### Six Me!

#### ТГЛ ГГС: Эта страница пока что не переведена полностью. Пожалуйста,

#### помогите завершить перевод.

(Сотрите это сообщение по окончании перевода.)

# Использование одноплатных Linux-компьютеров (SBC) с myCNC

Программное обеспечение myCNC может быть использовано с несколькими одноплатными компьютерами на базе Операционной системы Linux и процессоров на базе архитектуры ARM.

У нас есть скомпиленные версии myCNC для компьютеров

- Asus Tinkerboard
- Odroid-XU4
- Odroid-C2
- Raspberry Pi2/3
- Pine Rock64

## Потенциальная проблема быстродействия с одноплатными компьютерами (SBC)

Мы обнаружили потенциальную проблему быстродействия вызванную реализацией драйвера OpenGL-ES для одноплатных компьютеров (Tinker Board, Odroid-C2 и др).

В результате экспериментов мы пришли к выводу, что драйвер OpenGL частично или полностью использует вычислительные мощности основного процессора при просчете визуализации в 3D (драйвер не полностью hardware, не смотря на наличие специальных графических со-процессоров). В результате при обновлении визуализации в 3D отнимается большая часть процессорного времени.

Для примера, на скриншоте ниже показана программа для 3D ювелирного фрезерования, около 400 000 строк g-кода, 8M Байт размер файла.



Процессор одноплатного компьютера сильно загружен при выполнении данного кода. Утилита Нtop показывает загрузку одного ядра на 145% и остальных ядер около 16% каждое.

Файл	Правка	Вид	3ai	кладки	Наст	ройка	Справк	a	
1 2 3 4 Mem Swp	C                       C				 	5	22 18 1111 <mark>96</mark> 26 53M/1. 0K/1	6%] 7%] 3%] 8%] 96G] .28M]	Tasks: 87, 149 thr; 2 running Load average: 2.11 1.68 1.59 Uptime: 13:17:55
PID	HSER	PRI	NI	UIRT	RES	SHR S	CPUZ	MEMZ	TIME+ Command
16595	operator	20	0	543M	324M	67832 B	145.	16.1	1h14:31 ./TINKEB/muCNC -dtU -platform xcb
16598	onerator	20	õ	543M	324M	67832 S	16.7	16.1	7:54.90 ./TINKEB/muCNC -dtll -nlatform xcb
16600	operator	20	õ	543M	324M	67832 S	16.7	16.1	8:09.53 ./TINKEB/muCNC -dtU -platform xcb
16597	operator	20	0	543M	324M	67832 S	15.7	16.1	8:00.60 ./TINKEB/muCNC -dtU -platform xcb
16599	operator	20	0	543M	324M	67832 S	15.7	16.1	7:56.29 ./TINKER/myCNC -dtU -platform xcb
16606	operator	20	0	543M	324M	67832 S	2.8	16.1	1:23.89 ./TINKER/myCNC -dtU -platform xcb
16596	operator	20	0	543M	324M	67832 S	0.9	16.1	0:01.75 ./TINKER/myCNC -dtU -platform xcb
16624	operator	20	0	543M	324M	67832 S	0.0	16.1	0:51.28 ./TINKER/myCNC -dtU -platform xcb
16604	operator	20	0	543M	324M	67832 S	0.0	16.1	0:00.72 ./TINKER/myCNC -dtU -platform xcb
16607	operator	20	0	543M	324M	67832 S	0.0	16.1	0:06.73 ./TINKER/myCNC -dtU -platform xcb
16603	operator	20	0	543M	324M	67832 S	0.0	16.1	0:19.80 ./TINKER/myCNC -dtU -platform xcb
16602	operator	20	0	543M	324M	67832 S	0.0	16.1	0:00.18 ./TINKER/myCNC -dtU -platform xcb
16578	operator	20	Θ	<mark>3</mark> 832	<mark>2</mark> 104	<b>1</b> 960 S	0.0	0.1	0:00.01 /bin/bash /home/operator/myCNC/myCNC.sh
16601	operator	20	0	543M	324M	67832 S	0.0	16.1	0:00.00 ./TINKER/myCNC -dtU -platform xcb
16605	operator	20	0	543M	324M	67832 S	0.0	16.1	0:00.00 ./TINKER/myCNC -dtU -platform xcb
16619	operator	20	0	543M	324M	67832 S	0.0	16.1	0:00.00 ./TINKER/myCNC -dtU -platform xcb
16620	operator	20	0	543M	324M	67832 S	0.0	16.1	0:00.00 ./TINKER/myCNC -dtU -platform xcb
16621	operator	20	0	543M	324M	67832 S	0.0	16.1	0:00.00 ./TINKER/myCNC -dtU -platform xcb
F1 <mark>Hel</mark> )	2Setup	NSSea	arch	F4 <mark>F11</mark>	eri <sup>r5</sup> īn	ree F6S	ortBu	7 <mark>\ic</mark> e	-F6Nice +F9Kill F10Quit
5 10	porator) 102	169.0.1	00						

