

# User Manual





## 4 channel USB Relay Board with 16 Digital/Analog I/O USB Data Acquisition Card

Welcome to the world of Computer Automation. This USB Relay Board - U452 is a perfect companion for all your computer automation projects. It is USB based card having 4 onboard relays for switching external devices and up to 16 digital & analogue I/Os that will help you to monitor various real world scenarios using switches & different kind of sensors to monitor many parameters like Temperature, Pressure, Light, Touch, PH etc. This card is not only good for controlling Relays but a perfect example for Data Acquisition applications.

It appears as a USB CDC ( Communications Device Class) device when connected to USB port of a computer. This creates a Virtual Serial (Com) Port, which allows easy communication with the card. Any programming language that supports serial communications ( C, C#, C++, VB, VB.NET, Perl, Java etc) can be used to communicate with U452 very easily. Easy to use commands are available to communicate with UR488 which handle various tasks like Switching On/Off of Relays, Controlling Digital Inputs & Outputs, Getting analog data etc.

The controller provides 4 relay outputs to control various electrical devices. Apart from this, the card has up to 16 digital input & output pins. It has also got 8 Analog input pins. All pins can be individually configured as Digital Input or Digital output on the fly. All analog pins can be individually configured as digital I/Os also while taking care of input conditions.

Each Digital pin can support a TTL or Schmitt Trigger Input or a 5V output. Each Analog pin will convert analog voltage (Between 0 to 5V) or Higher (through voltage divider) into 8, 10 or 12 bit resolution raw data. This can be converted into required form using conversion formulas.

Any kind of sensor wether it is providing digital output or analogue output can be interfaced with U452 and monitored with the help of computer.

Get windows drivers, test applications and sample codes at -

### http://iknowvations.in

Manufactured by -

Iknowvations Rajivnagar,Vidyanagar Hubli - 580021 India.





8, 10 and 12 bit -User selectable

### **Please Read Carefully**

This device U452 connects to Usb port of your computer and can be used to control external devices through its relays. Incorrect use or faulty board can cause damage to controller itself or Usb controller of your computer or Motherboard of your computer. Extreme care should be taken while using this board. It will be totally user's responsibility for the use of this card.

Iknowvations, it's employees, suppliers, distributors, dealers and/or resellers are not liable to any kind of damage or loss of data as a result of use of this device, including special, incidental, or consequential damages resulting from the use of this device or under any legal theory, including loss of profits, downtime, goodwill damage to, or replacement of equipment or property and any cost for recovering or reproducing any data stored in computers connected with this device.

Your purchase and/or use of this board indicates your acceptance of these terms.



## Command Reference -

1. For Digital Outputs -	SO01 - Set Output of Channel 1 to 1. SO02 - Set Output of Channel 2 to 1.
There are up to 16 digital Outpu	it channels on this card so it will be up to SO16. ROO1 - Reset Output of Channel 1 to 0.
	ROO2 - Reset Output of Channel 2 to 0.
There are up to 16 digital Outpu	it channels on this card so it will be up to <mark>RO16</mark> .
2. For Digital Inputs -	GI01 - Get Input value of Channel 01.
There are up to 16 divital Input	GIO2 - Get Input value of Channel O2.
2 For Angle a Torrette	CAO1 - Cat AD Cushus of Channel 1
3. For Analog Inputs -	GAOI - Get ADC value of Channel 1. GAO2 - Get ADC value of Channel 2
There are up to 8 Analog channe	els on this card so it will be up to GA08. The resolution is
of 8,10 & 12 bits so the input v	oltage ( 0-5V Dc) will be converted to 0 to 256 or 0 to 1023
or 0 to 4096 Decimal value resp	ectively.
4. For Relay Outputs -	RL10 - Make Relay 1 Off. Dl 11 - Make Delay 1 On
There are 4 Relays on this card	l so it will be up to RL40 & RL41. There are 2 additional commands
, for relays -	
	RLAO - Make All Relays Off.
5 Setting ADC Resolution -	RLAI - Make All Relays On.
	AR08 - Set ADC Resolution to 8 bits.
	AR10 - Set ADC Resolution to 10 bits.
6 Missellangous Commands	AR12 - Set ADC Resolution to 12 bits.
BOR	D - Issuing this command will return the card Number.
VER	5 - Issuing this command will return the Firmware Version Number.
Channel 1 - CH1 - Input / Outp	ut
Channel 2 - Ch2 - Input / Outp Channel 3 - CH3 - Input / Outp	out ut
Channel 4 - CH4 - Input / Outp	ut
Channel 5 - CH5 - Input / Outp	ut
Channel 6 - Ch6 - Input / Outp	
Channel 8 - Ch8 - Input / Outp	ит мт
Channel 9 - CH9 - Input / Outp	ut / ADC 1
Channel 10 - Ch10 - Input / Outp	but / ADC2
Channel 11 - CH11 - Input / Out	but / ADC3
Channel 13 - CH13 - Input / Out	put / ADC5
Channel 14 - Ch14 - Input / Out	put / ADC6
Channel 15 - CH15 - Input / Out	rput / ADC7
Channel 16 - Ch16 - Input / Out	put / ADC8



