

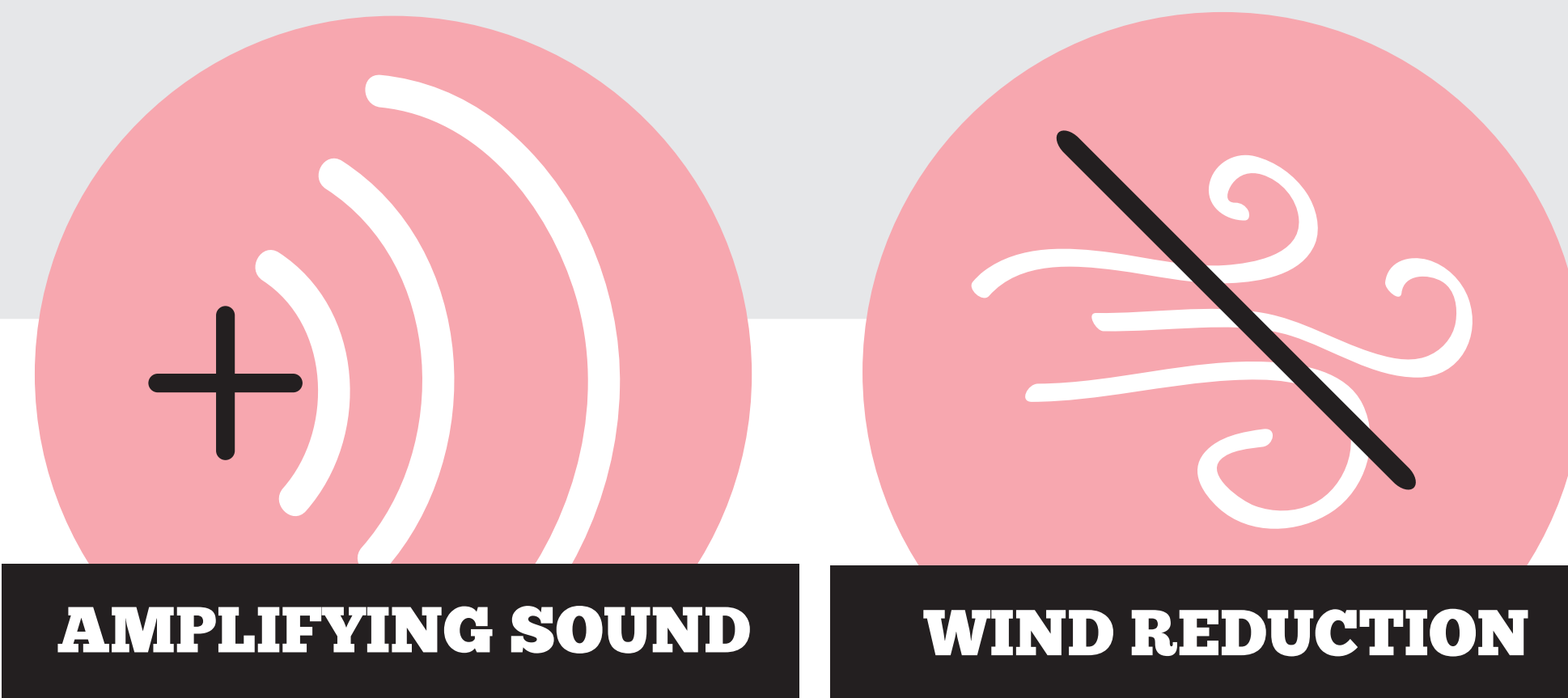
# ATHLETIC AUDIO

Improving player-coach communication for a youth athlete with bi-lateral hearing loss.