Такая загрузка ЦПУ может привести к перегреву компьютера (к сожалению, радиатор на компьютере Asus заметно меньше, чем хотелось бы), задержкам событий от клавиатуры, остановкам выполнения резки (в случае, если компьютер не успевает вовремя заполнить буфер команд контроллера) и другим системным проблемам (вплоть до зависания системы).

Для того, чтобы выяснить причину возникновения высокой загрузки системы, мы добавили опцию "Выключить курсор" ("Disable Cursor") в окне настроек 3D визуализации.

S							1
C	NC Settings	3D Visualisation					
	- ADC Mapping	Disable Visualisation				Disable Cursor	
	Connections	Tuning	1			Dimension lines	
	Network	Visualisation by Lines/Dots	Lines 🗸			Show extent	
	Motion	Touch screen sensitivity for Panning	0 🗘			Lathe visualisation	
>	Hardware PLC	Cursor size ratio	1.5				
	Software PLC	Zaros siza ratio	1.5			Bandar tima limit	00 ^
	G-codes settings	2003 5120 7810	1.5			Kender ume innic	<u> </u>
	DXF import settings	Default Viewpoint	-45	0	-45		
	Macro List	Background Color RGBA	50 🗘	50 🗘	50 🗘	231 🗘	
>	Macro Wizard	Foreground Color RGBA	50 🗘	254 🗘	50 🗘	252 🗘	
>	Probing Wizard	Foreground Color(G0) RGBA	128 🗘	128 🗘	0 🗘	128 🗘	
>	Preferences	Visualisation setun					
ľ	Screen	Avis	Enable	Show as			Direction Tilt
	Colors	AXIS	Enable	Show as			
	3D Visualisation	X		Χ.		~	+ ~
	Work Offsets	У		Y		~	+ ~
	Parking Coordinates	z		Z'		~	+ ~
>	Technology	a		A' - rotation/	tilt around X	~	cw ~
	Camera	b		B' - rotation/	tilt around Y	~	cw ~ 🗆
	5 axes RTCP	c		C' - rotation/	tilt around Z	~	cw ~
>	Panel/Pendant						
>	Hardware	u		0		¥	+ •

Если стоит галка, то окно визуализации игнорирует события от контроллера о новом положении (красный курсор на окне визуализации не меняет положение и вся картинка не перерисовывается при изменении координат).

Результат данного эксперимента можно посмотреть на скриншоте ниже. Загрузка процессора упала в несколько раз. Только 1 ядро процессора загружено на 40%, остальные существенно меньше. Основной процессор значительно больше 50% времени находится в режиме оидания и готов оперативно реагировать на внешние команды.