### Windows Driver Installations -

Connect the U452 through USB cable to your computer. If it is for the first time the following window should appear if the device driver is not previously installed. Download driver u452.inf from www.iknowvations.in

Found New Hardware Wizard	
	Welcome to the Found New Hardware Wizard Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission). <u>Read our privacy policy</u>
	Can Windows connect to Windows Update to search for software? Yes, this time only Yes, now and every time I connect a device No, not this time
	Click Next to continue.
	< Back Next > Cancel

Select " No, not this time" and click "Next". The next window should appear. Select the option, Install from list or specific location ( Advanced) and click "Next". The following window should appear.

Found New Hardware Wizard
Please choose your search and installation options.
<ul> <li>Search for the best driver in these locations.</li> </ul>
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.
Search removable media (floppy, CD-ROM)
Include this location in the search:
C:\Documents and Settings\abcd\Desktop\U452Inf 🐱 🛛 Browse
O Don't search. I will choose the driver to install.
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.
< Back Next > Cancel



Click "Browse" and then select the location where driver is saved. Click "Next". You may receive a message indicating that the driver has not passed Windows Logo testing. If so, click " Continue Anyway" to continue installation.





After finishing installation you can check the device connection and listing by inspecting Device manager view of Control Panel of your computer as shown in the screen shots. This will also provide you the com port number assigned to the card by your computer. This number will be used to communicate with the card at latter stage.



 iKantrol-111
 Error Detected in Connection !

 No iknovations Relay Board Found ! Please check Your Board or Serial Cable !

 OK

If card is not connected or powered up you will get following message -

If the card is connected, you will have following screen.

🔡 iKantrol-111			
<b>iknowva</b> Relayboard Co	tions ntroller	You have selected COM22 You are connected with U453 Firmware version no.101	2 COM10 Connect COM11 Disconnect
— Relays —	Set Output	Get Input	Get ADC
Relay1	D01 ● High ● Low D09 ● High ● Low	Get Get	Analogue Channel 1 Set ADC Read
Relay2	D02 ● High ● Low D010 ● High ● Low	Input CH2 Get Get	Analogue Channel 2 ution Read
Relay3 On O Off	D03 High O Low	Get Get	Analogue Channel 3 Read
Relay4	D04 High O Low	Get Get	Analogue Channel 4
	D05 High O Low D013 D013 High O Low	Get Get	Analogue Channel 5
	D06 High O Low D014 High O Low	Get Get	Analogue Channel 6 0 12
	D07 ● High ● Low D015 ● High ● Low	Input CH7 Input CH15 Get Get	Analogue Channel 7
	D08 High O Low D016 High O Low	Input CH8 Input CH16 Get Get	Analogue Channel 8
Know vations Dram the puture		Your Best Source for Au	iknowvations.in Itomation And Robotics needs

You are ready to play with U452. The software allows you to turn relays off & on, get input values of pins, set output value of pins, read analog channel values and set ADC resolution of 8, 10 or 12 bits as per your requirement.

