

This video covers how to use USB serial input on the Raspberry Pi Pico in your projects. We use a Visual Studio Code project to program the brand-new Raspberry Pi Pico microcontroller board in C. We create a basic blink LED program which accepts the inputs from the serial monitor over USB and changes the state of the LED. We also explain how to configure the CMake configuration file to enable the USB serial input on the Pico.

This video provides the fundamental background of the serial USB process and explains how to correctly configure your Pico microcontroller. It explains which functions in the Pico SDK to use in order to communicate to and from the Pico.

youtube <https://www.youtube.com/watch?v=NHwMJZwRo7k>  
<https://learnembeddedsystems.co.uk/usb-serial-input-on-the-pico>

Adding blink\_led project to my pico-examples

```
git diff CMakeLists.txt
diff --git a/CMakeLists.txt b/CMakeLists.txt
index 66add69..7641f33 100644
--- a/CMakeLists.txt
+++ b/CMakeLists.txt
@@ -15,6 +15,7 @@ pico_sdk_init()
include(example_auto_set_url.cmake)
# Add blink example
add_subdirectory(blink)
+add_subdirectory(blink_led)

# Add hello world example
add_subdirectory(hello_world)
```

Need make chgs to CmakeLists.txt  
Also the CmakeLists.txt needs to be CMakeLists.txt

```
diff CmakeLists.txt /opt/pico-examples/blink_led/CMakeLists.txt
1,7c1
< cmake_minimum_required(VERSION 3.12)
<
< include(pico_sdk_import.cmake)
<
< project(pico-projects)
<
< pico_sdk_init()
---
>
devel@pi4-23:/opt/pico-examples $ cd build
cmake ..
PICO_SDK_PATH is /opt/pico-sdk
PICO platform is rp2040.
Using regular optimized debug build (set PICO_DEOPTIMIZED_DEBUG=1 to de-optimize)
PICO target board is pico.
```

Using board configuration from /opt/pico-sdk/src/boards/include/boards/pico.h  
TinyUSB available at /opt/pico-sdk/lib/tinyusb/src/portable/raspberrypi/rp2040; adding USB support.

Compiling TinyUSB with CFG\_TUSB\_DEBUG=1

-- Configuring done

-- Generating done

-- Build files have been written to: /opt/pico-examples/build

cd blink\_led

devel@mypi3-20:/opt/pico-examples/build/blink\_led \$ ls

CMakeFiles cmake\_install.cmake Makefile

make

[ 0%] Performing build step for 'ELF2UF2Build'

[100%] Built target elf2uf2

[ 0%] No install step for 'ELF2UF2Build'

[ 0%] Completed 'ELF2UF2Build'

[ 0%] Built target ELF2UF2Build

[ 0%] Built target bs2\_default

[ 0%] Built target bs2\_default\_padded\_checksummed\_asm

Scanning dependencies of target blink\_led

[ 0%] Building C object blink\_led/CMakeFiles/blink\_led.dir/blink\_led.c.obj

[ 0%] Building C object

blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/pico\_stdlib/stdlib.c.obj

[ 0%] Building C object

blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/hardware\_gpio/gpio.c.obj

[ 0%] Building C object

blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/hardware\_claim/claim.c.obj

[ 0%] Building C object

blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/pico\_platform/platform.c.obj

[ 0%] Building C object

blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/hardware\_sync/sync.c.obj

[ 0%] Building C object

blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/hardware\_uart/uart.c.obj

[ 0%] Building ASM object

blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/hardware\_divider/divider.S.obj

[ 0%] Building C object blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/common/pico\_time/time.c.obj

[ 0%] Building C object blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/common/pico\_time/timeout\_helper.c.obj

[ 0%] Building C object

blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/hardware\_timer/timer.c.obj

[ 0%] Building C object blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/common/pico\_sync/sem.c.obj

[ 0%] Building C object blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/common/pico\_sync/lock\_core.c.obj

[ 0%] Building C object

blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/common/pico\_sync/mutex.c.obj

[ 0%] Building C object blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/common/pico\_sync/critical\_section.c.obj

