Abstract

The Motorcycle Communication and Music Station (MCMS) is a motorcycle accessory that will enable the rider to listen to music from an IPod and communicate with his fellow rider. An RF intercom system will allow voice communication at standard riding distances. The IPod will plug into a docking station and will be controlled by a new easy to use interface.

Background and Benefits

What are the two biggest luxuries to be had by riding in a car versus riding a motorcycle? You can talk to your passengers and listen to music while you drive. The Motorcycle Communication and Music Station, or MCMS, looks to add these abilities to the motorcycle riding experience.

Using the MCMS you will be able to talk to your riding buddy and listen to your favorite music, adding whole new dynamics to your rides. No longer will you have to pull off the road to use a cell phone or search endlessly when separated during a ride. Simply call your friend to figure out which direction to head.

We’ve all wished for some tunes on those long, boring freeway rides or while cruising through the back roads. With the MCMS you will be able to plug in your IPod and listen to all your favorite music. Worried about fumbling with the awkward IPod controls while riding and wearing motorcycle gloves? The MCMS has you covered. An easy to use interface and an LCD display will allow you to choose songs quickly and efficiently, allowing more time to focus on the important things such as not crashing. A weather proof case will keep your IPod safe while it is connected and the MCMS will keep it charged so you won’t run out of music on long rides.

There are several products on the market that attempt to provide motorcycle riders a way to communicate or listen to music. Most of these products come with a central unit that is either connected to the side of the rider’s helmet or placed in the rider’s pocket. The central unit is a hub that has a rider to rider intercom function and can be connected to other devices.

One of the more popular products of this style is the ChatterBox XBi2. The XBi2 uses Bluetooth technology to connect up to three bikes in an intercom system. The range of the XBi2 is around 500 m (1640 ft) in optimal conditions. The biggest draw of systems such as the XBi2 is the ability to sync with external devices such as an mp3 player or cell phone. In order to do this the device must be Bluetooth enabled or a Bluetooth adapter must be purchased separately.

While wireless systems such as this can be attractive, they do not address the problem of controlling the headset or music player while riding. These systems tend to come with a higher price tag as well. The XBi2 retails for around $200.
On the other end of the spectrum we have products such as Nady 22 Channel Bike to Bike Communicator which communicates over General Mobile Radio Service (GMRS) frequencies and has a range of about 2 miles. The Nady is basically a handheld radio that comes with a headset suitable for motorcycle helmets. The main unit is placed in a pocket or tank bag and all the connections are wired. There is an auxiliary stereo input for integrating portable music devices. The Nady puts much less of a dent in the pocket, retailing for $80. However we are still faced with the challenge or interfacing with the unit and our music playing devices.

This is where the MCMS comes in. With the main unit placed in front of the rider all of the controls and display are clearly visible with a quick glance. The interface is easy to reach and the switch style controls are swiftly manipulated even with thick riding gloves. No external adapters are needed to sync with the MCMS, plug in your IPod to the docking station and you’re ready to rock. An alert shows up on the display when your riding partner wishes to talk to you. A simple flick of a switch and you are in intercom mode. The aim of the MCMS is to offer these benefits while retailing for a relatively low cost compared to other products. What all of these interface benefits boil down to is safety. The less time you spend fumbling with your headset and music the more time you spend focused on the road.

Project Description

User Operation

The user interface will have controls for manipulating the IPod and switching between music and intercom modes. The controls will all be toggle switches, providing ease of use even while wearing thick riding gloves. This also means that the rider will not have to look for visual confirmation of whether a button has been activated. Information about the current track and mode will be displayed on the LCD.

There will be two states when in intercom mode, waiting to speak and speaking. When a rider wishes to communicate with their riding buddy they will use a switch to toggle to intercom mode. This will send a signal to the other rider’s MCMS and an alert will be displayed indicating they are in wait mode. The alert will also be displayed on the other riders MCMS, alerting them that their buddy wishes to talk. Once the other rider is in a safe spot they can toggle to intercom mode. When this is done both displays will show that both riders are ready to talk and they can begin speaking freely.
**Hardware Description**

The hardware components involved in the MCMS will be a microcontroller, RF transmitter and receiver, LCD, user interface switches, IPod connector, and headset. The microcontroller will process input from the user, display pertinent information on the LCD, send and receive the proper signals to the headset, and control the IPod. The RF transmitter and receiver will communicate with the other MCMS.

The MCMS will connect to the motorcycle’s battery for power, allowing for unlimited operation, even on long rides.
Societal Impacts

The main concern for any motorcycle rider is safety. There are no gadgets or features worth crashing your motorcycle. The MCMS will be developed with this in mind. The quick and easy user interface will allow riders to focus more on riding the motorcycle and less on getting to the song they want. Communication between riders is essential. Wild hand singles from frustrated riders is never a safe riding technique. Two way dialogues through headsets will provide a much safer system of communication.

The laws regarding headphone use while riding motorcycles vary by state. In Washington, along with the majority of states, there is no restriction on headphones or accessories as stated in RCW 46.37.530 “Motorcycles, motor-driven cycles, moped, electric-assisted bicycles, - Helmets and other equipment”.

The MCMS will comply with the FCC rules under CFR47 part 15 for unlicensed operation. The RF modules used in the MCMS will all be FCC approved for operation in the 902 MHz to 928 MHz range. Since this range is free to use it can be quite crowded with signals. To deal with this I will develop a protocol for the MCMS that will insure proper communication between the modules.

Project Development

The MCMS will be developed by me, mainly in the ET340 lab, with portions of code written from home. I plan on using a Freescale processor and the Codewright IDE because I already have knowledge of these products. I will be able to begin development on the MCMS immediately without using time to learn a new system. The LCD, switches, headsets and RF transmitter/receiver will be OEM solutions or modules that fit the project requirements. The enclosure and user interface will be built specifically for the MCMS. If need be, I will design a filter for the input from the headset microphone to improve the clarity of audio communication. The MCMS will be powered by the motorcycles battery. Due to the inconsistency of power
from auto systems a power regulator will need to be implemented. This will also be an OEM product.

For the IPOD dock I will use the PodBreakout IPod connector from SparkFun. The IPod accessory protocol is used to communicate with IPods 3rd generation and up. This protocol is readily available, well documented on sites such as IPodlinux.org and free of charge. For future marketing considerations regarding the MCMS, Apple has a program titled “Made for IPod”. Entering in this program enables the developer of IPod accessories to use the “Made of IPod” logo as well as providing some support for the accessory connectors and communication protocol. If the MCMS is to be sold in main stream markets I will consider joining this program.

**Project Demonstration**

The MCMS will provide a great demonstration. Two devices will be set up a fair distance apart, both with IPods. Two users at a time will be able to test the device. After each dons a headset they will first turn experience the Music Mode. After controlling the IPod with the MCMS for a minute, one will use the MCMS to call the other. The second user will be able to answer and test the Intercom mode. Videos and pictures of the device being used on actual motorcycles will be shown as well. Since there is no way to bring a motorcycle into the lab for the demonstration test devices will have to be connected to an outlet for power during the demonstration.