# Project Overview

In this project I created a mechanizm to encode and decode given strings to mors codes. After encoding, I used I2C to transfer the encoded message from one arduino to another one. And I can send whatever I want as a mors code and receive them.

# Encoder and Sender

I have created some data structures to encode and send the encoded message. The main idea here is to send the message at minimum clock cycles. I have used advantages of morse code which is frequency of letters. Letter e is most frequent letter in the spoken words. I can transfer letter e in two clock cycles. But comman I2C protocol transfer in 8 clock cycles. Common I2C protocol more consistent because it can transfer all letter in 8 clock cycles but mine from 2 to 12 clock cycles. In morse code there are two sign which is a dot and a minus. I can transfer dots in 2 cycles and minuses in 3 cycles. At the receiver part I used a finate state machine and trie data structure to decode the message.

# Decoder and Receiver

In decoding part I used trie data structure which is a way of storing words and their meaning in other languges. In this case one of the languages is morse code and other one is English. Receiver reads input pin when an interrupt occurs in the interrupt input pin. If input pin is high then I set the state of the machine to 1. And wait for the second interrupt. When second interrupt occurs and pin still high the state changes to 2 and a pointer points to root of the trie goes to right child because the letter we get is a minus. And change state to 0. If pin is low at the second interrupt then pointer goes to left child and so on. When state is 0 and we receive a 0 at input pin that means a space and we have completed a letter. So pointer resets to root of the trie and continue.

# Conclution

Morse code designed to send more frequent letter easily. I used that opportunitue to send a message in less clock cycles compared to common bit repersentation. For examle: “Hi” is 16 clock cycles in common bit repersentatiion but in my protocol it is 12 cycles. It seems the difference is not that big but when it comes to sending billions of letter with this protocol it saves a lot of time.