[ 0%] Building C object blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/common/pico\_util/datetime.c.obj  
[ 0%] Building C object blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/common/pico\_util/pheap.c.obj  
[ 0%] Building C object blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/common/pico\_util/queue.c.obj  
[ 0%] Building C object  
blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/pico\_runtime/runtime.c.obj  
[ 0%] Building C object  
blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/hardware\_clocks/clocks.c.obj  
[ 0%] Building C object  
blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/hardware\_irq/irq.c.obj  
[ 0%] Building ASM object  
blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/hardware\_irq/  
irq\_handler\_chain.S.obj  
[ 0%] Building C object  
blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/hardware\_pll/pll.c.obj  
[ 0%] Building C object  
blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/hardware\_vreg/vreg.c.obj  
[ 0%] Building C object  
blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/hardware\_watchdog/  
watchdog.c.obj  
[ 0%] Building C object  
blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/hardware\_xosc/xosc.c.obj  
[ 0%] Building C object  
blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/pico\_printf/printf.c.obj  
[ 0%] Building ASM object  
blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/pico\_bit\_ops/  
bit\_ops\_aeabi.S.obj  
[ 0%] Building C object  
blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/pico\_bootrom/bootrom.c.obj  
[100%] Building ASM object  
blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/pico\_divider/divider.S.obj  
[100%] Building ASM object  
blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/pico\_double/double\_aeabi.S.obj  
[100%] Building C object  
blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/pico\_double/  
double\_init\_rom.c.obj  
[100%] Building C object  
blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/pico\_double/double\_math.c.obj  
[100%] Building ASM object  
blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/pico\_double/  
double\_v1\_rom\_shim.S.obj  
[100%] Building ASM object  
blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/pico\_int64\_ops/  
pico\_int64\_ops\_aeabi.S.obj  
[100%] Building ASM object  
blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/pico\_float/float\_aeabi.S.obj  
[100%] Building C object  
blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/pico\_float/float\_init\_rom.c.obj  
[100%] Building C object  
blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/pico\_float/float\_math.c.obj

[100%] Building ASM object  
blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/pico\_float/  
float\_v1\_rom\_shim.S.obj  
[100%] Building C object  
blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/pico\_malloc/pico\_malloc.c.obj  
[100%] Building ASM object  
blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/pico\_mem\_ops/  
mem\_ops\_aeabi.S.obj  
[100%] Building ASM object  
blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/pico\_standard\_link/crt0.S.obj  
[100%] Building CXX object  
blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/pico\_standard\_link/  
new\_delete.cpp.obj  
[100%] Building C object  
blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/pico\_standard\_link/  
binary\_info.c.obj  
[100%] Building C object  
blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/pico\_stdio/stdio.c.obj  
[100%] Building C object  
blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/pico\_stdio\_usb/  
reset\_interface.c.obj  
[100%] Building C object  
blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/pico\_stdio\_usb/stdio\_usb.c.obj  
[100%] Building C object  
blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/src/rp2\_common/pico\_stdio\_usb/  
stdio\_usb\_descriptors.c.obj  
[100%] Building C object  
blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/lib/tinyusb/src/portable/raspberrypi/rp2040/  
dcd\_rp2040.c.obj  
[100%] Building C object  
blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/lib/tinyusb/src/portable/raspberrypi/rp2040/  
rp2040\_usb.c.obj  
[100%] Building C object blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/lib/tinyusb/src/device/  
usbd.c.obj  
[100%] Building C object blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/lib/tinyusb/src/device/  
usbd\_control.c.obj  
[100%] Building C object blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/lib/tinyusb/src/class/  
audio/audio\_device.c.obj  
[100%] Building C object blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/lib/tinyusb/src/class/  
cdc/cdc\_device.c.obj  
[100%] Building C object blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/lib/tinyusb/src/class/  
dfu/dfu\_device.c.obj  
[100%] Building C object blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/lib/tinyusb/src/class/  
dfu/dfu\_rt\_device.c.obj  
[100%] Building C object blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/lib/tinyusb/src/class/  
hid/hid\_device.c.obj  
[100%] Building C object blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/lib/tinyusb/src/class/  
midi/midi\_device.c.obj  
[100%] Building C object blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/lib/tinyusb/src/class/  
msc/msc\_device.c.obj  
[100%] Building C object blink\_led/CMakeFiles/blink\_led.dir/opt/pico-sdk/lib/tinyusb/src/class/  
net/net\_device.c.obj

```
[100%] Building C object blink_led/CMakeFiles/blink_led.dir/opt/pico-sdk/lib/tinyusb/src/class/
usbttmc/usbttmc_device.c.obj
[100%] Building C object blink_led/CMakeFiles/blink_led.dir/opt/pico-sdk/lib/tinyusb/src/class/
vendor/vendor_device.c.obj
[100%] Building C object
blink_led/CMakeFiles/blink_led.dir/opt/pico-sdk/lib/tinyusb/src/tusb.c.obj
[100%] Building C object
blink_led/CMakeFiles/blink_led.dir/opt/pico-sdk/lib/tinyusb/src/common/tusb_fifo.c.obj
[100%] Building C object
blink_led/CMakeFiles/blink_led.dir/opt/pico-sdk/src/rp2_common/pico_fix/
rp2040_usb_device_enumeration/rp2040_usb_device_enumeration.c.obj
[100%] Building C object
blink_led/CMakeFiles/blink_led.dir/opt/pico-sdk/src/rp2_common/pico_unique_id/unique_id.c.obj
[100%] Building C object
blink_led/CMakeFiles/blink_led.dir/opt/pico-sdk/src/rp2_common/hardware_flash/flash.c.obj
[100%] Linking CXX executable blink_led.elf
[100%] Built target blink_led
```

```
devel@pi4-23:/opt/pico-examples/build/blink_led $ ls
blink_led.bin blink_led.elf  blink_led.hex CMakeFiles      Makefile
blink_led.dis blink_led.elf.map blink_led.uf2 cmake_install.cmake pico-sdk
```

