

# Kwan-Truc



Todd Hummel

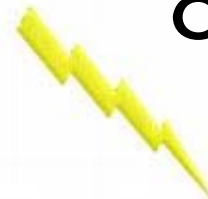
Travis Reed

Concept





802.11b



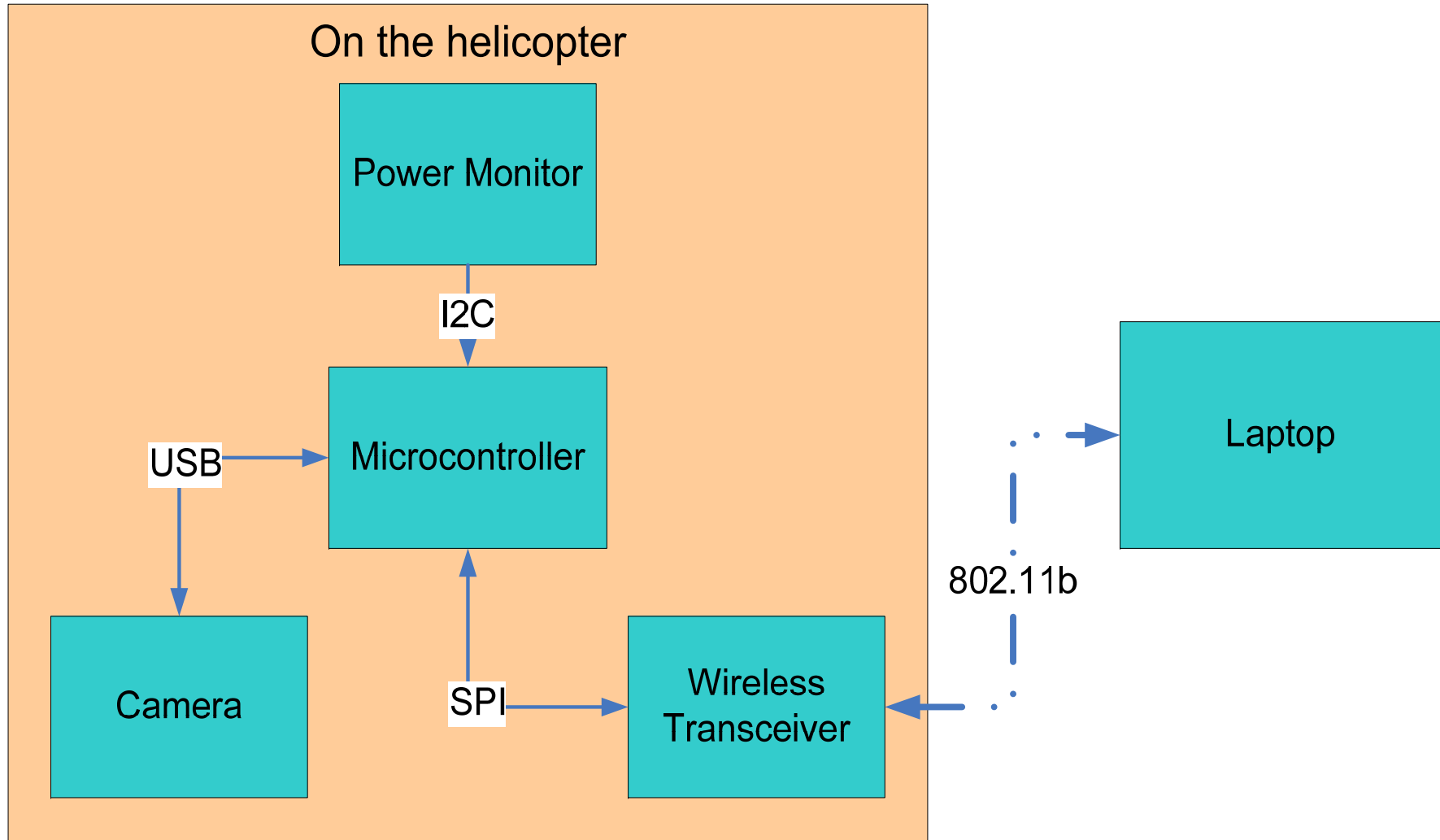
USB 1.1



SPI



# Block Diagram



# Hardware Components



# USB Camera

- Any USB Camera that has a vendor supplied Windows driver should work.
- The Camera will either need to be USB 1.1, or be configurable for a low enough bandwidth.