Choose the comport after you confirm the number to which you have connected the card. To know the comport number, check Device manager in System in Control Panel of your computer.



Please note that all the input channels have weak pull up enabled all the time and after first time connection of card the channel setting will be FF that is all channels will be outputs. All the output pins will be 0 that is will be low at this time.

You can connect the card with your computer using USB cable. You have also to apply power 12 V DC to Barrel connector (center +ve) if you want to operate Relay also.

You can communicate with the card through Hyper Terminal Software which generally every computer has pre installed or you can use iKantrol-111 - a special software made by Iknowvations (you can download it free from our website iknowvations.in) or you can develop your own software also.

Now let us see how we can communicate with U452 with the help of iKantrol-111. Connect U452 card with USB cable & power it.

Start iKantrol-111.

You will get following screen on your computer.

🔡 iKantrol-111			
<mark>iknowva</mark> Relayboard C	tions ontroller	Please select com port first Relayboad is disconnected	COM1 Connect COM10 COM11 Disconnect
— Relays —	Set Output	Get Input	Get ADC
Relay1	D01 C High O Low C High O Low	Input CH1 Input CH9 Get Get	Analogue Channel 1 Set ADC Read Resol
Relay2 On Off	D02 High O Low D010 High O Low	Input CH2 Input CH10 Get Get	Analogue Channel 2 ution in Bits Read
Relay3	D03 High @ Low D011 High @ Low	Input CH3 Input CH11 Get Get	Analogue Channel 3 Read
Relay4	D04 High @ Low     D012     High @ Low	Input CH4 Input CH12 Get Get	Analogue Channel 4 Read
Relay5	D05 High @ Low D013 United High @ Low	Input CH5 Input CH13 Get Get	Analogue Channel 5
Relay6 On Off	D06 High O Low D014 D014 D014	Input CH6 Input CH14 Get	Analogue Channel 6 12 Read
Relay7	D07 High Cow D015 High Low	Input CH7 Input CH15 Get Get	Analogue Channel 7
Relay8	D08 High C Low High Low	Input CH8 Input CH16 Get	Analogue Channel 8 Read
Know vations Dram the peter		Your Best Source for Au	iknowvations.in utomation And Robotics needs

Select the com port to which you have connected the card U452 from available com port list. Press connect button. If the card is connected you will get next screen with all the buttons enabled in blue panel.



Type HELP and press Enter. This is the way to enter any command. Please note that all the commands are entered in CAPs followed by Enter button. HELP command shows all the available commands along with their short description.

🗞 Iknowvations - U452 - HyperTerminal		🗞 Iknowvations - U452 - HyperTerminal
File Edit View Call Transfer Help		File Edit View Call Transfer Help
File Edit View Call Transfer Help D ☞ @ ⑧ =D 편 답 HELP Welcome to iknowvations - U452 I understand following commands : HELP: Prints help about commands.		File Edit View Call Transfer Help         Soll4: Set output value of IO Channel 14         Soll5: Set output value of IO Channel 15         Soll6: Set output value of IO Channel 16         RO01: Reset output value of IO Channel 1         R002: Reset output value of IO Channel 2         R003: Reset output value of IO Channel 3         R004: Reset output value of IO Channel 4         R005: Reset output value of IO Channel 5
RL10: Switches OFF Relay1 RL11: Switches ON Relay1 RL20: Switches OFF Relay2 RL21: Switches OFF Relay2 RL30: Switches OFF Relay3 RL31: Switches ON Relay3 RL40: Switches OFF Relay4 RL41: Switches ON Relay4 RL40: Switches OFF All Relays		R006: Reset output value of IO Channel 6 R007: Reset output value of IO Channel 7 R008: Reset output value of IO Channel 8 R009: Reset output value of IO Channel 9 R010: Reset output value of IO Channel 10 R011: Reset output value of IO Channel 11 R012: Reset output value of IO Channel 12 R013: Reset output value of IO Channel 13 R014: Reset output value of IO Channel 14 R015: Reset output value of IO Channel 15 R016: Reset output value of IO Channel 16 P000: Reset output value of IO Channel 16
RLH1: Switches UN HII Relays GA01: Get ADC value of Channel 1 GA02: Get ADC value of Channel 2 GA03: Get ADC value of Channel 3 GA04: Get ADC value of Channel 4 GA05: Get ADC value of Channel 5 GA06: Get ADC value of Channel 6 GA07: Get ADC value of Channel 7		VERS: Provides model number of this board. VERS: Provides firmware version number of this board. >_ Connected 0:00:28 Auto detect 115200 8-N-1 SCROLL CAPS NUM Capture Print echo
GA08: Get ADC value of Channel 8 AR08: Set ADC Resolution to 8 bits Connected 0:01:24 Auto detect 115200 8-N-1 SCROLL CAPS N	M Capturg	

