

EBSID

Eye-Blinking Switch for Individuals with Disabilities

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Outline

- Introduction
- Problem Statement
- Market Overview
- Objectives
- EBSID Architecture
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- Estimated Budget
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Statistics

People with a disability* in 2010:



19% of total population or approximately 58.7 million people.



19% of total population or approximately 707,900 people.

*According to US Census Bureau, more than a half of this population were severely disabled (physical and/or mentally).

What Motivates Us?



- Independent living.
- Improvement of communication and control of their surroundings.

The Problem

Client: Puerto Rico Assistive Technology Program (PRATP)

- **Direct Contact:** Dr. Mauricio Lizama
- **Their Objective:** To increase Assistive Technology access for people with disabilities.

Problem Identified

Limited communication tools for people with severe physical disabilities that are only able to control their eye blinking.

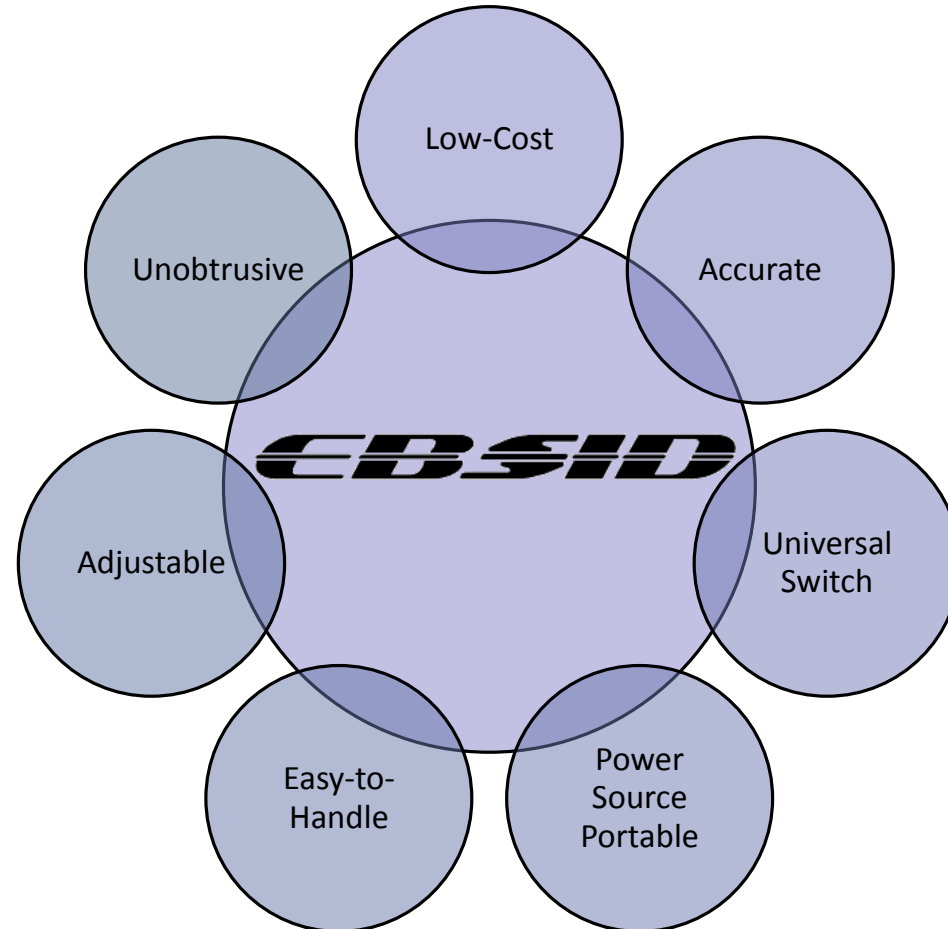
Solution Proposed

Eye-blink switch with an involuntary blink filter.

