Wireless Calculator Linking

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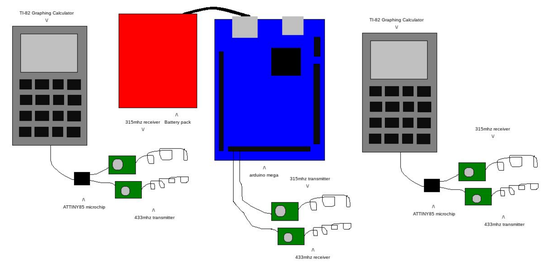
Abstract

The goal of my project was to wirelessly transmit data between older model Texas Instrument graphing calculators. I used easy to find and inexpensive parts purchased on Amazon and eBay to build an interface to send a wireless signal between calculators.

Introduction

The purpose of this project is to discover the capabilities of old technology by sending data wirelessly between older model Texas Instruments graphing calculators with link port capabilities such as the TI-85, TI-82, TI-83, TI-84, TI-86, TI-89, and all other variants of those models. This project will allow people to transmit data and share programs while sitting across the room, rather than having to sit next to each other to cable-up. I decided to build this interface after studying what other people had been able to do with their old graphing calculators such as configuring a graphing calculator to use a Shell program on a TI-Series calculator (This Does Not Compute, 2019).

The goal of this project is to build an interface that will transmit data wirelessly between the calculators by using readily available and inexpensive components. Some of the other projects I studied involved using hard-to-find and expensive parts (Sweatman, 2014; KermMartian, October 5, 2014). I felt that I could build a system that would be less expensive and easier to build than others that I had researched.



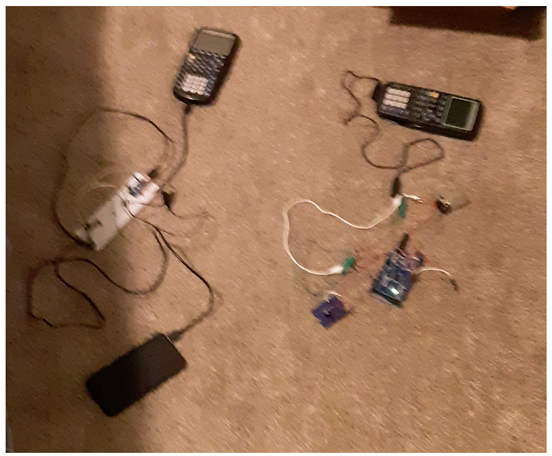
Methods

The project required the use of two TI-83 calculators, an Arduino Mega microcontroller board, an Arduino Nano microcontroller board, a breadboard, jumper wires, 433 mhz and 315 mhz RF transmitters and receivers, stock TI link cables, a USB battery pack, an 9V battery and alligator clip connectors.

To set up the project, I connected one TI-83 calculator to the Arduino Nano microcontroller by connecting one end of a link cable into the data port of the calculator and the other end into the Nano. I also connected an RF receiver to the Nano. I then connected the other TI-83 calculator to the Adrudino Mega by similarly connecting one end of a link cable into to data port of the calculator and the other end into the Mega. I then connected an RF transmitter to the Mega. I used an open-source program (KermMartain, October 30, 2014) built to connect older model TI calculators to an Arduiono as a platform to build this project. I then modified the code in the program to have the sending calculator instruct the Arduino to send a signal to turn a digital pin on or off. The pin, which is connected directly to the transmitter, sends the signal through the transmitter. The digital signal sent by the Arduino Mega is read as an anolog singal on the Arduino Nano by the amount of voltage detected in the signal. A higher voltage signal (5v) would mean the the pin is on, whereas a lower voltage signal (<1v) would mean the pin is off. The Adruino Nano then assigns a value between 0 and 1023 based on the voltage it senses. As the voltage increases, the assigned value also increases. The Nano stores the value in to a letter variable, such as the letter x, and then sends it to the calculator, when asked, where it is stored into the corresponding variable on the calculator. The receiving calculator is programmed with an IF statement to check the value of the variable. A value less than 896 is interpreted as no signal being sent, and a 0 is displayed on the screen. A value equal to or greater than 896 is interpreted as a signal being sent, and a 1 is displayed on the screen. This process is repeated approximately 16 times per second.

Project Results

The project was successful in that I was able to establish a wireless connection between the TI-83 calculators. The connection was verified by the data output of a 0 or 1 on the screen of the receiving calculator signifying that a signal was either being sent, or not being sent.



Conclusion

While this project was successful in that a wireless connection was established, it was limited by the fact that data itself was not able to be transmitted. At this time, the project only allows for a signal to be detected and interpreted by the receiving calculator, but no data that the calculator would consider useable could be sent. This does mean that you could potentially send a message in morse code or some other form of communication that uses the length of pulses to communicate but nothing precise. Further research needs to be conducted to determine how to transmit data between the calculators.

References and Works Cited

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