

# Helium Speech Simulator

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## The Background

Divers typically breath air comprised of a similar mixture to that in the atmosphere, i.e. ~20% oxygen and ~80% nitrogen

Deep sea divers experience narcotic effects at extreme depths due to nitrogen narcosis.

To combat this the nitrogen in their air supply is replaced with helium.



## The Problem

One well known side effect of helium is to make a person's voice appear high pitched.

A diver's voice can appear to be up to 3.5 times higher than normal depending on the amount of helium used at depth.

This makes them extremely difficult to understand, because of this surface personnel often employ a device to lower the pitch in order to facilitate communication with divers.

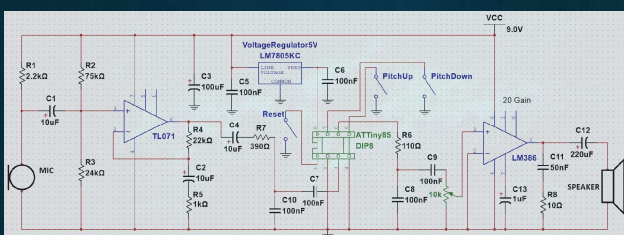
This project is to create a helium speech simulator for use as an exhibit at the Diving Museum, Gosport.

## The Solution

To design, implement and test a prototype electronic helium speech simulator that uses signal processing to change the pitch of a users voice in real-time.

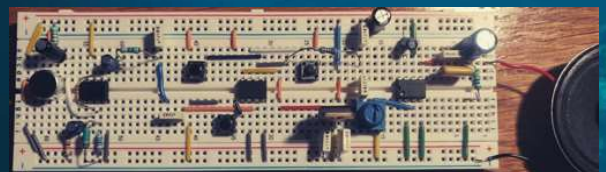
Based around the ATtiny85 micro-controller, the system comprises of:

- Microphone and pre-amplifier
- 4kHz low pass filter
- ATtiny85 acting as a signal processor
- 14kHz low pass filter
- Audio power amplifier and speaker
- Controls to raise/lower pitch and reset



## The Final Product

After assembly and testing the final prototype was built.



The results are a partial success; the ATtiny85 is too noisy for voice however single frequencies can be increased and decreased in pitch.

