6.S196/PPAT Client Descriptions
September 2011

[Bracketed terms] indicate skill sets likely to be involved in working with this client.

Amber (shopping) [Smartphone, software]

Amber is blind. While shopping, she wishes to efficiently identify products. While she has a barcode scanner, she notes that it can be difficult to find the barcode on an object since its placement varies. Shape symmetry (e.g. of cans) increases ambiguity in barcode placement.

Brian (bicycling) [Sensors, electronics, firmware?]

Brian is blind. He wishes to ride a bicycle safely within a suitable environment, for example around a rubberized outdoor high-school track.

Dan (screen viewing) [Sensors, software, display]

Dan has low vision. His work environment includes frequent conference-room meetings and presentations in which speakers project slides or charts onto a fixed, wall-mounted screen. He wishes to have a clear view of the projected material, which he can contrast-enhance, magnify or pan as desired. He also wishes to be able to view earlier slides, even if they are no longer being projected.

[Note: this project could incorporate software from NoteTaker, an existing assistive technology for viewing chalkboards or projected material, developed by a student who is now pursuing his Ph.D. at MIT.]

Derek (reaching and grasping) [Mechanisms, materials, electronics?]

Derek is a 43-year-old man diagnosed with incomplete tetraplegia secondary due to a spinal tissue tumor. Derek uses a power wheelchair for all mobility, and is very active with his family and in the community. Derek reports difficulty with upper extremity reaching and grasping of the telephone, the TV remote, and his laptop, and with positioning and opening his laptop. He has impaired sensation, which limits his feedback for knowing when he has sufficient grasp of an item or is in proximity of an item in situations with poor lighting. He also reports having great problems with finger foods, because he is not able to sense temperature, and has developed burn blisters from handling hot foods.

Ellen (comfort, balance) [Mechanisms, materials]

Ellen underwent a right upper extremity forequarter amputation including the upper limb, glenoid, and medial scapula (basically the entire arm and shoulder). She wears a prosthetic shoulder cap for symmetry and as a protective frame. She desires to re-design the shoulder cap to provide an appropriate mass in place to counterbalance the existing limb, to address evolving skeletal abnormalities such as gait disturbance, spinal rotation, and neck, back and hip strain due to the lack of efficient biomechanical counterbalance. Ellen wants the counterbalance both for dynamic situations like walking and picking up objects from the ground, and for static situations like standing and sitting.

Farzin (email, teleconferencing) [Sensors, software, mechanisms]

Farzin has a diagnosis of Multiple Sclerosis which has resulted in quadriplegia, with no functional movement in his extremities. He drives a power wheelchair with the aid of a proximity sensor head array. He uses eye gaze, head tracking, and voice recognition software to operate his TV, phone and computer. He currently has several accessibility devices mounted to his chair.

Farzin wishes to communicate with his family via email and Skype. Any device mount must support easy installation and removal by staff, as well as adjustability to accommodate his field of vision. It should also support operation from his bed, and being swung out of the way when not in use and for patient care. Finally, Farzin is concerned about the aesthetics of his adapted devices.

Janet (bed control) [Electronics, software]

Janet has Multiple Sclerosis which prevents any functional movement in her lower extremities and allows only limited movement in her right hand. She drives a power chair with a proportional hand control. She currently controls her Hill-Rom 8400 bed functions with a custom device incorporating six single switches (head up/down, foot up/down, bed up/down) installed in a project box and mounted on an over-the-bed table. Access to these switches with her dominant hand is not always achievable.

Janet wishes to control her bed using either voice commands or with a single-switch scanning device (e.g., a TASH Mini Relax infrared transmitter). Her words are clear but her compromised diaphragm prevents her from projecting sound, resulting in a weak voice. She also has limited vision.

Jason (triathlons) [Materials, mechanisms]

Jason is a 36-year-old man whose SCI has resulted in paraplegia. Since then he has become an active wheelchair user, participating in triathlons. He wishes to adapt his sports chair with lighter materials such as titanium, carbon fiber, and seating foams. He also desires an effective way of transitioning among triathlon stages, as well as a way to keep his legs floating during the swim portion.

Joyce (environmental control) [Software, electronics]

Joyce has quadriplegia secondary to Multiple Sclerosis. She uses a power chair operated through a single switch scanner controlled by a chin switch. She currently uses a minimal number of functions on a Quartet environmental control device, activated by a single Microlite switch mounted on her bed. This switch is not always accessible to Joyce while she is in bed, and never while she is in her wheelchair. She also has difficulty remembering how to operate the device and is sometimes confused by its cascading menu format.

Joyce would like to have better control of her television and nurse call mechanism through a voice-activated device when in bed and in her chair. She should have adequate voice projection to control voice recognition devices. Since Joyce struggles with memory issues, she requires any proposed device to be simple and intuitive.

Marty (perceiving surroundings) [Smartphone/tablet, software]

Marty has low vision, manifesting as an inability to discern text, signage and objects in his surroundings. He desires a means of visual amplification and contrast enhancement to support tasks such as menu-reading in dim restaurants, and sign-finding in stores. He also desires a hands-free mode in which he can see a contrast-enhanced image of the workspace in front of him, to support woodworking (he currently organizes materials by row and column in bins, and finds them by feel).

Samantha (reminders) [Smartphone, software]

Samantha has a brain injury, which produces deficits in short-term and working memory. She finds existing reminder devices "too simplistic," and past experience with multiple devices "overwhelming." She desires easy creation of "multiple, recurring" reminders that "do not interfere with one another." She wishes to have reminders announce themselves in her own voice rather than as "meaningless tones." She desires easy creation of recurring reminders such as "take vitamins" (daily) or "drink water" (several times per day), as well as *in situ* creation of one-time reminders such as "car is parked on Level 3" or "attend class today at 1pm." Integration with a calendar program would be desirable.

Sunish (clothing) [Smartphone, software, electronics]

Sunish is blind. He has some perception of light and dark, and can distinguish between light and dark colors, but cannot distinguish among similar shapes or similar colors. He desires a smartphone application (to run on any platform), that can verbally report the color and pattern of an article of clothing at the touch of a button. It should work in ambient light, or supply its own light. He would also like the ability to name an article of clothing, e.g., "This is my blue work shirt," and have the device generate that name the next time it is asked to "describe" the article.