Flexible Camera Interface Solution

Faster to Product, Faster to Market with the Latest NXP MCU Solutions
What is the problem we are solving

- Camera interface solution are available on very few parts in the market place
  - Flexible camera solution is portable to a large variety of LPC MCUs
  - You can add a camera interface to a low end or high-end microcontrollers

- Flexible camera interface is highly configurable
  - The SCT/PWM is programmable therefore it can support different communication protocols
Outline

- Solution Highlights
- Applications
- Camera Interface Description
- State Configurable Timer
- Keil board
- Camera Module
- LPC1800
- For more information and to order the board
Solution Highlights

- Interface to and capture digital images from a Serial Camera Control Bus (SCCB) still camera module

- Add images based features to your applications using a fraction of the CPU
  - Image processing, face detection, motion control, etc.

- It can interface any SCCB based camera
Applications

- Toys
- Face Detection
- Door bell camera
- Wearable Cameras
- Automated inspection
  - Quality assurance (detection of defects, flaws, missing parts)
- Part sorting and identification
- Bar-code reading & verification
- Fire or smoke detection camera based
Camera interface Description

- Only 8% CPU used to run this application
  - Camera’s 8bit data are connected to the GPIOs
  - Vsync, Hsync, PixClk are driven by the SCTimer/PWM module
  - SCL and SDA are driven by two I2C channels
State Configurable Timer (SCT/PWM)

- Combines powerful 32-bit timer counter with configurable state machine logic

- **SCT based Camera Interface Advantages**
  - Flexible Data Format
    - possible early image processing
    - adjust video data capture speed and size
  - Adaptable to Proprietary Camera Interface
    - adjustable synchronization scheme
    - adjustable clocking scheme

Available on LPC1800/LPC4300 (full featured); LPC800 (streamlined)
Keil Board

- NXP LPC1850 family of ARM Cortex™-M3 processor
- 180MHz ARM Cortex-M3 processor-based MCU in LBGA256
- On-Chip SRAM: 136KB (LPC1857), 200KB (LPC1850)
- On-Chip Flash: 1MB dual bank (LPC1857), no on-chip Flash (LPC1850)
- On-Board Memory: 16MB NOR Flash, 4MB Quad-SPI Flash, 16 MB SDRAM, & 16KB EEPROM (I2C)
- Color QVGA TFT LCD with touchscreen
- High-speed USB 2.0 Host/Device/OTG interface (USB host + Micro USB Device/OTG connectors)
- Full-speed USB 2.0 Host/Device interface (USB host + micro USB Device connectors)
- CAN interfaces, Serial/UART Port, 10/100 Ethernet Port, MicroSD Card Interface
- Digital Temperature Sensor (I2C)
- Analog Voltage Control for ACD Input
- Audio CODEC with Line-In/Out and Microphone/headphone connector + Speaker
- Debug Interface Connectors

http://www.keil.com/mcb1800/
OmniVision OV7670 camera module

- High sensitivity low-light operation
- Low operating voltage for embedded portable apps
- Standard SCCB interface compatible with I2C interface
- Output support for Raw RGB, RGB (GRB 4:2:2, RGB565/555/444), YUV (4:2:2) and YCbCr (4:2:2)
- Image sizes: VGA, CIF, and any size scaling
- Automatic image control functions

http://www.ovt.com/

Any other SCCB type of cameras can be used
Interface to other Camera Modules

- Adaptable to any 8 bit parallel camera modules with QVGA format
- Steps to integrate a new camera module:
  a. align the camera pins to the camera daughter boards
  b. adjust the camera pixel clock based on the new camera module
  c. initialize the new camera registers
LPC1800

- **180 MHz**
- **1MB dual-bank Flash**
- **High Speed USB**: on-chip HS PHY, dual HS USB host capable
- **High-Performance Cortex-M3**
- **BGA256/180/100, LQFP208/144**

### Part Number Table

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**Single bank of Flash**
For more information and to order the board

http://www.nxp.com/demoboard/OM13059.html