Last update: 2018/09/06 14:04				ru:mycnc:sbc				http://docs.pv-automation.com/ru/mycnc/sbo			
Файл	Правка	Вид	Зa	кладки	Наст	ройка	Сп	равк	а		
1 [ 2 [ 3 [ 4 [ Swp[		     				I	698	2 18 19 22 M/1, 0K/1	2.7%] 3.5%] 5.8%] 2.7%] .96G] L28M]	Tasks: Load a Uptime	91, 201 thr: 1 running perage: 0.60 0.59 0.56 : 15:35:40
PID	USER	PRI	NI	VIRT	RES	SHR	SC	PUZ	MEMZ	TIME+	Command
17446	operator	20	0	534M	316M	68588	S 3	9.7	15.7	50:58.04	./TINKER/myCNC -dtU -platform xcb
17460	operator	20	0	534M	316M	<mark>68</mark> 588	S	4.7	15.7	4:44.65	./TINKER/myCNC -dtU -platform xcb
17454	operator	20	0	534M	316M	<mark>68</mark> 588	S	0.7	15.7	0:28.36	./TINKER/myCNC -dtU -platform xcb
17458	operator	20	0	534M	316M	<mark>68</mark> 588	S	0.0	15.7	0:02.74	./TINKER/myCNC -dtU -platform xcb
17461	operator	20	0	534M	316M	<mark>68</mark> 588	S	0.0	15.7	0:12.36	./TINKER/myCNC -dtU -platform xcb
17447	operator	20	0	534M	316M	<mark>68</mark> 588	S	0.0	15.7	0:03.46	./TINKER/myCNC -dtU -platform xcb
17453	operator	20	0	534M	316M	<mark>68</mark> 588	S	0.0	15.7	0:00.30	./TINKER/myCNC -dtU -platform xcb
17450	operator	20	0	534M	316M	68588	S	0.0	15.7	0:05.93	./TINKER/myCNC -dtU -platform xcb
17451	operator	20	0	534M	316M	68588	2	0.0	15.7	0:05.77	./TINKER/myCNC -dtU -platform xcb
17448	operator	20	0	534M	316M	68588	S	0.0	15.7	0:06.08	./TINKER/myCNC -dtU -platform xcb
17449	operator	20	Ŭ	534M	3160	68588	5	0.0	15.7	0:05.55	./TIMKEK/myCNU -dtu -platform xcb
17430	operator	20	U A	3832 524M	2084		ۍ د	0.0	45 7	0:00.01	/DIN/DASh /nome/operator/myUnu/myUnu.sh
17436	operator	20	0	5340 534M	310H	00000 60000	o c	0.0	15.7	0.00.00	TINKEN/MUCHC -atu -platform xcb
17466	operator	20	ñ	534M	316M	68588	с v	0.0	15 7	0.00.00	TINKER/muCNC = dtll = platform xcb
17467	operator	20	õ	534M	316M	68588	2 V	0.0 0 0	15.7	0.00.00	TINKER/muCNC _dtll _nlatform ych
17468	onerator	20	ň	534M	316M	68588	S	ñ ñ	15.7	0:00.00	TINKER/muCNC -dtll -nlatform ych
	_										
F1Help	F2Setup	F3 <mark>Se</mark>	arch	F4 <mark>Filt</mark>	er <mark>F5</mark> Tr	ree <mark>F</mark> f	Sor	tBy	7 <mark>Nic</mark>	e – <mark>F8</mark> Nice	+ <mark>F9</mark> Kill <mark>F10</mark> Quit
	perator) 192	168.0	108								

Выводы: Если вы собираетесь работать с тяжелыми g-кодами, и хотите использовать 3D визуализацию, рассмотрите возможность

- Выключить курсор в окне 3D визуализации при использовании одноплатных ARMкомпьютеров, или
- Использовать обычные компьютеры на базе процессоров Intel и операционной системы Linux. Даже самые дешевые современные процессора Intel с встроенной графикой имеют достаточное быстродействие нормальные драйвера для устойчивой работы 3D визуализации.

