected to have a 10 year expected lifetime.

Maintenance

There is no maintenance cost associated with the GHID. In the 8 months academic year the assigned students to the project group will be responsible of upgrading/replace parts of the device if needed.

Conclusion

The GHID fourth year project team would like to request financial support for implementing the GHID. The amount of funds requested from CUSEF is $538.59. The parts have been purchased from the personal finances of the students. The GHID team will be responsible for maintaining the device. The team believes the project is a great opportunity to expand on its technical and academic skills, in addition, it has the potential to add value to computer users and specifically to the rehabilitation centers.

Appendix