Project Report

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1 Preface

The project I engaged in is about Artificial Cochlea which can transmit data by Bluetooth. The reason why I choose this project is that Artificial Cochlea is relatively of high performance for kids with severe hearing damage compared with hearing aid. Hearing aid simply amplify the sound and transmit it to users' ear yet for users whose hearing has been seriously injured such an approach will not work out. The principle how Artificial Cochlea works is to transplant the Cochlea into users' ear and it will convert the sound into electricity, then the electricity will thus stimulate the neuron in the ear so as to enable users to hear. Although the quality of sound users receive is still not good enough, I believe the research in this field is much more prospective.

2 Target

Recently we have three aims for us to fulfill.

First of our aim is to enhance the data rate which needs to reach to 100Kb/s so as to comply with the requirement of long-distance transmission.

Second target is that we hope we can decide which microphone to be activated. Please imagine a scenario, when the students wearing a cochlea connected to the mobile phone wants to listen to the lecture, yet the micro phone on cochlea is opened and the microphone in the mobile phone is shut off. Such a dilemma is what we want to solve.

The last aim is to create a journal in the bluetooth chip. Such a concept resembles ROM. And the intention of this aim is data acquisition. We can save the incident which audio processor encounters and send it to the mobile terminals when the cochlea is connected to the mobile terminals.

3 Blue Print

As to the problem of data rate, the prospected solution is: under the premise of not altering any protocols, we utilize A2DP(Advanced Audio Distribution Profile) to transmit the data. When we start to transmit, first we close the mic of external machines so as to prevent the data from being interfusing by audio data. Then establish a connection between external machines and mobile phones, and the connection's source are external machines and the connection's sink are the mobile phones. The coding of external machines should be SBC format which is the format all bluetooth facility that support A2DP should support. The mobile phones receive the A2DP audio data and turn it into original data.

4 Process

The progress now we approach is to realize the data rate measurement when bluetooth devices such as the bluetooth cochlea sends data to the mobile terminals. The way we tackle this problem will be based on the works we have done which is the scenario of that mobile terminals sending data to the bluetooth cochlea. The main job is constantly looking for the uppermost function that calls MessageSend() function. As to this job, it requires great comprehension of infrastructure of the lower protocols such as RFCOMM, SPP and L2CAP. Take RFCOMM for instance

```
/*****************************************************************************
    RFCOMM Disconnect Req

    Triggers:
        ConnectionRfcommDisconnectRequest

    Message Sequence:
        Connection -> BlueStack         RFC_DISCONNECT_REQ
        Bluestack -> Connection         RFC_DISCONNECT_CFM
        BlueStack -> Connection         RFC_DISCONNECT_IND
        Connection -> BlueStack         RFC_DISCONNECT_RSP  (stream destroyed)

    Response:
        CL_RFCOMM_DISCONNECT_CFM

*****************************************************************************/
static void sendRfcommDisconnectCfm(Task appTask, Sink sink, rfcomm_disconnect_status statu
{
    MAKE_CL_MESSAGE(CL_RFCOMM_DISCONNECT_CFM);
    message->status = status;
    message->sink = sink;
    MessageSend(appTask, CL_RFCOMM_DISCONNECT_CFM, message);
}
```

The main principle is first creating a message or primitive(based on whether the direction of data transmission), and let the pointer points to the parameter which is ought to be pointed based on the status. Though the principle is not hard, yet it is crucial for our works.