Matryoshka Cipher Solution

Puzzle: Yannick Yao
Solution: Yannick Yao
Answer: NEUTER

The puzzle is contained in a very large text file, which contains the line "WHAT CAN YOU USE AS KEY" (with spaces removed) and a long string of "ZERO", "ONE", and "SPACE". With or without understanding the flavortext, one may see that the encryption used here is ASCII (which sounds like AS KEY), and then use some combination of online tools, search-and-replace features of text editors, and/or coding to convert the string into letters.

However, we are not done here. After the conversion, we encounter a new flavortext and a new ciphertext, so we need to repeat this process (in fact, *eight times in total*). This is what the title is referring to: this puzzle has ciphers contained in ciphers, just like Matryoshka dolls (more commonly known as Russian dolls). The flavortext and encryption methods used at each step are below:

Flavortext	Encryption
WHATCANYOUUSEASKEY	ASCII encoding
SHIFTLIKEAKING	Caesar cipher (with shift = 3)
KNOCKKNOCKCANYOUHEARMETAPPING	Tap code
ZIGZAGYOURWAYBETWEENTHEFIVERAILS	Rail fence cipher (also known as zigzag cipher), with five rails
WHYAMIFEELINGSOMOROSE	Morse code
WHENTHECODEISINDECIPHERABLEUSEVINEGAR	Vigenere cipher (also known as the indecipherable cipher), with key being VINEGAR
USEREVERSEPSYCHOLOGYANDBASHITOUT	Atbash cipher
ALMOSTTHERECANYOUHEARTHERADIO	NATO alphabet

Once the cipher has been completely decoded, we get the message YOU DID IT! THE ANSWER IS **NEUTER**.

<u>Author note</u>: When I wrote this puzzle I wrote a Python program to generate the puzzle, so I expected teams to write their own implementation to reverse this process. To my surprise, the test-solvers and all the teams circumvented writing code by using online decryptions and search-and-replace features of editors like Microsoft Word, so the puzzle is less tech-savvy than I expected.

On the other hand, the sheer size of this puzzle (2.5MB in .txt form) and the fact that the text is on one single line seem to cause some trouble when trying to open it with Notepad or some other text editors (possibly because the absurdly long line overflowed the loading buffer for these editors), so I apologize to all teams affected by this.