program the pico with blink\_led.uf2

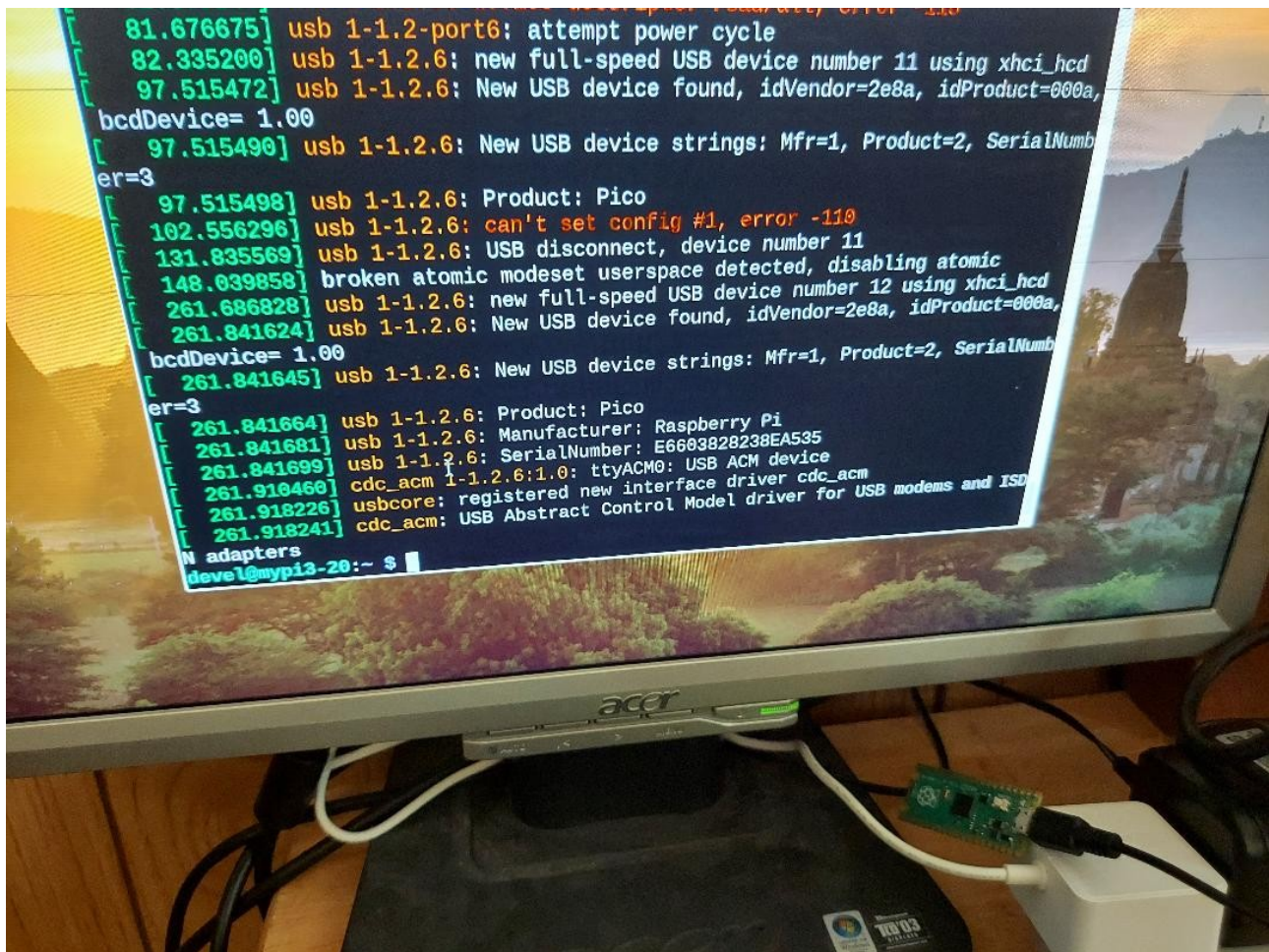
```
sudo minicom -s
Welcome to minicom 2.7.1
```

```
OPTIONS: I18n
Compiled on Aug 13 2017, 15:25:34.
Port /dev/ttyACM0, 13:06:57
```