Eleanor Burgess, Jennifer Swift, Vasiliki Valkanas, Cody Zervas

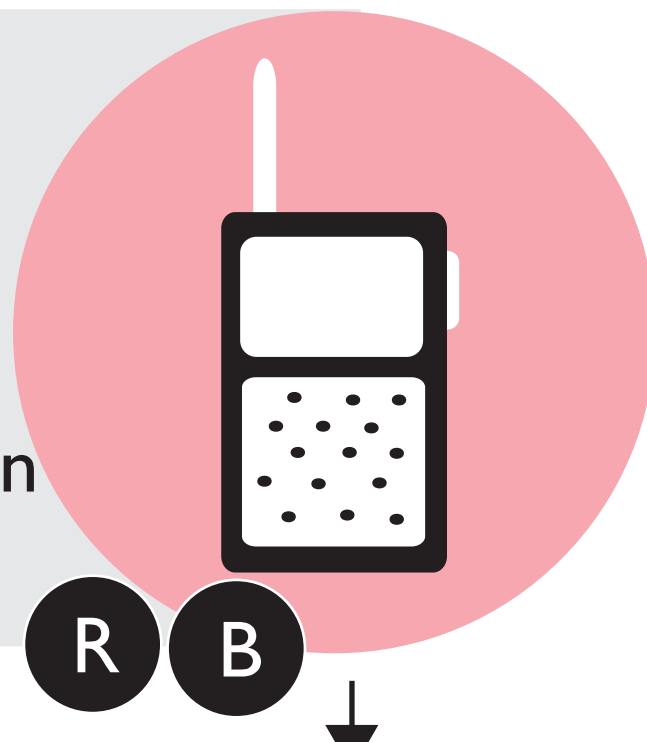
## THE PROCESS

Based on field observations, our first goal was to boost the signal to noise ratio.



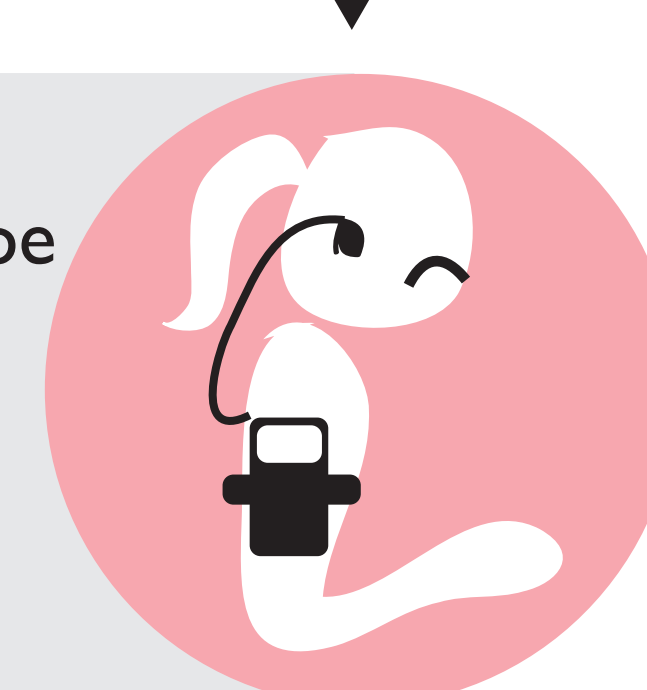
### WALKIE TALKIES

Least expensive, commercially available way to boost sound for person-to-person communication.



### TESTING

Built a rough physical prototype with the right dimensions and weight. Too big and too heavy.



### FM TRANSMITTER

The FM transmitter would remove the need for Cheyenne to wear any additional equipment.



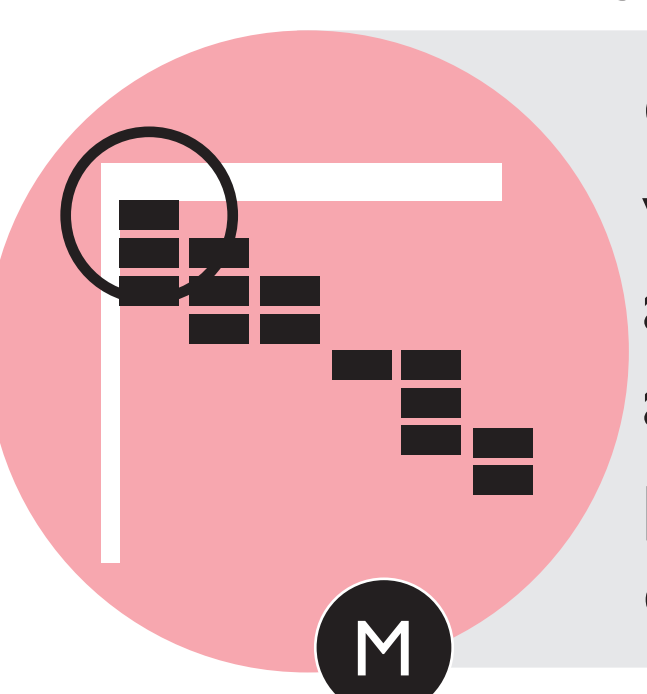
### FM BOOTS?

Cheyenne's hearing aids had FM boots which removed the additional cost barrier.



### FM FREQUENCY

Consultation with Cheyenne's audiologist gave access Phonak's private frequency diagram.



