# Project: Universal Bluetooth Audio Transmitter

# Description

The goal of this project is to create a cost-effective universal Bluetooth to 3.5mm signal converter that would allow users to stream audio from a Bluetooth enabled device to any standard speaker set that has a 3.5mm audio connection.

# Project Stages

## Stage 1: Proof of Concept

Estimated Work Time: 1 week  
Estimated Cost: $65 to $85

Since a similar project has already been attempted using a Raspberry Pi (RP) Linux machine, our first step would be to replicate those results as a starting point. At the end of this stage, we should have a proof of concept on an open Linux platform like RP would give us the ability to us a way to very easily test new ideas and debug problems.

Stage 2: Hardware Selection

Estimated Work Time: 1 to 2 weeks  
Estimated Cost: $100 to $250

Once we have done our initial proof of concept, we need to select the parts for the actual project. This includes but is not limited to selecting the microcontroller or SoC, Bluetooth module, and audio circuits that would could perform digital to analog conversions.

## Stage 3: Prototyping, Debugging and Testing

Estimated Work Time: 4 to 10 weeks  
Estimated Cost: $0

When all the hardware components are gathered, we will need to assemble our prototype and write the firmware code to make our device function. At the end of this stage, we should have a prototype that can reliably pair with other Bluetooth enabled devices, be able to receive audio streams from other devices and be able to convert that digital information into analog signals and push it out through a 3.5mm port.

## Stage 4: PCB Design and Part Assembly (Concurrent with Stage 3)

Estimated Work Time: 1 to 2 weeks  
Estimated Cost: $75 to $150

In this stage, we would design the PCB and purchase the correct integrated circuits needed for the project. We would then solder the parts onto the PCB and have a product ready to load code onto and perform final testing.

## Stage 5: Device Testing

Estimated Work Time: 1 to 3 weeks  
Estimated Cost: $0

In this stage, we would test the final device with various speaker systems and Bluetooth devices to check for overall quality and effectiveness of the product.

# Skills and Training

## Required Skills for All Team Members

Firmware coding skills in C/C++.

* Code testing and debugging skills via JTAG and USB interfaces.
* Basic electrical circuits skills and lab testing skills.

Knowledge of Bluetooth modules and devices and how they work.

* Basic knowledge of microcontrollers and how they function.

## Skills that Need to be Developed

Printed Circuit Board (PCB) design skills

Skills with soldering ICs onto a PCB

Knowledge of signals and systems

Knowledge of analog-to-digital conversions and Fourier transformations