

Microcontroller programming

NPRG037

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Annotation and Syllabus

- Annotation
 - A seminar focused on microcontrollers, their programming and application usage. The course will consist of theoretical as well as practical part, where the attendees will try programming and usage of a real microcontroller.
- Syllabus
 - Theoretical overview part: Microcontroller architectures, Peripherals, Emulators and simulators, Microcontroller programming.
 - Practical part + tutorials: for example Arduino, Micro:bit, Picaxe, Atmel AVR and/or similar - based on our selection.



Topics

- Microcontrollers in general
 - Atmel AVR (ATmega8, 128, 328/168)
 - Arduino / micro:bit / Raspberry Pi Pico ?
 - Some Arm? Something else?
-
- MCU programming in C/C++ and in assembler
 - Interfacing, communication
 - Application

Bureaucracy

- Tutorials
- Exam





Motivation

● Gadgets

Rickard's electronic projects page - PIC Game System - Mozilla Firefox

http://www.rickard.gunee.com/projects/video/pic/gamesys.php

Getting Started Latest Headlines

-- Rickard's electronic projects page --

PIC B&W Video

- PIC Game System
- PIC-PONG
- PIC-Tetris
- Howto
- FAQ

SX Color Video

- SX Game System
- SX-Tetris
- SX-PONG
- Howto
- FAQ

Mechanically scanned

- Virtual Game System
- Virtual Pong
- Virtual Tetris
- Virtual Clock
- Virtual RS232 display
- FAQ

Mixed stuff

- Playmobile
- Links
- Contact Info
- Back

Page Counter

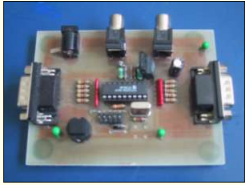
You are visitor number 108539 to my PIC Game System page since 2002-12-05.

About the Layout

This page uses stylesheets, your

PIC Game System

I have designed the hardware of the PIC game system to be able to run several different kinds of games. It has two standard C64/Amiga/Atari joysticks and video and audio output. The processor is a PIC16F84 running at 12MHz. The description of the hardware is placed on this separate page as it is the same for both of my PIC-based video games. So far I've only made two games for the system. (Most unlikely that I write more games though as I probably will write more games for the SX-system instead).



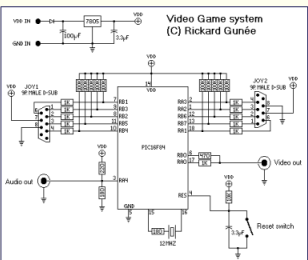
Picture of the game system

The hardware design

The hardware design is quite simple. The power supply section is just a standard 7805 regulator to get the voltage to 5v, and it has a diode and a cap at the input so it can be fed with both AC and DC (input voltage should be 9..15v something).

Two C64/Amiga/Atari joysticks are used as input for the games. Each joystick has four direction switches (up,down,left,right) and one fire switch. These five switches just short the IO line to ground when moving the joystick around and pressing fire button. This kind of joystick could be connected directly to the IO pins, but it need some resistor nets for protection, I'll get back to why soon.

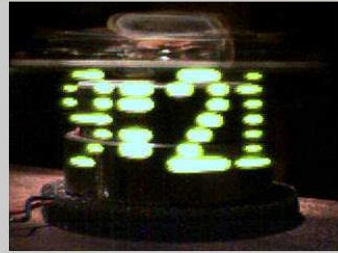
The video is generated by a two bit DA, using only two resistors and the input impedance of the TV. To be able to get a higher resolution, the software uses PORTB as a shift register. (I got the idea for this from Eric Smith) So that is why the two bits are on different IO-registers. One problem with using one IO register as a shift register is that one loses a lot of IO-pins by doing this, but I solved this by using 100k pullups and 1k serial resistors for protection on the remaining IO-pins so they could be used as input pins for the joystick. When the pin is set as an input the voltage in will be 5v thanks to the pullup when the joystick switch is open, and 5v*1k/100k=0.05v when the switch is closed. When the pin is set as an output, the 1k resistor will protect the IO-pin from too high currents during shifting operation when the joystick switch is



Schematics over the PIC Game System (Click to enlarge)

Propeller Clock - Mozilla Firefox

http://www.bobblick.com/techref/projects/propclock/propclock.htm



"Propeller Clock" Mechanically Sounded LED Clock

Seven light emitting diodes spin, giving the ill

OverClocked Inside - Redaktion ocinside.de PC hardware page - Mozilla Firefox

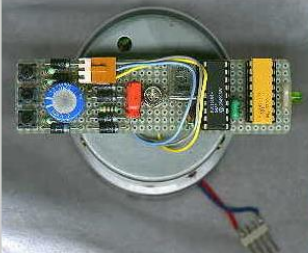
http://www.ocinside.de/go_a.html?http://www.ocinside.de/html/nodding/sub_ultra_x_receiver/sub_ul

Getting Started Latest Headlines

429 OverClocked at ocinside.de #3 at Hardwaremag.de News and 514 in the Forum

USB Ultra Infrared Receiver to remote control and power on/off the PC

The extended guide for the infrared receiver with hardware side function to remotely switch the PC on and off as well USB-variant is now available and get the name "USB Ultra infrared receiver" or briefly "USB Ultra IR".



Top View

This is the first clock I ever built. I've built a few LED signs know the message.

Done

Where is the sense of an infrared receiver at the PC ...

If you like to use the PC to watch television or S-VCD/DVD, or if you like to build a complete 3-bee IR project with LCD display, etc. for the HiFi rack, you would also like to enjoy the comfort to remote control all applications of this PC easily from the sofa.

So the first **Linux/Lanost infrared receiver** circuit was published in July 2002 on ocinside.de and the goal was a remote controlled PC with a connection to the serial port.

The next development was the **USB infrared receiver** guide to control the PC with a conventional remote control unit, but with an USB connection instead of using the serial port.

So, there've a few ways to manage this very comfortable - may be with the well-known Linux IR, Lanost IR, USB IR, or with the new USB Ultra infrared receiver which is now also offered as a complete kit in the **Flashup**.

That is new at the (USB) Ultra infrared receiver ...

Well, but what can the USB Ultra IR receiver contrary to conventional infrared receivers?

Very simple - on the one hand it receives the signals to send it to the PC software (like Gerdar, WollIRC, etc), but on the other hand it can also compare infrared signals to power off or power on the PC.

So it's possible to remotely power on the PC (ATX Power Button, Woll, etc.), watch a film or hear some music and hardware side power off the PC.

The PC can be that be completely controlled with a usual remote control unit (33 kHz RC-5 e.g. of the television,



Motivation

- Gadgets
- Robots





Motivation

- Gadgets
- Robots
- IoT
- Industrial applications
- Challenges



Handy tools

- Microchip Studio / VS Code + PlatformIO or avr-gcc + avrdude
- Atmel ATmega<whatever> (8, 128, 168, 328, any AVR-based Arduino,...)
 - Bare AVR:
 - Power supply + 3.3V or 5V regulator / or USB if you dare
 - USB-TTL serial dongle
 - Breadboard (whiteboard)
 - AVR-based Arduino:
 - USB cable
- Some small electronics bijou
 - Wires (“Dupont cables”, “jumper wires”)
 - Resistors, LEDs, switches, pushbuttons...