#### Odroid-C2

Login: operator Password: operator

Root password: operator

#### Change IP address of Single Board Computer (SBC)

#### Change IP address of Single Board Computer (SBC) - Odroid-C2

We provide single board computers (Odroid-C2, Raspberry Pi2/3, NanoPi K2) based on Ubuntu Linux

2023/03/19 08:27

5/22

with MATE Desktop environment.

Notice: Network settings in Linux attached to MAC address of Network controller (wired or wireless). You may need to re-setup Network settings in case you insert new Wifi dongle (new MAC address) or update SD card image from our FTP (Network configured for tor MAC addresses of computer we prepared the image.

There are many ways to change IP address of computer board. Linux users can do it easily without our how-to. For those who need it:

- 1. Hide or Close Full screen windows to open Desktop screen
- 2. Find Network Icon in top Taskbar



3. Press Right Mouse button on the icon, select "Edit Connections" menu and click on it



- 4. Network Connections setup window will be opened. Select Ethernet Connection you have in the list, press "Delete" button, confirm "Delete".
- 5. Goto again to Network Icon in top Taskbar, press right mouse button and select "Auto Ethernet"

🔇 Applications Places System 🏪 🥹	(e)				🔟 💆 🔶 I	🛯 en Thu Jul 27, 16:47 🕛
				Ethernet Network		
				disconnected		
		P		Auto Ethernet	_	
operator's Home		Teamviewer STAR	r .	Wi-Fi Networks		
				197-BASE	(fr	in the second
SĎ	a Mahurah Garaga Ma			Disconnect		Ę
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Midnight				✓ Enable Wi-Fi		
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			Close			
Terminal MATE						
the second s						
le l						
E-Motion						
ɪ 📕 [(16:47:41) myCNC co 🐚 [TeamV	'iewer] 🛛 🛃 Netw	ork Connections				

6. "Auto Ethernet" Connection will appear in "Network Connections" setup Window. Click on it and press "Edit" button

🔇 Applications Places System 🏪 😜			🎹 🏹 🛜 💷 en Thu Jul 27, 16:51 🖒
operator's Home	Teanviewer STARI	r	
so boot B Onboard	Name Last Used  Ethernet Auto Ethernet never Edit the	Add <u>Add</u> <u>Fedi</u> selected connection	44015 24016
Midnight Commander	197-BASE now	Close TE	
E-Motion			
🖬 🁎 [(16:51:04) myCNC co 🎕 [TeamV	/iewer] 🛃 Network Connections		

- 7. "Editing Auto Ethernet" window will appear. Select "IPv4 Settings" Tab
- 8. Select Method: Manual
- 9. Address: **192.168.0.50**
- 10. Netmask: 255.255.255.0
- 11. Gateway: **0.0.0.0**
- 12. Press Save button

🕽 Applications Places System 🏪 🤤	e e		🎹 🔄 🤶 💷 en Thu Jul 27, 16:59
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	L		
		Cancel Save	
		Save any changes made to this connec	ction.
	ewerg 👘 Network Connections 👘 Editing At	Jto Ethernet	

- 13. Close Network Settings windows, reboot Computer
- 14. After Reboot goto Network Icon in top Taskbar, press Left Mouse button on it, select **Connection information**



15. **Connection Information** window will be opened. Check "Auto Ethernet" Tab is present and you have IPv4 address 192.168.0.50 (or address you setup in the settings)

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boot	Connection Information	<ul> <li>■</li> </ul>		44015
	Active Network Co	nnections		
	Auto Ethernet 197-BA	ASE (default)		-
B	General			Ĕ
Onboard	Interface: E Hardware Address: 0	Ethernet (eth0) )0:1E:06:34:15:2D		44016
	Speed:	Inknown		
	Security: N	None		
Commander				
	IPv4			
	IP Address: 1	192.168.0.50		
	Broadcast Address: 1	192.168.0.255		
Terminat MATE	Subnet Mask: 2	255.255.255.0		
6 3				
	IPv6	0000210165550241452d/64		
E-Motion	IP Address:	e80::21e:011:1e34:1520/04		
		Close		
🎟 🦊 [(17:00:57) myCNC co 💐 [TeamViewer]	⑦ Connection Information			