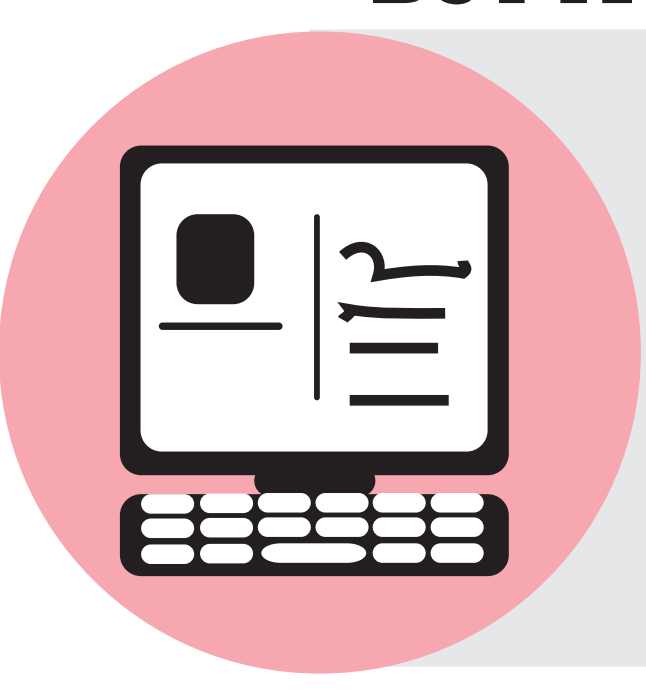
### BUILD IT?

Experts in EECS suggested some avenues that were ultimately not feasible.



### BUY IT.

Spoke to Phonak, Comtek, and others to purchase a transmitter with the required frequency.



### BUTTON TRIGGER

Our current solution uses a coach-operated momentary button trigger to send necessary information.



### VOICE ACTIVATED

A future iteration would streamline the process for the coach.



## DEFINING THE SOLUTION

Cheyenne is a nine-year-old girl with bi-lateral hearing loss. Cheyenne experiences difficulty with player-coach communication on the vast soccer field as a result of ambient noise from whistles of surrounding games, children and parents shouting, the Metra, nearby construction, and the wind.

Her hearing aids amplify these ambient sounds, inhibiting her ability to hear the instructions her coach is attempting to communicate to her; he generally has to repeat her name multiple times until she hears him.

According to the Center for Hearing and Communication, 15% of children between the ages of 6-19-- the age range into which Cheyenne falls-- have a measurable hearing loss in at least one ear. Furthermore, the large majority of children in this age range enjoy at least some degree of athletic activity, whether competitive or for leisure. The field of audiology and hearing technology has brought about remarkable advances in the past couple of decades. Thus it seems almost unimaginable that a solution for Cheyenne's difficulty with player-coach communication, which likely confronts thousands of children and adults alike, has not yet been created.

## USERS / NEEDS

Cheyenne's (and her parent's) optimal solution is:

