

# 基于FPGA的可控图像显示系统

本项目是一个可以通过上位机通过UART控制的图像显示系统，根据上位机设置的x, y, w, h等参数，选取视频源响应区域并将该区域通过HDMI输出。

## 接口说明

该系统的上位机控制接口为UART，每帧长度为2bytes，big endian。每帧数据首4bit为name field，后12bit为data field，分别用于确定参数名和值。

如果不进行任何设置，(x, y, w, h)分别为(0, 0, 1920, 1080)。

该系统通过坐标控制视频源。视频源需要在输入(x, y)时输出pixel[x][y]的RGB值，每个颜色1byte，共3bytes。

该系统输出帧率可变，取决于输入时钟和w, h， $\text{fps} = \text{clk} / (\text{w} * \text{h})$ 。例如要达到30fps需要提供124MHz的时钟频率。

## 演示

将HDMI接口接上显示器



设置x为270



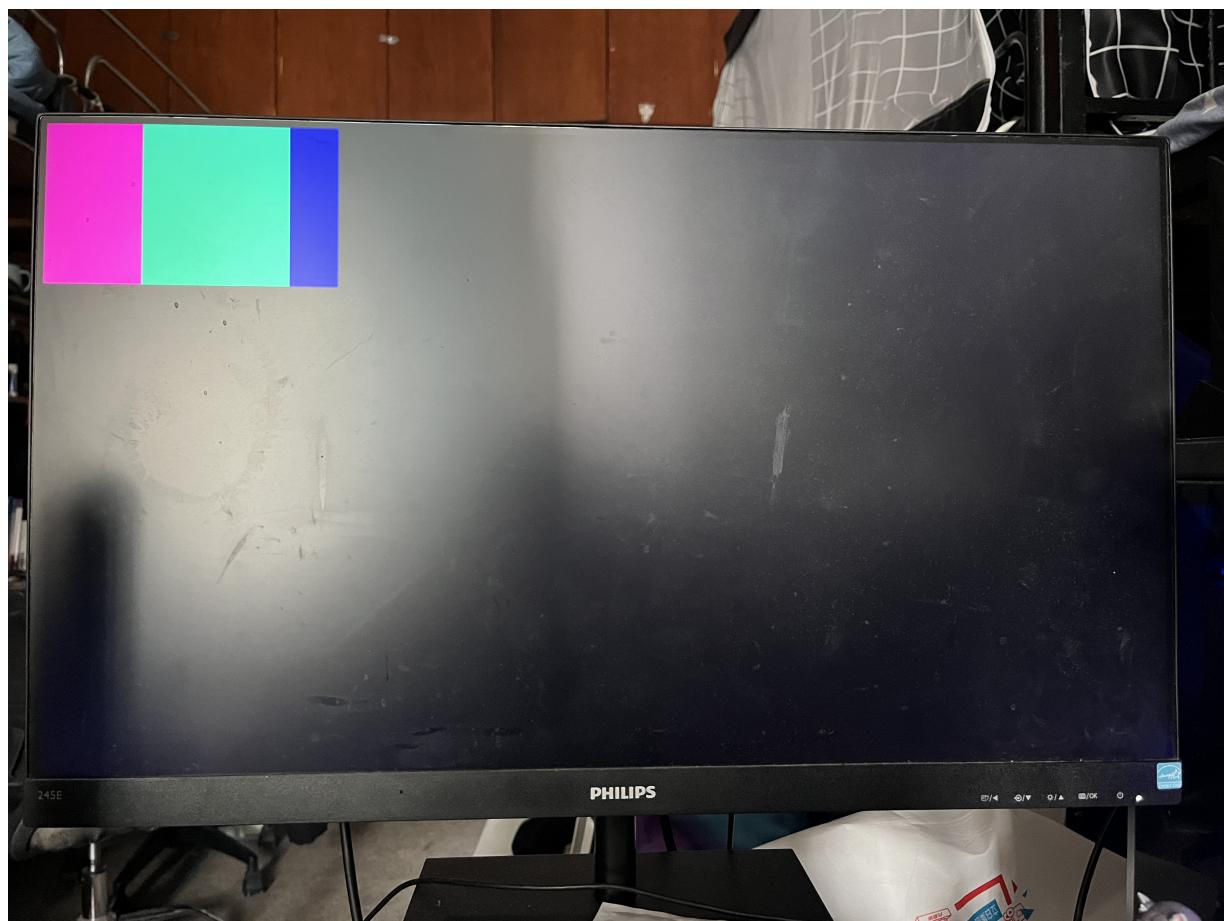
设置y为540



设置w为480



设置h为240



设置(x, y)为(960, 540)



设置(w, h)为(1920, 1080)



## UART发送记录

File Edit View Help

Connect Record Send File Receive File Port Setup Preferences Help

Clear CTS CD DSR RI

Received ASCII Received HEX

00000000 00 .

Clear DTR RTS

Sent ASCII Sent HEX

00000000 11 40 22 1C 31 E0 41 0E 13 C0 22 1C 37 80 44 38 .@".1.A...".7.D8

Outgoing

| Send HEX ▾ No end ▾

/dev/ttyUSB1 CLOSED 115200,8N1 TX: 0, RX: 0

This screenshot shows a window titled 'UART发送记录' (UART Send Record). The interface includes a menu bar with File, Edit, View, and Help. Below the menu are several icons: Connect (two arrows), Record (circle), Send File (up arrow), Receive File (down arrow), Port Setup (gear), Preferences (cogwheel), and Help (globe). A toolbar below the icons includes Clear, CTS, CD, DSR, and RI buttons. The main area has two tabs: 'Received ASCII' and 'Received HEX', with 'Received HEX' currently selected. It displays the hex value '00000000 00 .' in blue. Below this is another set of buttons: Clear, DTR, and RTS. There are also tabs for 'Sent ASCII' and 'Sent HEX', with 'Sent HEX' selected, showing the transmitted data: '00000000 11 40 22 1C 31 E0 41 0E 13 C0 22 1C 37 80 44 38 .@".1.A...".7.D8'. At the bottom, there's an 'Outgoing' text input field with a cursor, and buttons for Send, HEX selection, and message endings. Status information at the bottom indicates '/dev/ttyUSB1 CLOSED 115200,8N1' and 'TX: 0, RX: 0'.