Dokkō Designs

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PROGRESS REPORT

Over the past three weeks, *Dokkō Designs* has nearly completed Phase I in the development of the Freedom Voice Controller™, a voice activated remote to be used by immobile patients to control their Freedom Bed™, a ProBed Medical technologies Inc product.

Phase I

Phase 1 consists of the following tasks:

1.) requirements analysis
    i.) background research
    ii.) user functional requirements and user interface
        i. caregivers
        ii. potential end-users
        iii. user interface experts
        iv. biomedical experts
2.) system level analysis
    i.) block diagrams
    ii.) system architecture
    iii.) hardware consideration
        i. microphone
        ii. speakers
        iii. voice recognition chip
        iv. CAN bus
        v. additional microcontrollers
    iv.) software/firmware consideration
3.) technical specification
    i.) system requirements and benchmarks
        i. performance characteristics
        ii. error handling and extreme conditions
        iii. quality issues
        iv. physical environment
        v. security issues
        vi. resource management
        vii. environmental impact
        viii. documentation
        ix. maintenance

Requirements Analysis

Since the Freedom Voice Controller will be used in a medical device by a rather unique end-user, Dokkō Designs is investing significant time and resources into identifying the key user function requirements. One of these requirements involves the design and implementation of an easy-to-use and efficient user interface that caters to the particular needs and wants of our end-user. Dokkō Designs has drafted several UI schemes for presentation to end-users, caregivers and experts in the field, including SFU faculty members. A general list of commands has also been tentatively agreed upon, to be discussed with Pro-Bed and faculty members familiar with the issues surrounding the Freedom Bed and its end-user.

System-level analysis

Dokkō Designs has completed proposed system block diagrams and the resulting system architecture. The Dokkō team has split into several groups to more efficiently research and develop the various modules of our system. Our respective areas of research should yield conclusive results by the first team deadline of February 12th.

Using the Internet and several reference books, our CEO is investigating various microphones to determine which would be most appropriate for our product; additionally, methods for analog filtering of the microphone signal output are being studied. Our system will also require some form of audio output as part of the user interface and appropriate speakers are also being investigated.

After researching and comparing commercially available voice recognition DSP chips, Dokkō Designs decided upon and ordered the Sensory Voice Extreme Development Kit. This package was chosen as it provides the greatest degree of flexibility for realizing a user dependent system. After receiving the package, the chip was tested and several test programs run in order to understand the functions and reliability of the voice recognition technology on the chip. We discover that the chip enables some minor control over the DSP logic and is very effective at storing and outputting voice at various compression rates. However, while it can recognize words accurately when spoken in a regular fashion, it sometimes fails when the words are pronounced differently. We are investigating methods to overcome this obstacle, including recording and storing several versions of each word into the chip so that most variations in pronunciation could be accommodated. Ideally, if we could fully understand the chip's algorithm and functionality, such as the voice recognition process options, we could try to adjust these to ensure the highest accuracy in detection for our specific application.

For the CAN components, ProBed Medical Technologies has been consulted on several occasions in order to ensure that the CAN network for the Freedom Voice Controller will be compatible with the rest of the Freedom Bed. Dokkō Designs has thoroughly researched potential components and parts for the CAN network will facilitate interfacing with our DSP chip. We have determined that CAN will be accessed through a controller and transceiver managed by the Sensory chip. At present we believe that a microcontroller with a built-in CAN controller will NOT be necessary for our application since we already have a microcontroller on the Sensory chip. Therefore, we did not need to consider hardware for an additional microcontroller.

Technical Specification

Dokkō Designs has begun the task of outlining crucial system requirements needed for the successful design, implementation, and delivery Freedom Voice Controller™. Over the next weeks, these requirements will be completed and fully specified.

Budget

Dokkō Designs is financially sound and the development costs of the Freedom Voice Controller™ are well on schedule. We have disbursed approximately $230 on our Sensory Development Board, as well as ten dollars in long distance calls to Sensory Inc in California and Pro-Bed in Abbotsford. These funds have been disbursed from our initial check of five hundred dollars from ProBed.

Human Resources

Group dynamics are still in the healthy phase with happy chatter nicely packaging the serious technical topics we frequently discuss. We are all still friends and don't fear the weekly meeting we have scheduled.

Action Items

February 12th is the first milestone date for the Dokkō Design team. By this time, sections 1 and 2 of Phase 1 will be completed; in particular, the following outstanding tasks will be accomplished: complete hardware consideration and component purchasing for CAN network, microphone and speaker selection, and specification and initial design for the user interface.