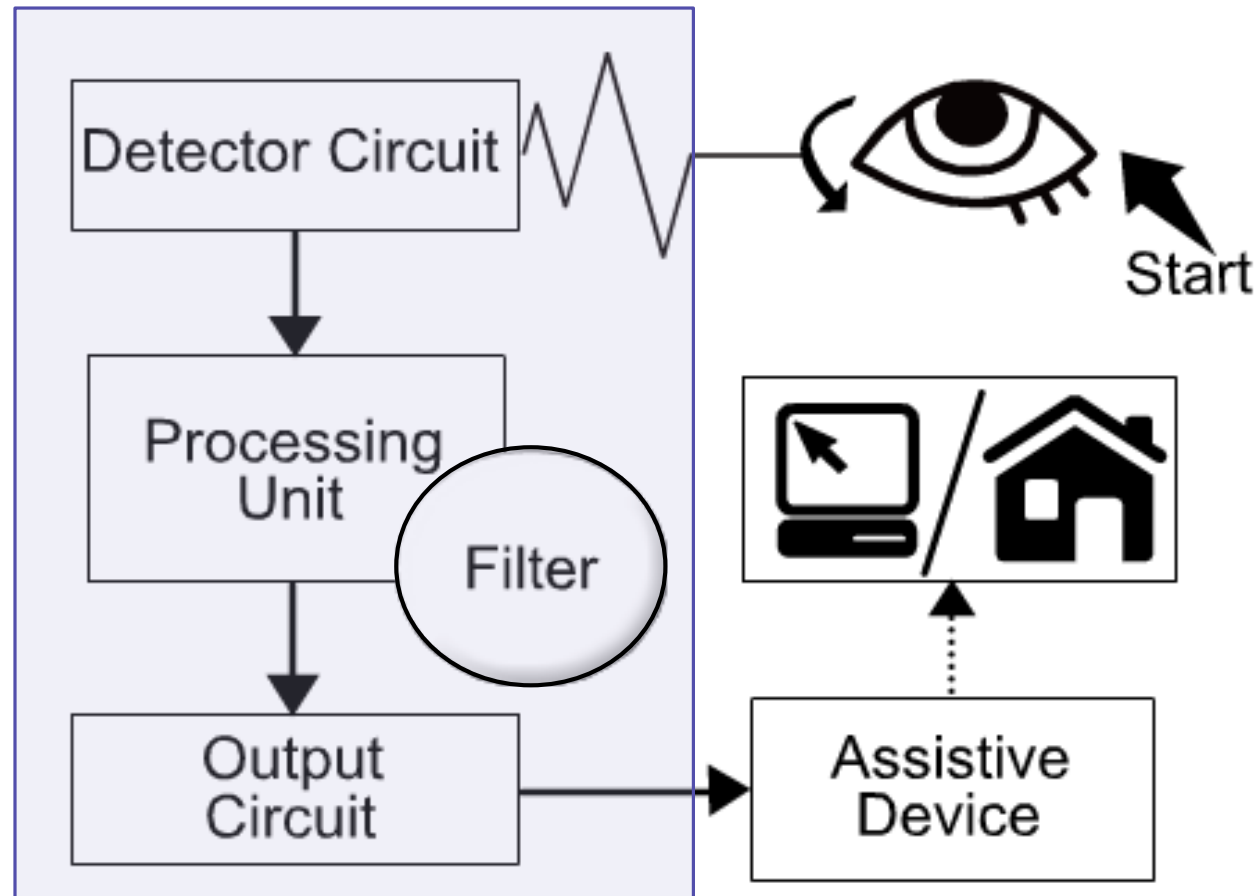
Market Overview

Product	Advantages	Disadvantages
SCATIR Switch	<ul style="list-style-type: none">• Rechargeable batteries	<ul style="list-style-type: none">• \$699.00• Accuracy• Not easy-to-handle or to adjust
Eye-blink Switch from Enabling Devices	<ul style="list-style-type: none">• Easily mounts to most eyeglass frames or head bands.	<ul style="list-style-type: none">• \$160.95• Obtrusive• Eyeglasses not included
Fiber-optic eye-blink Switch kit AMDi	<ul style="list-style-type: none">• Low interference of luminescence contamination.	<ul style="list-style-type: none">• \$645.00• Obtrusive• Any movement of the head can cause the sensor to misaligned.

What will make our Product Different?



EBSID System Architecture



Main Objective

To design and deliver by November 17, 2014 an universal eye-blink switch that enables individuals with severe physical disabilities to communicate with their environment through a voluntary eye-blink action.

Other objectives (1/3):

To design and implement a low-cost system, in which in our case is defined by a maximum of \$125.

Other Objectives (2/3)

Sensor for Blink Detection

- Safe, unobtrusive, and easy-to-handle system.
- Capable of detecting involuntary and voluntary blinks in a person.

Output Circuit

- Universal output circuit with a 1/8 monophasic output to activate a “switch closure” action.

Other Objectives (3/3)

Processing Unit for Filter Implementation

- Real-time system capable to perform online signal processing directly on the hardware computational structure.
- Accuracy of a minimum of 90% in the activation of the switch once a voluntary eye blink have been detected.
- Experiment to collect data from a minimum of 10 people which is going to be used to create the coefficients of the filter.
- Filter is going to eliminate the involuntary eye blinking signal from eye blinking signal representation.