# MCF52221



- 80 pin LQFP
- 128 Byte Flash
- 16K Byte Ram
- USB On-The-Go (OTG) Phy
- 4ch, DMA Controller w/ Timers
- 2ea. Programmable Interrupt Timer
- 4 GPT Timers
- 8ch, 12b ADC
- UART Serial Ports with DMA capability
- QSPI and IIC Ports
- 3.3V operation



# M52221DEMO

- Integrated USB BDM
- 40 pin I/O port
- miniUSB Port
- RS-232 Serial Port w/ DB9-S Connector
- ON/OFF Power Switch w/ LED indicator
- RESET switch w/ indicator
- Power Input Selection Jumper
- User Features
  - 3-axis Accelerometer
  - 4 User LED's w/ enable
  - 2 User Push Switches
  - 5k ohm POT w/ enable
- Connectors
  - RJ-45 Ethernet Connector
  - Type B USB connector
  - DB9 Serial Connector
  - 2.0mm Barrel Power Input
  - 2pos, screw type, terminal block



## Specifications:

Board Size 3.0" x 4.0"

Power Input: +5 to +16 VDC,  
9VDC typical

# QUATECH

A DPAC TECHNOLOGIES COMPANY



## WLNG-AN-DP102

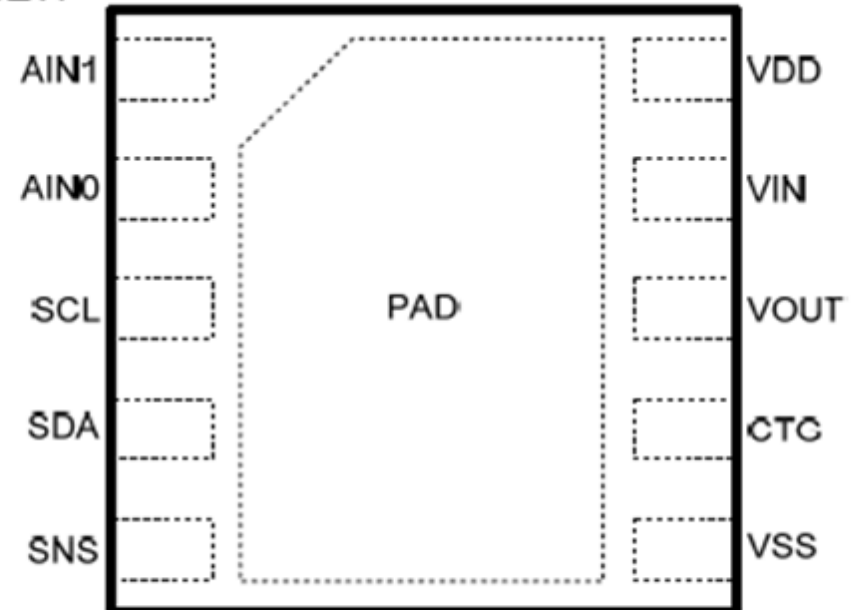
- Extended operating temperature range (-30°C to +85°C) and environmental specifications, including shock and vibration tolerance
- Advanced security: WEP (64 & 128 bit), WPA and 802.1x (LEAP) authentication
- Highly integrated 802.11b/g wireless module with radio, base-band & application processor
- Software-configurable 802.11b/g interface
- Configurable serial, digital & analog I/O ports
- Integrated RTOS, TCP/IP Stack and CLI
- Reduces need for RF and communications expertise

# POWER



DS2746

TOP VIEW



Battery Monitor

Will warn you when  
battery is running low  
allowing you to land safely.

3mm × 3mm TDFN

# Laptop

Any plain old laptop  
with 802.11 wireless  
will do...



# Interfaces

# Camera to Processor

- Hardware connectivity will be simple, just a male mini-USB to female USB A adapter
- The USB “driver” on the processor will only have to set control registers and read memory in order to communicate over the USB bus.
- The processor reference manual claims to support full speed USB transfers of 480 Mbps.

# Processor to Transceiver

- Physical connection achieved via 4-wire Serial Peripheral Interface bus.
- The wireless transceiver must be configured correctly for using its built-in SPI port.
- Then, the processor must be programmed to send data to the wireless transceiver.
- Once the data is sent to the wireless transceiver, it is automatically packaged and sent across the 802.11 interface.

# Power Monitor to Processor

- The hardware interface will be a 2-wire bus, I2C.
- The processor will be the bus master and the power monitor chip will be a bus slave.
- The driver we write on the processor will simply have to configure the correct control registers and read the result back.



