# Pal

*Building a robot that follows you around*

Pal

So, for my first robot i'd like to make a dog.

or at least make my RC truck follow me around like a dog.

to do this i plan to use a beacon type system, where the dog, named Pal in this case, sends out a pulse that is heard by a receiver held by the owner. when the receiver on the owner hears the pulse it replies with it's own pulse that the dog is listening for. a synthetic echo, if you will. this lets the dog figure out how far his master is.

he can figure out what direction he is in by mounting one or more receivers on a pan axis and scanning for peak signal, indicating the direction of the owner.

or, Interaural Time Delay techniques could be used with 3 sensors mounted orthogonally in the horizontal plane. i'm not sure of the resolution on this across the whole 360, though. but the sweet spot would be pointing forward, of course.

The ITD approach is nice because it has no moving parts. and those moving parts would probably cost time too. and it's pretty sexy too.

Status Report

I have developed a circuit using an RS-232 transceiver chip to drive a 40KHz Ultrasonic Transducer (UT) at about +/-8Volts pk-pk. this might be improved by increasing the caps a bit over spec.

presently the receiver circuit consists of a first op-amp cap coupled to the receiver, followed by a diode and RC circuit to rectify and smooth the envelope. the final op-amp will probably be a digital pot to allow for dynamic gain enhancement while listening for the echo.

i believe next i would like to jig up a 2 receiver ITD and test it's practicality. i can rig up a second channel on the proto board and then move the transmitter (including PIC processor development board) a suitable distance away. mount two receivers on a bar, maybe 10" apart and connect to protoboard.

But, the directional transceivers need to be made omnidirectional. a simple, naive way to do this is mount an inverted cone above the receiver. or perhaps it could be a bit parabolic to capture more power and focus it to the receiver. i'm now working out how to fabricate and test out the omni-directional antenna design. needs me a turntable.

Pal System Block Diagram

here's a shot at the overall design.

i would like to be able to switch between autonomous, on-board PIC control, or regular 4x4 truck rip-up-the-road control.

i guess those NPN transistors shouldn't really be neccessary, i didn't want to burden the PIC with the menial task of supplying current though.

[Pal System Block Diagram](http://mcecere.casacecere.com/Pal/Pal%20System%20Block%20Diagram.jpg)

Pal Timer Allocation

here's my *working* layout for getting the 40 KHz ultrasonics generation and 20mS RC servo signal and etc working in a dsPIC33FJ128GP802

[Pal Timer Allocation](http://mcecere.casacecere.com/Pal/Pal%20Timer%20Allocation.jpg)