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For BugBrain™ Users

Robot Newsletter

*"Never be afraid
to try some-
thing new.
Remember that
amateurs built
the ark. Profes-
sionals built the
Titanic."*

— Unknown

Yost Engineering, Inc.

www.YostEngineering.com

October 2003

Support Services

All robotics and
kit purchasers
receive
unlimited toll-
free and email
support.

If you are
having problems
with assembly
or programming,
be sure to
include a
description of
what you are
trying to do, the
problem or
error, and a copy
of your program
code if it is a
programming
problem.

**We're here to
help!**

(888)395-9029

or

**robots@
YostEngineering
.com**

Expansions and Cool Stuff: Adding Wireless Capability to Your BugBrain™

This month's request comes from Joriel Robles in the Philippines, who wants to control his BugBrain using a remote control device. This project provides one option for adding this wireless capability.

There are many methods by which to get your BugBrain to respond to remote control messages. Various remote control methods include: infrared control (like a VCR or TV remote), manual radio frequency (RF) control (like a remote-control car), and computer RF control (like a wireless network connection).

This example will focus on creating a simple manual remote control system for your BugBrain robot kit. Later project notes will discuss adding infrared or computer RF remote control capabilities.

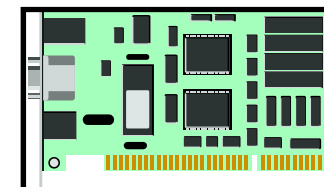
(continued on page 2...)



RF Digital 28005
Transmitter

Next Contest Deadline: December 31, 2003

Does your BugBrain look amazing? Did you program it to do something new and different? Tell us about it, and you could win a prize!



*Finished Building Your
BugBrain?
Show it off!*

Besides, all participants get their name and BugBrain picture on our webpage, so go ahead and show off your creation!

Enter by sending your name, address, age, and email address, along with pictures and programming code (for Bug-Attack contest) to:

robots@YostEngineering.com

Be sure to specify which contest you are entering (you may enter both):

Picture-Perfect Contest: send us one or more pictures of your assembled BugBrain, showing off your personalized body parts or decorations. One winner gets a \$50 Amazon.com gift certificate. One runner-up gets a \$25 gift certificate.

Bug-Attack Contest: send us pictures of your BugBrain in action, along with the code that makes it happen (specify whether or not we can share the code with others). One winner gets a \$75 Amazon.com gift certificate, and one runner-up gets a \$50 gift certificate.

Robotics Newsletter

Project Ordering Information

Available from:

RF Digital (<http://www.rfdigital.com>)

Parallax (<http://www.parallax.com>)

Parts:

RF Digital
Transmitter, Part
#28005

RF Digital Receiver,
Part #28004

Price:

Approximately \$90
(USD) for both parts

Don't Forget to Register!

When you register, you'll always know what's new with BugBrains.

- Get notification of new features, parts, and accessories
- Get sample code you can use with your BugBrain
- Get pictures and tips about what other BugBrain owners are doing
- Find out about Contests
- Learn from FAQs and Q&A columns
- Send in your own questions
- Learn about special discounts and sales
- Tell us what you want to see next!

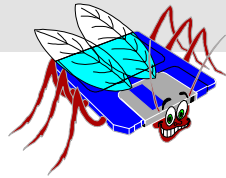


You can register by sending in the form in the front of your BugBrain Resource Manual. If you can't find it, email us at robots@YostEngineering.com with the following information:

- Your name
- Your age (if under 18)
- Parent name (if under 18)
- Address
- City
- State
- Zip
- Country
- Phone
- Email
- Where you bought your BugBrain

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Recent Tech Questions...

**QUESTION: Why are circuit boards green?**

ANSWER: Circuit boards are green for a couple of reasons. The green color is actually an enamel that is applied to the circuit boards to protect the copper traces. Underneath the green color, the circuit board is a beige color. The enamel protects the traces (the connections between components) from water and oxidation, and makes them less susceptible to damage. Although green is a traditional color, because it is easy to look at under many different lighting conditions, circuit boards can also be manufactured in other colors, such as red, blue and purple.

QUESTION: On the Basic X-24 chip, what is the blue tube-like thing on top of the chip?

ANSWER: This is the oscillator. The oscillator is basically a crystal that acts as the clock for the processor, so that it can synchronize its activities. For example, in the Centering Servos program, you can include the instruction: Call delay (0.02). This causes a pause of 0.02 seconds before the next instruction is carried out. The only way for the processor to know how long to wait, is if it has its own clock — which is the job of the oscillator, a very special crystal.

QUESTION: Every time I turn my BugBrain on, all the LEDs are on and they won't turn off. When I try to load a program it says "download failed." What can I do?

