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AUDIO SIGNALLING

DESIGN

- **Physical Encoding:** Each bit 0/1 is assigned to a particular short audio clip using line encoding, such that they can be easily distinguished by a Python script

- **Link Layer Framing:** Encode special patterns(01111110) to signify start and end of message to help decode. If this pattern appears in the message itself we add a ‘0’ after 5 ‘1’s(bit stuffing)

- **Error Detection/Correction:** Consider a (4*5) matrix. We put the bits in this matrix, and add 0s at the end if required. Using **2D parity** would allow us to detect upto 3 bits of error

- **Link-Layer reliability:** Upon detecting an error, the receiver would send a single 11(ACK) or 00(NACK). Upon getting NACK or due to timeout, sender sends the packets again

IMPLEMENTATION

- Play the audio on sender’s speaker and let the receiver laptop record it on microphone, while sender waits for ACK/NACK
- Process the recording using Python **aubio** library and decode the audio back to bit string, remove sentinels and stuffing, check for errors, send ACK/NACK
- One python script running on sender and receiver each to automate the process of hearing the sound bits and sending appropriate response