

The Kwan-Truc: A Digital Wireless Video System

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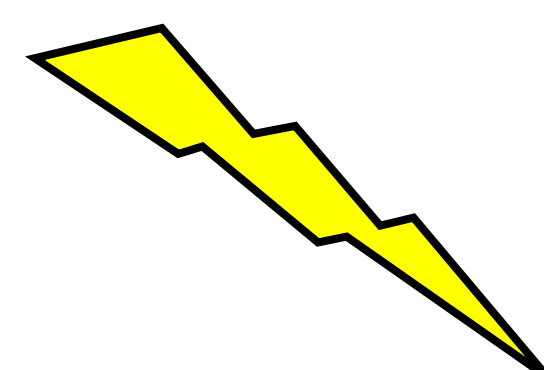
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Introduction

The Kwan-Truc is not just any video system! It is:

- Wireless: Not tethered to anything.
- Digital: No special receiver needed, just a laptop.
- Compact: Fits in small spaces.
- Lightweight: Perfect for an RC helicopter!

Software



Features

- Plays from TCP/IP socket.
- Plays from serial port direct connection.
- Plays back from saved file.
- Records video.
- Performs image upscaling/interpolation.
- Cross-platform compatible (written in Java).

Materials Used and Data Flow

IBM Webcam

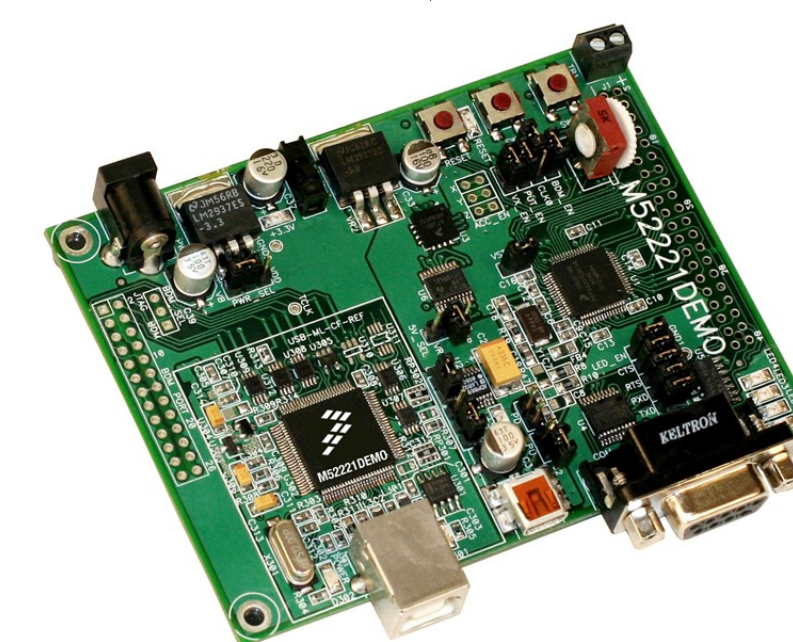
- 176X144 interlaced video
- Standard USB 1.1 interface
- No fancy features made reverse engineering simpler



USB

Freescale Microcontroller

- 16KB RAM for video buffering
- 128KB Flash for program
- USB On-The-Go
- Three RS-232 ports



RS-232

Quatech Transceiver

- Automated RS-232 to 802.11 bridge.
- Ad-hoc capable
- Selectable data rates



802.11



Standard Laptop

- Any 802.11-enabled laptop will work
- Simple Java program displays video



System Bandwidth

Source	Destination	Interface	Bandwidth
IBM Webcam	Freescale Microcontroller	USB 1.1	480 Mb/s
Freescale Microcontroller	Quatech Wireless Transceiver	RS-232	115200 b/s
Quatech Wireless Transceiver	Laptop	802.11	54 Mb/s

As is seen here, RS-232 (UART) is the system bottleneck.

Conclusions

We have created a USB to 802.11 bridge for the IBM Webcam and a GUI capable of interpreting, recording, and playing back the video stream. We tested this wireless link by packaging, powering, and flying it on the Align T-Rex 600 RC Helicopter.

Acknowledgments

We would like to thank Al Davis, L-3 Communications, and Freescale Semiconductor for their support of our project. We also acknowledge Some Dude's Hobby Shop for answering questions regarding the helicopter and for verifying its proper construction.



For Further Information

More information on this project can also be obtained at www.eng.utah.edu/~thummel/cs3992, or by contacting todd.hummel@utah.edu or twreed83@gmail.com.