ANSWER: The problem is not due to the software or your program — the continually-on LEDs indicate a hardware problem. First, unplug both servos, leave them unplugged, and try communicating with the bug. If you can communicate now, with the servos unplugged, it usually means that the servos were plugged in backwards, and just need to be reversed.

If you still have a problem, also make sure that (a) the microprocessor is firmly seated, and (b) that all of your soldering looks good — no cold solder joints, or joints where you can see the hole around the wire, and remove any excess solder that might touch other solder joints.

Adding Wireless Capability to Your BugBrain™ (continued from page 1)

For our RF control implementation we're going to use a 418 MHz transmitter receiver pair from RF Digital (see order information in the box on page 4). The transmitter is a battery-operated key-fob transmitter that has five remote function buttons. The receiver is a 7-pin SIP module that can be interfaced with your BugBrain. This will allow you to send messages to your BugBrain at ranges up to 75 feet. The pair can be used to send and receive up to five single remote control commands, or commands & sequences can be combined to trigger any number of remote functions.

The transmitter has 5 buttons and the receiver has 5 outputs. When one of the 5 buttons on the transmitter is pressed, the corresponding output on the receiver goes high and remains high while the button is held. Because the BugBrain is completely programmable, it is possible to control virtually unlimited numbers of operations by using combinations of buttons or particular sequences of button presses. So let's look at the 3 basic steps to adding remote-control capabilities to your BugBrain...

Step 1: Setting up the transmitter

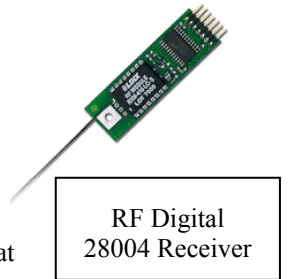
Setting up the transmitter is easy because there is nothing to set up! The transmitter is ready to use as shipped. Simply remove it from the packaging and you're ready to go. The transmitter is shipped with a battery already installed. Should you need to replace the battery, be sure to use a single CR2032 battery cell.

Step 2: Interfacing the receiver

The receiver is a 7-pin SIP module that has the following connections: +5 volts, ground, and output 1 through output 5. The output pins correspond with each of the five buttons on the transmitter key fob. To connect the receiver module to the BugBrain you simply need to perform the following:

Adding Wireless Capability to Your BugBrain™ (continued from page 2)

- Connect the +5VDC pin to BugBrain's Vdd line located on pin 1 of BugBrain's expansion connector.
- Connect the GND pin to BugBrain's Vss line located on pin 2 of BugBrain's expansion connector.
- Connect the Output1 through Output5 pins as desired to an available input port of BugBrain. As shipped, BugBrain has I/O port pins 11 and 12 unused and available. Also I/O port pins 16, 17, and 18 can be connected to the remote control modules, but in this case the inputs can also be driven by the three rear push buttons. It is not necessary to connect all of the outputs, only those that will be used.



The receiver module will work best when its antenna is facing as near to vertical as possible. Be sure that the antenna is not touching any of the metallic components because this will greatly affect the module's effective operating range.

Step 3: Programming the BugBrain to respond to commands

Programming the BugBrain to respond to remote control commands is now just as easy as programming it to respond to rear button presses or front feeler activation. When a button on the transmitter is pressed, the input pin on the receiver goes high. This means that a program can use the GetPin function to read the state of that pin as either a 0 when the remote button is not pressed or a 1 when the button is pressed. The sample program below illustrates this by getting the remote to make the LEDs flash from left to right or right to left according to which button on the remote is pressed.

(Note that the sample code assumes that the receiver is connected to pin 11 and pin 12.)

```
*****
** Remote Control Example Program
** Illustrates the use of the GetPin and IF/THEN Statements
** The program reads pin 11 and pin 12 and then sends
** a light pattern to the LEDs depending which remote button
** is pressed.
*****
Option Explicit
Public Sub Main()
    dim i as byte
    'turn all LED lights off
    for i = 5 to 10
        call putpin(i,0)
    next
    'set expansion pins 11 and 12 as inputs so remote control module
    'can be read.
    call putpin(11,3)
    call putpin(12,3)
    do
        if getpin(11) = 1 then
            call putpin(5,1)
            call putpin(6,1)
            call putpin(7,1)
        else
            call putpin(5,0)
        end if
        if getpin(12) = 1 then
            call putpin(8,1)
            call putpin(9,1)
            call putpin(10,1)
        else
            call putpin(8,0)
            call putpin(9,0)
            call putpin(10,0)
        end if
    loop
End Sub
```

Thanks to Joriel, for his suggestion for a great expansion to the BugBrain.

Do you have an idea too? Need help? Want to share? Let us know!



robots@YostEngineering.com