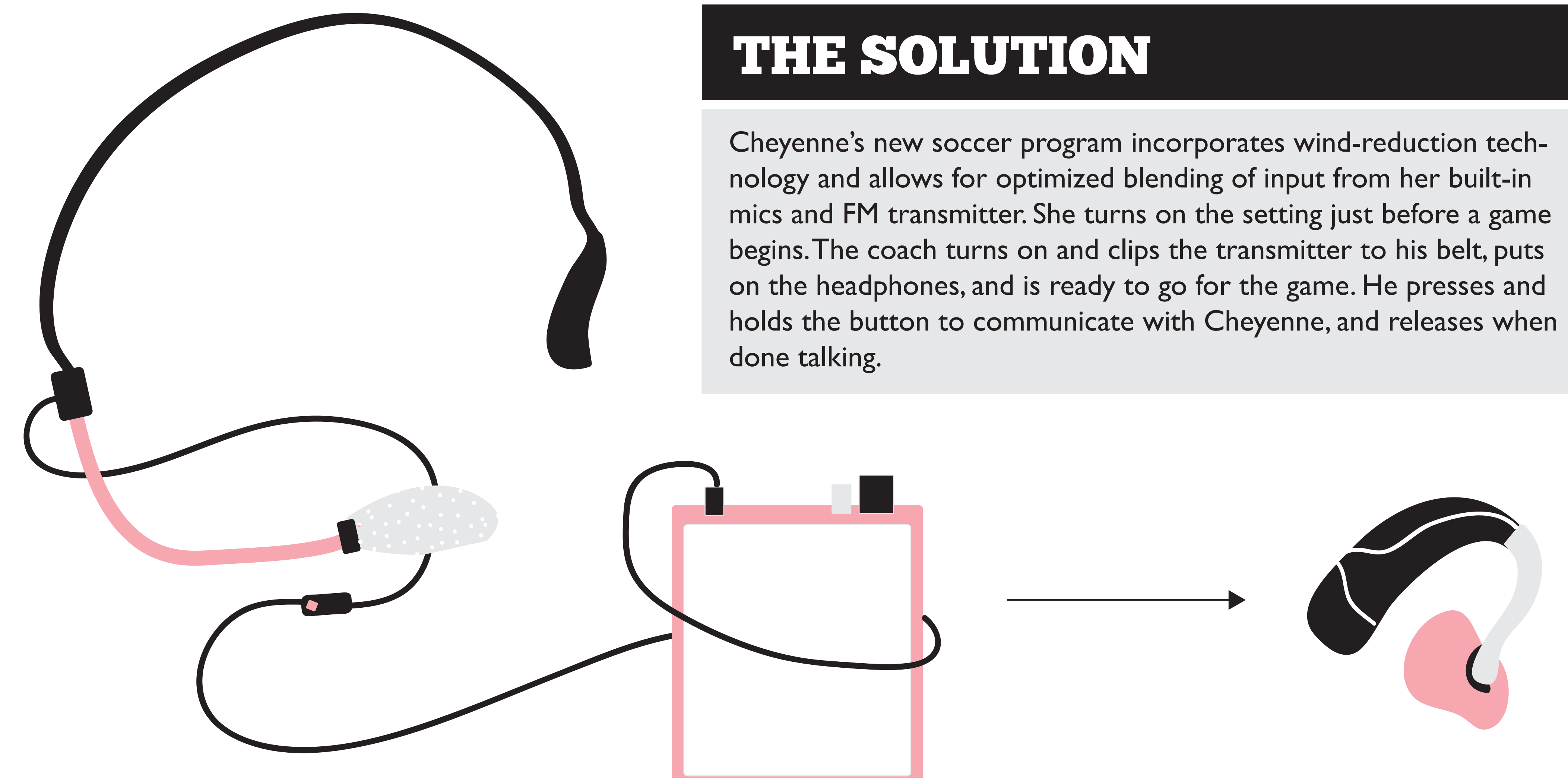
- Cost-effective
- Practical
- Utilizes minimal pieces
- Easy to use
- Comfortable
- Discrete

The Coach's optimal solution is:

- Simple
- Streamlined

## THE SOLUTION

Cheyenne's new soccer program incorporates wind-reduction technology and allows for optimized blending of input from her built-in mics and FM transmitter. She turns on the setting just before a game begins. The coach turns on and clips the transmitter to his belt, puts on the headphones, and is ready to go for the game. He presses and holds the button to communicate with Cheyenne, and releases when done talking.



## OTHER APPLICATIONS

Any situation in which the subject requires regular use of their hearing aids, but also to occasionally hear someone who would otherwise be obscured by noise, distance, or other factors.

This system might be useful:

- For a parent to tell her child, who is playing outside, that dinner is ready.
- For a teacher to get the attention of her student while the class is doing noisy group activities.
- For an assistant to give speaking notes to a businesswoman while she gives a presentation.
- For a someone to hear his date during a dinner conversation at a loud restaurant.
- With the supplantation of a hyper-cardioid microphone for the regular one, for someone to hear his often-changing conversation partner at a loud house party.

## FUTURE ITERATIONS

What: The replacement of the momentary switch with a voice recognition module that will control a binary gate. When the software recognizes Cheyenne's name, it will open the gate for a predetermined amount of time, before closing again and disallowing signal continuity.

How: An Arduino chip containing open-source voice recognition software that has been trained for sensitivity to the coach's voice will be inserted into the transmitter itself, interrupting the signal chain immediately after the line-in.

Why: This module will eliminate the need for the coach to participate in the transmission process, freeing both his attention and his hands.

When: Now. All of the technology necessary for this addition is available and relatively cheap; its implementation is mostly a matter of execution.

### EXPERT HELP

- M** Dr. Murphy, Charlotte's Audiologist
- R** RadioShack Experts
- GC** Professor Grieco-Calub, Northwestern University
- E** Dr. Erdos, Northwestern University
- B** Benjamin Stanley, Audiology Graduate Student
- C** Dr. Raymundo Cornejo, Northwestern University
- EE** Engineering Experts, Northwestern University