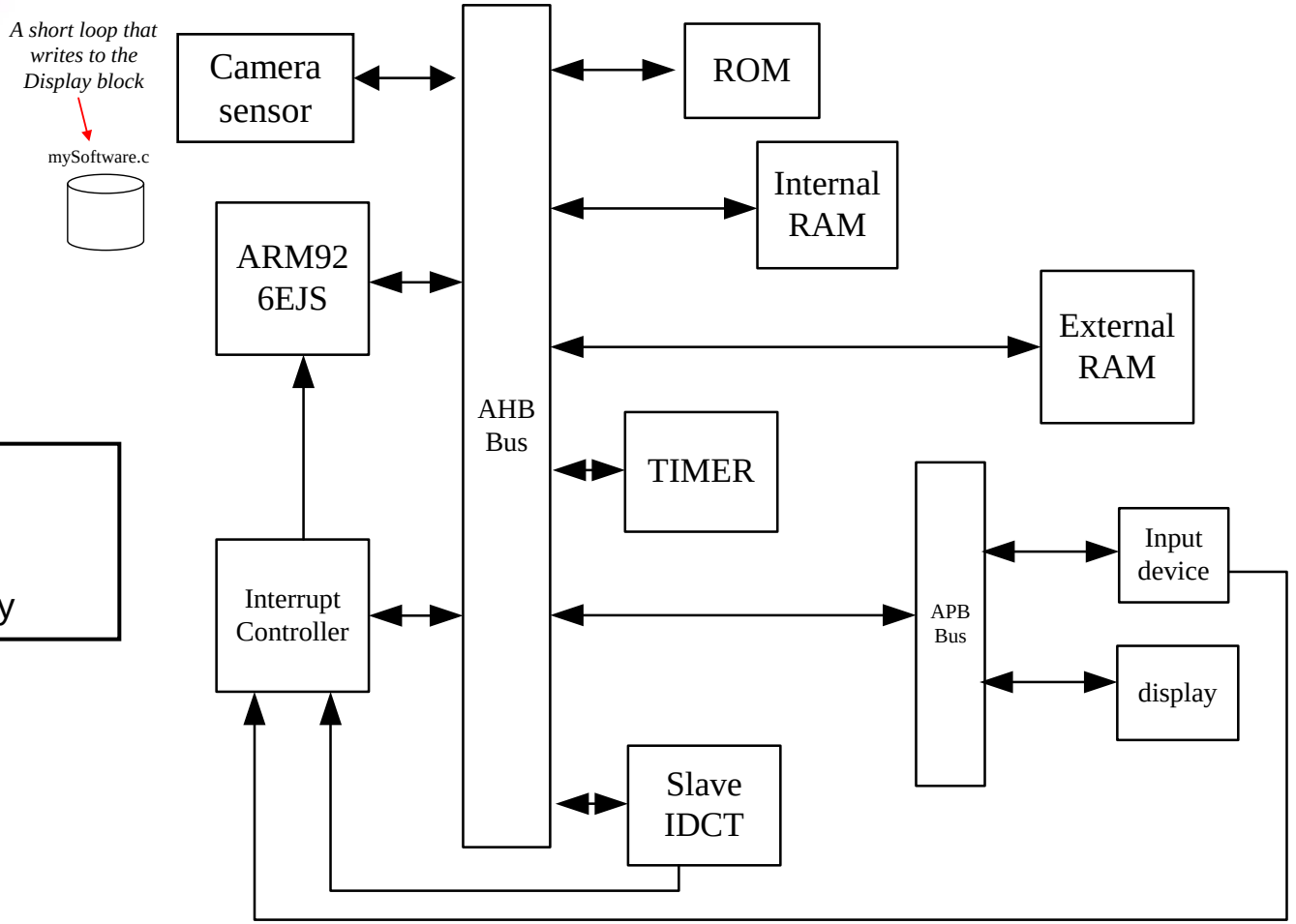
MSOC Final Project

Surveillance System

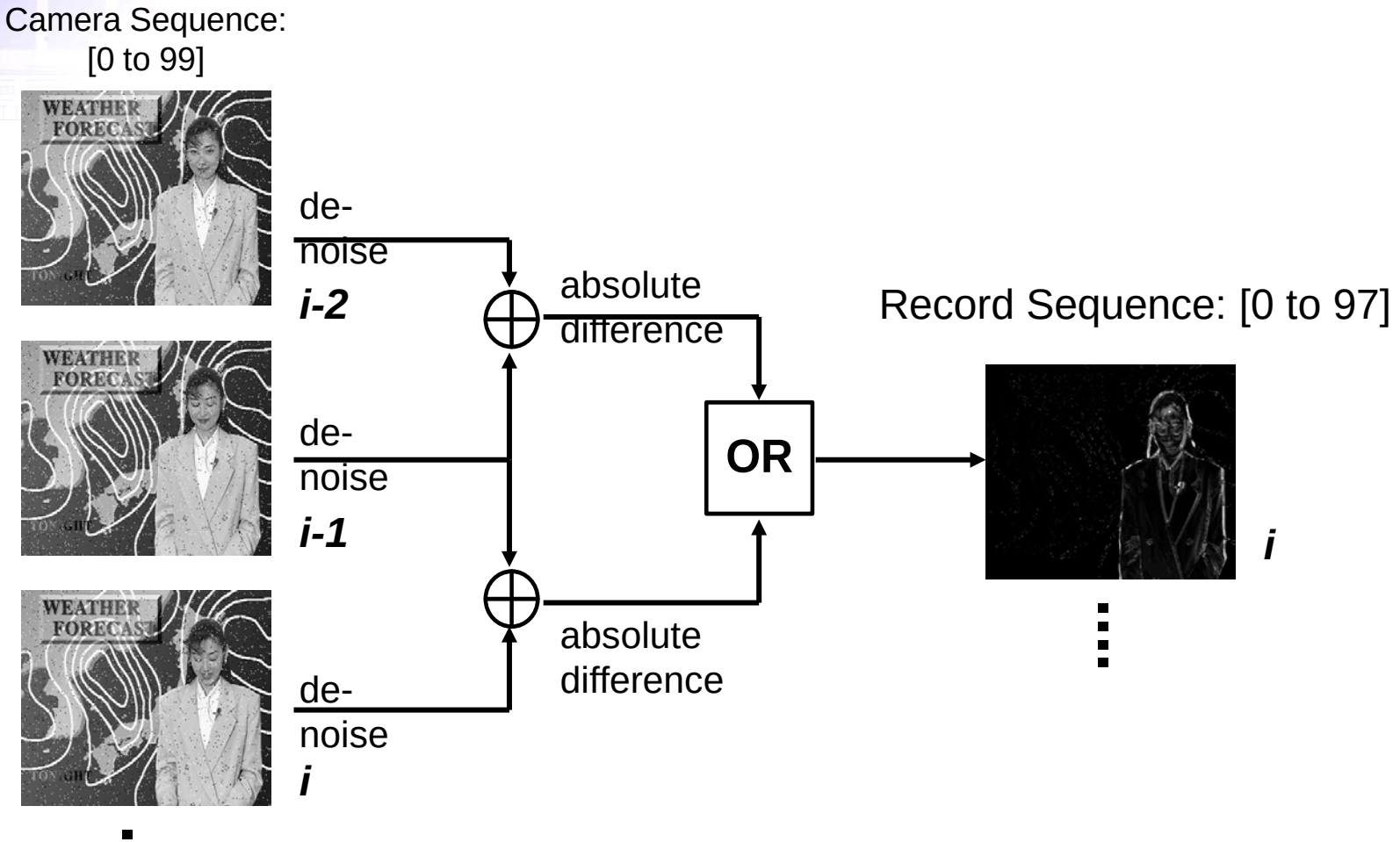
Project – MSOC Platform



Camera sensor

```
if is_enabled
    for every 33 ms
        1 frame is ready
```

Function View



Project – Software flow

While (read *status* of the sensor) {

(1) skip frames if needed according to *status*

(2) read one frame to internal memory

(3) de-noise the frame

(4) if (read_in_frame_num < 3)

save frame into External memory, then goto (2)

else

save frame into External memory , then go (5)