Change Screen Resolution for Single Board Computer (SBC) - Odroid-C2

Touch Screen calibration on Ubuntu Mate - Odroid-C2

Change Screen Resolution for Single Board Computer (SBC) - Odroid-C2

#### **Asus Tinker Board**

Login: operator Password: operator

```
Root password: operator
```

#### How to add new screen resolution for Tinkerboard

#### Add New Screen Resolution TinkerBoard SBC

Screen resolution for Tinkerboard can be changed in Settings»Display configuration dialog.



Default resolution list in the dialog does not include popular resolutions like

- 1. 1280×800
- 2. 1368×768
- 3. 1600×900

Utility  $\ensuremath{\text{CVT}}$  can be used add new resolution modes to the list

1. Open console window (konsole icon)



#### 2. Type command

#### cvt 1368 768 [Enter]



The utility will print modesettings parameters that should be included in modesettings configuration

operator@tinkerboard:~\$ cvt 1368 768 # 1368x768 59.88 Hz (CVT) hsync: 47.79 kHz; pclk: 85.25 MHz 11/22

Modeline "1368x768\_60.00" 85.25 1368 1440 1576 1784 768 771 781 798 - hsync +vsync operator@tinkerboard:~\$



3. Open for edit **modesettings** configuraion file "/etc/X11/xorg.conf.d/20-modesettings.conf" with administrator permissions (sudo)

sudo mcedit /etc/X11/xorg.conf.d/20-modesettings.conf

4. Add modesettings for 1368×768 resolution into "Monitor" Section. There can be several **Modeline** lines for different screen resolution you like to add. Add "PreferredMode" Option for resolution you like to have by default. Press **"F2"** button to save the changes.

#### 20-modesettings.conf

```
Section "Monitor".
    Identifier "HDMI-1".
    Modeline "1280x800 60.00"
                                83.50
                                       1280 1352 1480 1680 800 803 809
831 -hsync +vsync
    Modeline "1368x768_60.00"
                                85.25
                                       1368 1440 1576 1784 768 771 781
798 -hsync +vsync
    Modeline "1600x900 60.00"
                               118.25
                                       1600 1696 1856 2112
                                                            900 903 908
934 -hsync +vsync
    Option "PreferredMode" "1368x768_60.00"
```