Schedule and Resources

DSP Specialist Engineers:

- Sylmarie Dávila Montero (Project Manager)
- Keisha Castillo Torres

Schedule:

Tasks	Dates or Deadlines
Detail Design Modules	September 1 st , 2014
Demonstration #1	September 24, 2014
Implementation of Modules	October 7 th , 2014
Demonstration #2	November 5 th , 2014
Testing & Refining (Integrations)	November 14, 2014
Final System Demonstration	November 24, 2014

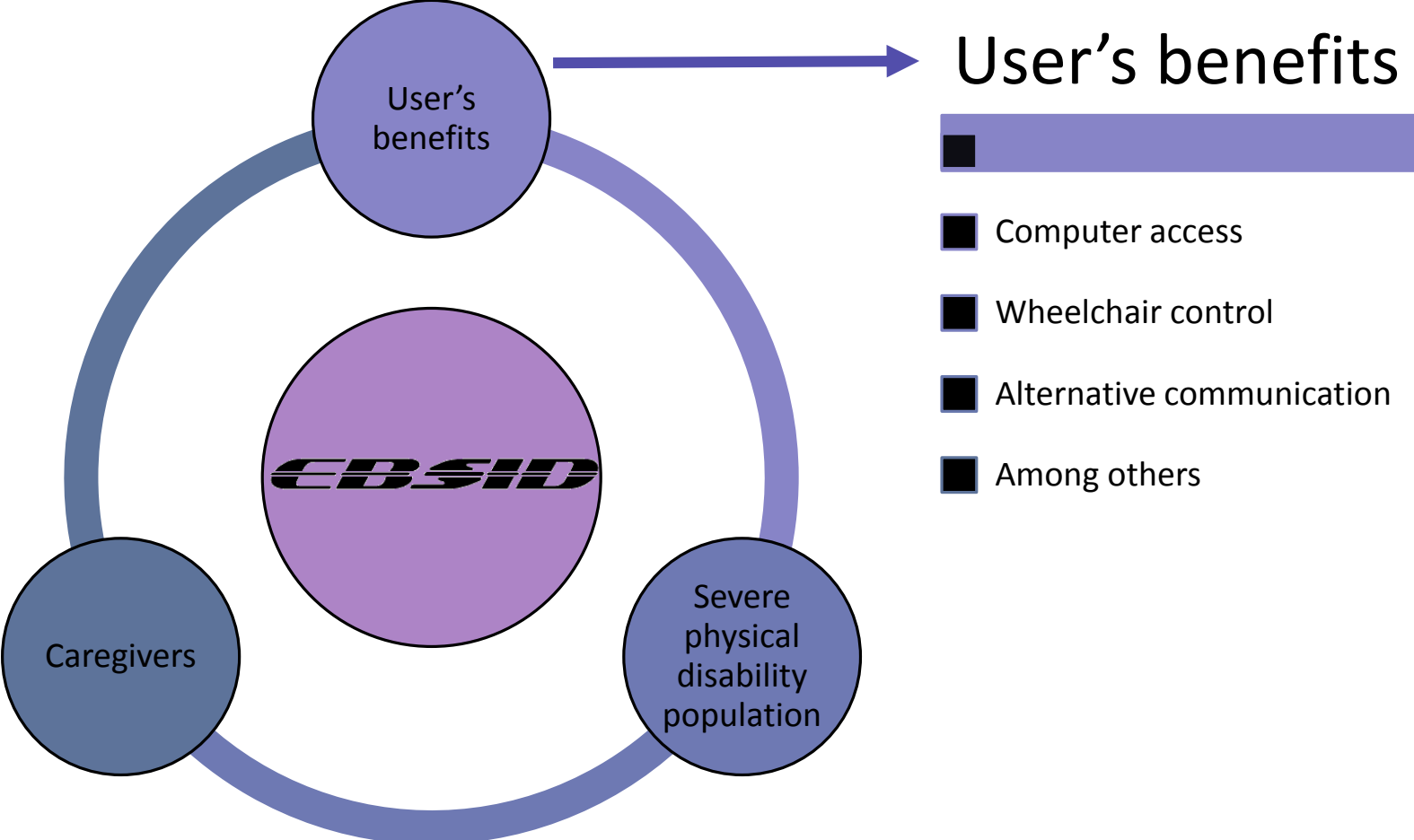
Estimated Budget

Resources or Components	Price
Microcontroller	\$20
DSP	\$10-\$100
Mounting Structure	\$10
Personal Computer (will use a personal PC)	\$300
Infrared LED (pkg of 25)	\$15
Infrared Sensor	\$15
Resistors Kit	10
Capacitors	\$8
Monophonic Cable (1/8")	\$8
Overhead (25%)	\$121.50
Resources/Components Total	\$608
Work Hours (including Overhead)	\$ 25,032.50
Total	\$26,248

Deliverables

- A low-cost eye-blink switch that acts as a universal switch and that will activate with each voluntary eye-blink.
- The device will be small, easy to handle, adjustable and unobtrusive for the user.

Project Impact



Questions?