# Wireless Transceiver to Laptop Application

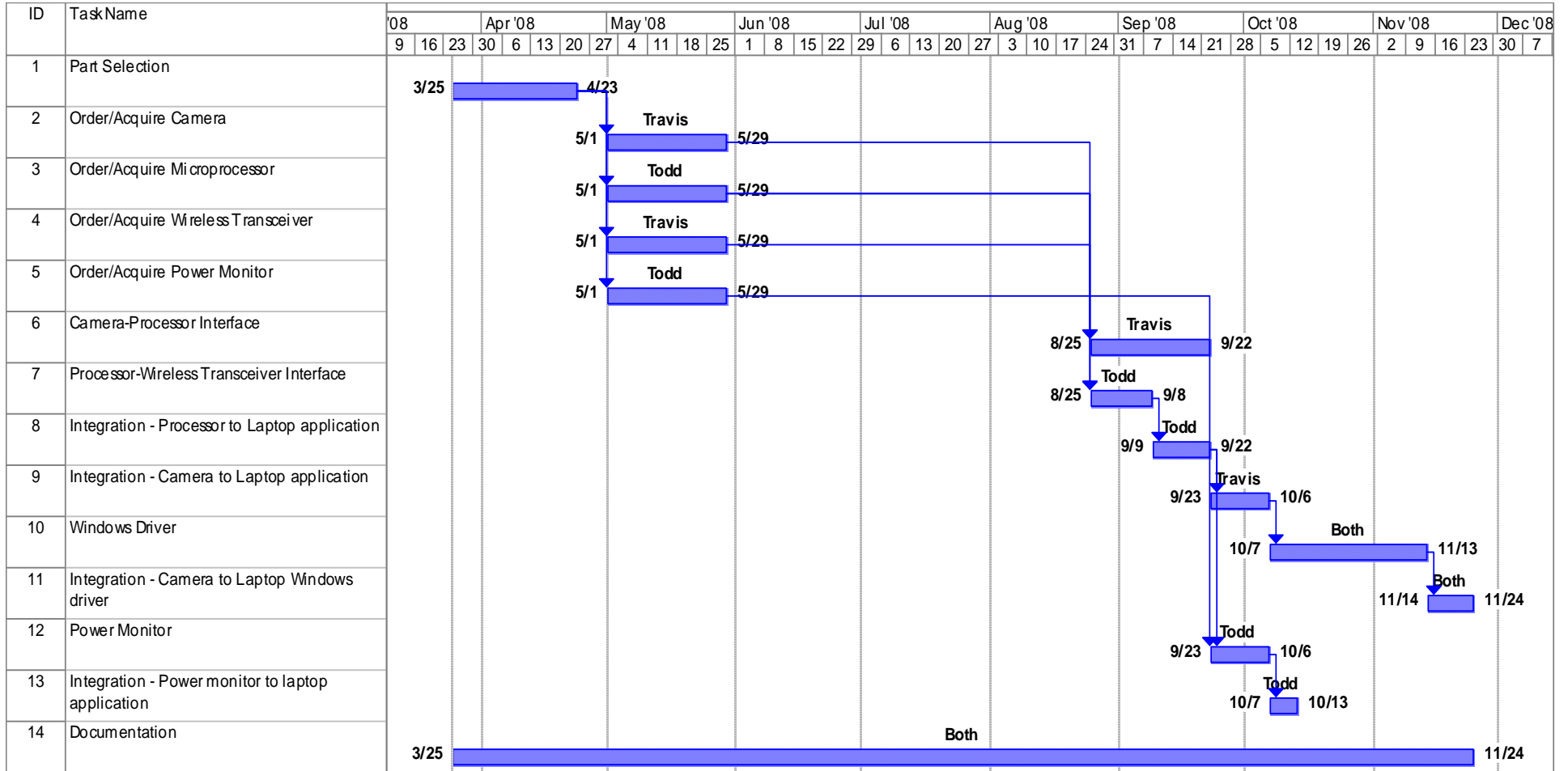
- The hardware interface is wireless transmission.
- The software interface involves making a connection and reading the data off the connected socket.

# Laptop Application to Camera Driver

- This interface is Software only (the laptop has all the hardware built-in)
- The information from the camera will be fed to a Windows device driver that is capable of finding, loading, and communicating with the camera's vendor-supplied device driver (assuming it is installed on the laptop).
- This supplied driver will then be able to function as it normally does when the USB camera is plugged in directly to the laptop. Any commands given by the vendor-supplied driver will then be able to flow the other direction as well (back to the laptop application, then to the camera).

# Schedule

# Gantt Chart



# Bill of Materials

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Component	Vendor	Contact Info	Part Number	Unit Cost	Qty.	Total Cost
Microcontroller Project Board	Freescale	1-800-521-6274	M52221 DEMO	119.00	1	119.00
	Future Electronics	1-800-FUTURE1 1-800-675-1619	M52221 DEMO	119.00	1	119.00
Wireless Transceiver	Quatech	1-800-553-1170	WLNG-AN-DP102	129.00	1	129.00
	Mouser	1-800-346-6873	WLNG-AN-DP102	109.06	1	109.06
Antenna	Quatech	1-800-553-1170	ACH2-AT-DP003	11.00	1	11.00
	Digikey	1-800-DIGIKEY	590-1007-ND	12.38	1	12.38
Camera	Local store...		TBD	~25.00	1	~25.00
USB adapter	Vernier	1-888-837-6437	USB Standard-A to Mini-A Adapter	5.00	1	5.00
Power Monitor	Maxim	1-888-629-4642	DS2746	Sample/ 1.94	1	Sample/ 1.94
	Digikey	1-800-DIGIKEY	DS2746G+-ND	3.82	1	3.82
Batteries	Local store...		NIH-2200	7.50	4	30.00
Practice Helicopter	Some Dude's Hobbies	801-233-6565	TBD	~40.00	1	~40.00
Final Helicopter	Some Dude's Hobbies	801-233-6565	TBD	~250.00	1	~250.00

**Risks**

# Risks

- Cash flow (some parts are somewhat expensive)
- Base Station Software – Drivers/porting data to Windows
- Lack of RC experience (may necessitate helicopter repairs/hospital visits)