#### EndSection

<b>III</b> *	NoMachine - 192.168.0.112	~ ^ 😣
1		
Trash	Config TOUCH	
Ele Sys	operator:sudo – Konsole + – 🗆 x	
	/etc/X11/xorg.conf.d/20-modesettings.conf [] 0 L:[ 1+11 12/ 14] *(374 / 376b) 0010 0x00A [*][X] ▲ Section "Nonitor".	
CLEAR	Identifier "HDMI-1".	
	Modeline "1280x800 60.00" 83.50 1280 1352 1480 1680 800 803 809 831 -hsync +vsync Modeline "1368x768 60.00" 85.25 1368 1440 1576 1784 768 771 781 798 -hsync +vsync Modeline "1600x900 60.00" 118.25 1600 1690 1556 2112 900 903 908 934 -hsync +vsync	
Tearnvi	Option "PreferredMode" "1368x768 60.00".	
STARTEN	EndSection	
STOP TV		
2		
TeamVi		
Konsole		
E-Motion	Help 25ave 3Mark GReplac 5Copy 6Move 7Search 8Delete 9PullDn 10Quit	
HDMI-1		
	NoMachine - 192.168.0.112	~ ^ &
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Trash Trash © File Sys CLEAR	NoMachine - 192.168.0.112         Image: Config         Config         TOUCH         Image: Config         Image: Config <td< td=""><td>~ ^ 😒</td></td<>	~ ^ 😒
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Trash File Sys CLEAR Teamvi	Description         Description           Config         Config           Config         Operator: sudo - Konsole           Image: Section * Monitor*.         Image: Section * Monitor*.           Identifier * HDMI-1*.         Modeline * 1280x800 60.00°           Modeline * 1280x800 60.00°         83.50           Identifier * HDMI-1*.         Modeline * 1280x800 60.00°           Modeline * 1280x800 60.00°         83.50           Identifier * HDMI-1*.         Modeline * 1260x708 60.00°           Modeline * 1260x708 60.00°         182.25           Identifier * HDMI-1*.         Modeline * 1260x708 60.00°           Modeline * 1260x708 60.00°         182.25           Identifier * PreferredMode* *         Save file           Confirm save file: */etc/X11/xorg.conf.d/20-modesettings.conf*           Indsection         [gave] [ cancel ]	~ ^ 🔇
Tearnvi	Wachine - 192.168.0.112         Image: Config         TOUCH         Image: Config	~ ~ 🐼
Teamvi Teamvi Teamvi Teamvi Teamvi Teamvi Teamvi	Wachine - 192.168.0.112         Config         Config         Config         Config         File         File         File         Edit View Bookmarks Settings Help         Ctc/X11/Xorg.conf.d/20-modesettings.conf         File         File         Edit View Bookmarks Settings Help         Ctc/X11/Xorg.conf.d/20-modesettings.conf         File         File      <	~ ^ 🔇
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5. Reboot the computer and check if new resolutions appear in the Display settings



#### HDMI event handler for SBC Tinkerboard

**Teamviewer Reset Config** 

#### **Change IP Address for TinkerBoard SBC**

#### Change IP address for TinkerBoard SBC

1. Open **Konsole** (Click on **Konsole** Desktop shortcut or select Menu  $\rightarrow$  Application  $\rightarrow$  Terminal Emulator)



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#### 2. Open Network settings in editor with Administrator permissions. Type in the konsole

sudo mcedit /etc/network/interfaces

and press Enter.





There are 2 IP addresses setup on the Tinkerbboard by default

 $192.168.1.50\\192.168.4.50$ 

Configuration sections are

```
iface eth0 inet static
# address 192.168.0.50
```

netmask 255.255.255.0 address 192.168.1.50

iface eth0 inet static address 192.168.4.50 netmask 255.255.255.0



Symbol "#" is used as a line comment.

3. Edit **Address** to fix LAN IP Address as you need. Press **F2**, **Enter** keys to save changes. Reboot computer.



We noticed that

the last address only is configured if LAN connector is disconnected from Network while computer boot.

All IP addresses in the **interfaces** configuration file should be set up correctly if LAN connector is connected to Network while booting. We don't know if this is a bug or "feature", just share this information.

#### **Touch Screen Calibration for TinkerBoard SBC**

Touch Screen calibration for TinkerBoard, XFCE Window manager

1. Open **Konsole** (Click on **Konsole** Desktop shortcut or select Menu  $\rightarrow$  Application  $\rightarrow$  Terminal Emulator)



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#### 2. Run **xinput\_calibrator** in the konsole. Type in the konsole

xinput\_calibrator

and press Enter.





3. Follow instructions and Tap the red crosses to make calibration. After calibration done the **xinput\_calibrator** will offer new calibration data to add to the system calibration settings

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Calibration settings should be saved into file /etc/X11/xorg.conf.d/99-calibration.conf

4. Open new konsole window. Open file **/etc/X11/xorg.conf.d/99-calibration.conf** with administrator permissions from Editor.

sudo mcedit /etc/X11/xorg.conf.d/99-calibration.conf

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5. Copy Calibration settings from **xinput\_calibrator** output to the Editor window.

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5. Press **F2**, **Enter** to save the settings. Reboot the computer to apply the changes.

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