Press CTRL-A Z for help on special keys

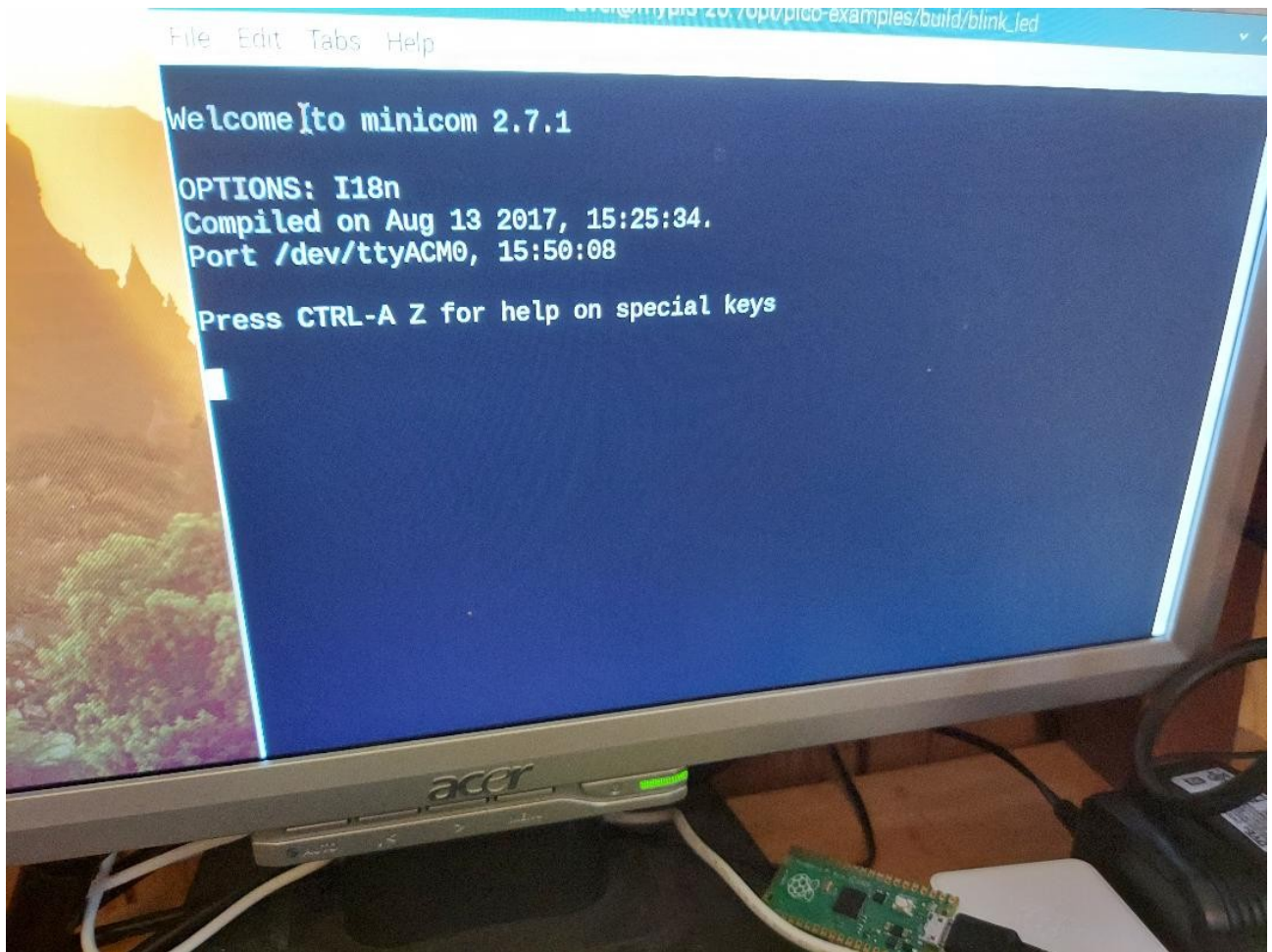
```
LED switched on!
Command (1 = on or 0 = off):
LED switched off!
Command (1 = on or 0 = off):
```

sudo dmesg to see what com port is used for the pico. The pico is in the lower right.