You can experiment with the card by using different commands.

🌯 Iknowvations - U452 - HyperTerminal 🛛 🔲 🔀
File Edit View Call Transfer Help
D 🖻 🛞 🔏 🗈 🎦 😭
<pre>&gt;BORD U452 &gt;VERS 101 &gt;AR08 ADC resolution set to 8 bits. &gt;AR10 ADC resolution set to 10 bits. &gt;AR12 ADC resolution set to 12 bits. &gt;RL10 &gt;RL10 &gt;RL11 &gt;GA01 0446 &gt;GI07 1 &gt;R011 Done &gt;</pre>
Connected 0:05:39 Auto detect 115200 8-N-1 SCR0



## USB Relay Board-U452

User manual

📰 iKantrol-111 You have selected COM22 iknowvations COM10 ^ You are connected with U452 COM11 Relayboard Controller ~ Firmware version no.101 C0M22 Disconnect - Relays -Get ADC Get ● High ● Low ● High ● Low Get Read 0028 💽 High 💿 Low Get 1 Get Read Read 0017 08 Get 1 Get Get 1 Get Read 0 10 Get 1 Get Read 0279 Get 1 Get Read Get Get Read Read Get Get know iknowvations.in rations Your Best Source for Automation And Robotics needs 41. hicks

Following is a sample screen, once you are connected with the card and start exploring it.

If you want to communicate with the card via HyperTerminal then start the HyperTerminal & set the com values as per following screen shot.

COM22 Properties	?
Port Settings	
Bits per second:	115200
Data bits:	8
Parity:	None
Stop bits:	1
Flow control:	None
	Restore Defaults
0	K Cancel Apply



Using Relay Outputs -

Relay outputs can be used to operate various electrical devices under software control. Extreme care should be taken if you are using 110 or 230 V AC. Iknowvations will not be responsible for any kind of damage or loss whatsoever to life or property. It will be totally user's responsibility.



Use of RC Snubber Circuit across relay contacts is recommended to avoid electrical interference.



### Using Input channels -

Input channels can be used to monitor input conditions of any signal that toggles between 0 and 1, that is between High & Low. Following is one of the ways to monitor input value - Key inputs.



### Using ADC channels -

ADC channels can be used to monitor input voltages of any signal that varries between 0 and 5V Dc. Following is one of the ways to monitor ADC input value.





### Using Output channels -

Output channels can be toggled between 1 & 0, that is bet High & Low. This signal can be used to switch on & off through use of transistor shown as under -





If you have any questions, want any assistance, want us to develop any special products for you just contact us at support@iknowvations.in.

We have other products also that might interest you like -



Just like U452, R242 is an RS232 based Relay Card having up to 9 I/O channels & 4 ADC channels. The ADC resolution is 10 bits.

Experimental Board for TI LaunchPad.





6 digit 7 segment Multipurpose LED Counter

For more information visit - www.iknowvations.in For experiments & other technical knowledge do read our blog at www.iknowvations.in/blog/



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