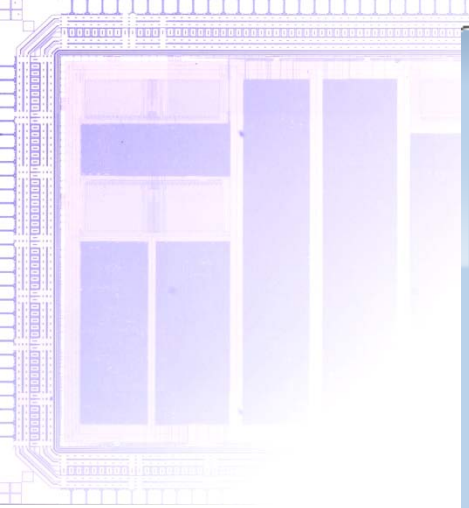
(5) segmentation (frame1, frame2, frame3)

(6) write out frame

}

Basic Requirements

- System constraints ➔ do not change!
  - Clock frequency: 100MHz (10ns/cycle)
  - Internal memory size: 7Kbytes
  - External memory size: 20Kbytes
  - Frame size: 88x72 in gray scale
- No frame skipping
- Write out result must be done in the CPU
- Only the following approaches can be used
  - Add hardware de-noise accelerator on AHB
    - At least 6336 cycles/frame
  - Add hardware segmentation accelerator on AHB
    - At least 6336 cycles/frame
- Try to claim your hardware cost is minimum



ARM926

```
ARM Source-level Debugger, CCM Version r3p5-00rel3 [build Jun  3 2005]
ARM Cycle-Callable Model, Version r3p5-00rel3 [build Jun  3 2005]
ARM926EJS_rev0, [Blocks: IBIU DBIU TLB IMMU DMMU DTCM ITCM IEXT DEXT ICACHE
DCACHE CP15] , 4Kb I-Cache, 4Kb D-Cache, Configurable I-TCM, Configurable D-TCM,
 Memory Management Unit, TLB, (Physical memory, BIU, CCM [AMBA ML-AHB]),
Little endian, Debug Comms Channel, RDI Codesequences (v1) [three_nops],
CoWare Bus [ARM926EJSAHB, MultiLayer], CoWare ACI Handler [ARM926EJSAHB],
Normal Simulation, Tracer, Semihosting+ANGEL Clock=Real Time
ARM926: load ../../arm926soft/mySoftware.axf
ARM926: go
ARM Program start!
test INPUT DEVICE start!!
r0 = 7263969f
r0 = 7e808280
Enable camera sensor.
Start processing...
previous_status = -1, current_status = 0
get video frame 0 start
de-noise start
spent 93 ms to de-noise frame 0
load to memory
previous_status = 0, current_status = 2
get video frame 2 start
Skip frame 1 ...QQ
de-noise start
spent 93 ms to de-noise frame 2
load to memory
previous_status = 2, current_status = 5
get video frame 5 start
Skip frame 3 ...QQ
Skip frame 4 ...QQ
de-noise start
spent 93 ms to de-noise frame 5
load to memory
segmentation start
spent 5 ms to segment frame
spent 2 ms to write out frame 5
spent total 103 ms to process frame

previous_status = 5, current_status = 8
get video frame 8 start
Skip frame 6 ...QQ
Skip frame 7 ...QQ
de-noise start
spent 92 ms to de-noise frame 8
load to memory
segmentation start
spent 5 ms to segment frame
spent 2 ms to write out frame 8
spent total 102 ms to process frame
```

Advance Topic

- Improve the performance of the system
  - The criterion is the frame rate to apply read/write/de-noise/segment frame
  - Possible directions
    - DMA
    - Change bus structure to multi-layer bus
    - Modify the functions of IPs
  - Please show the pros and cons about your modification

- Analysis for any modification is important

Grading

- Basic Requirements
  - 70%
- Detailed analysis
  - 20%
- Use AXI
  - 10%
- Create more realistic environment
  - 10%

Presentation

- Date
  - See syllabus
- Don’t need to write report, **only need to present**
  - Please present more details
- Upload *project file* and *presentation slide* **before presentation**
  - groupX.tar.gz
  - groupX.ppt (or pptx)

FTP Submission:
IP: 140.112.48.126
Port: 5111
Account & Password: the same as the course website