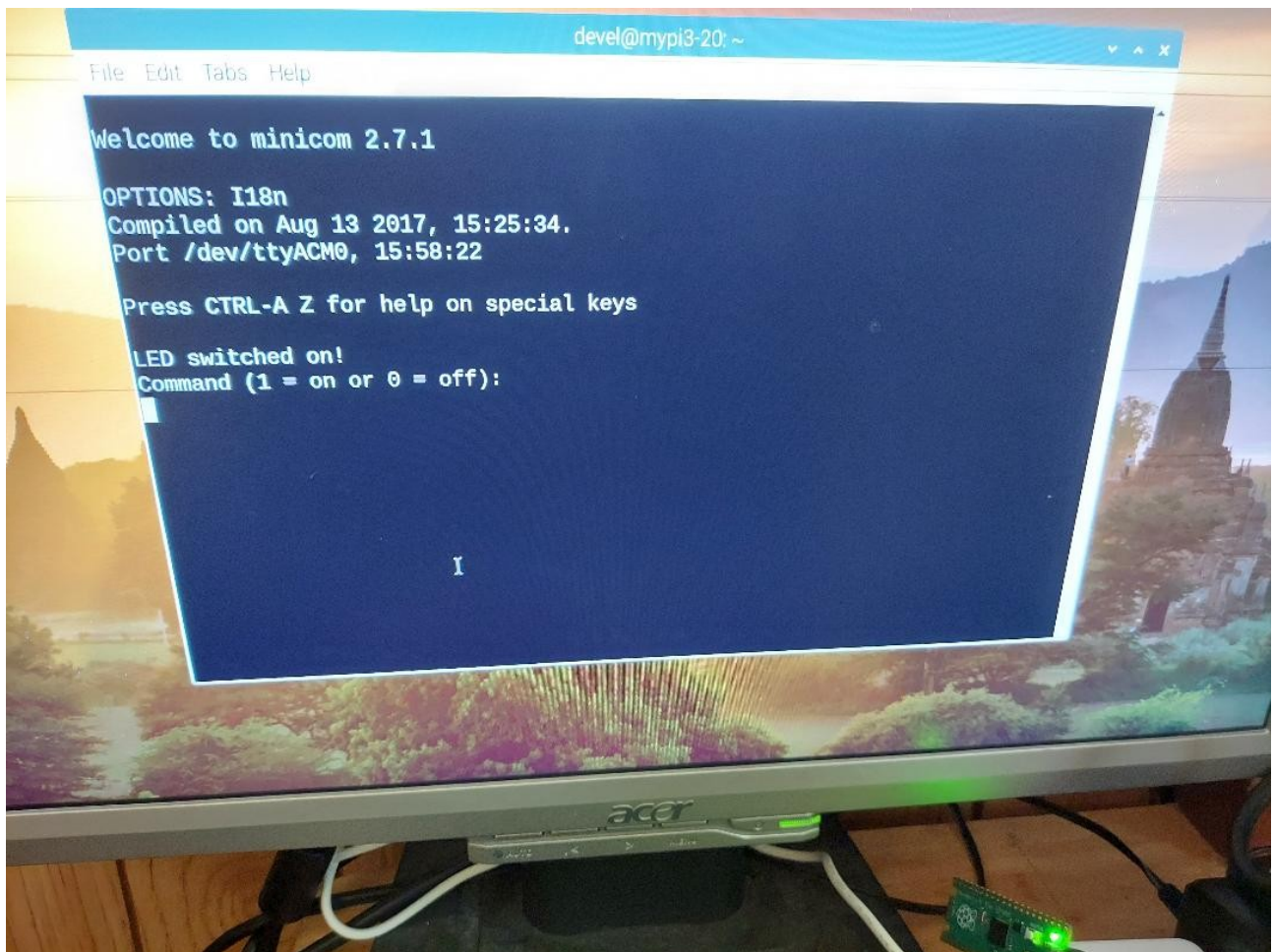


Xx





Turning led on



Turning led off.



