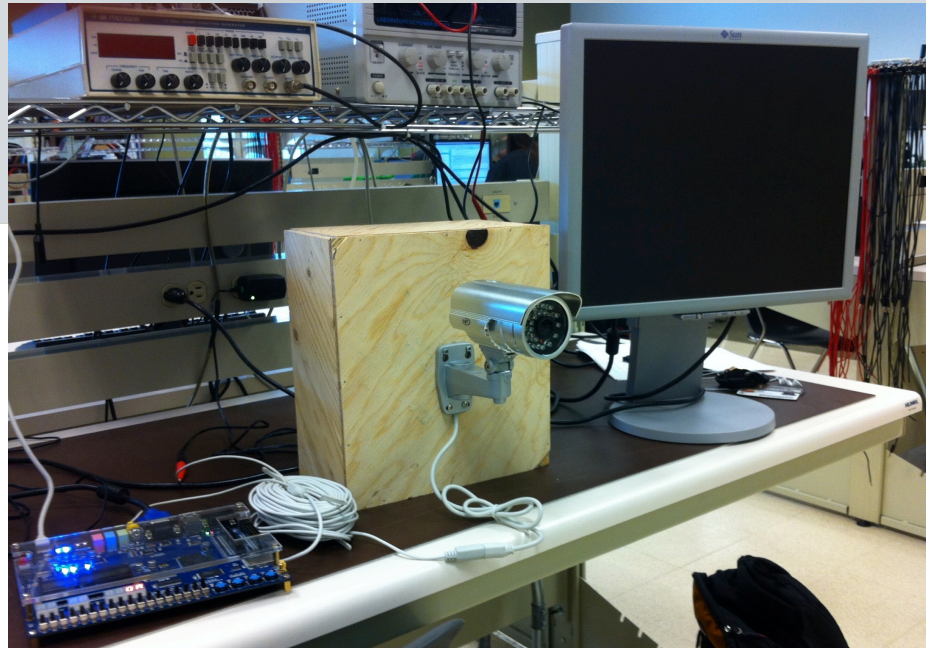




CMPE 450/490 Capstone Project

Intruder Alert System



Jordan Tymburski

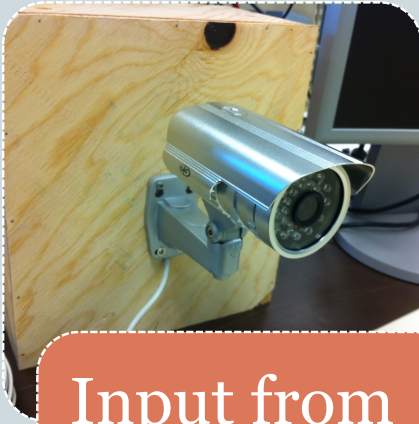
Rachita Bhatia

Motivation / Achievement



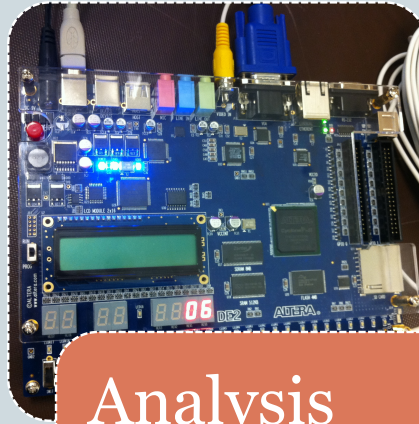
- An unmanned security system that will be able to detect intruders.
- Target audience: personal home security or large scale business security
- Succeeded in creating a basic implementation to detect motion.

Functionality Overview



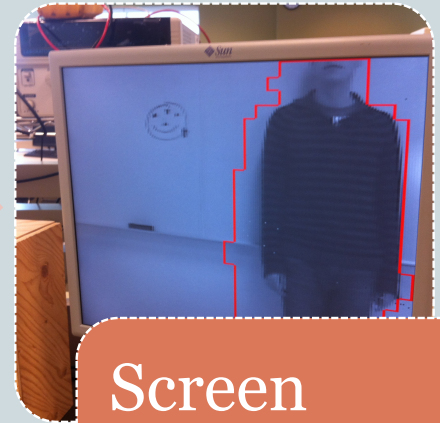
Input from Camera

- Frame snapshots are read in



Analysis

- Using a motion detection algorithm

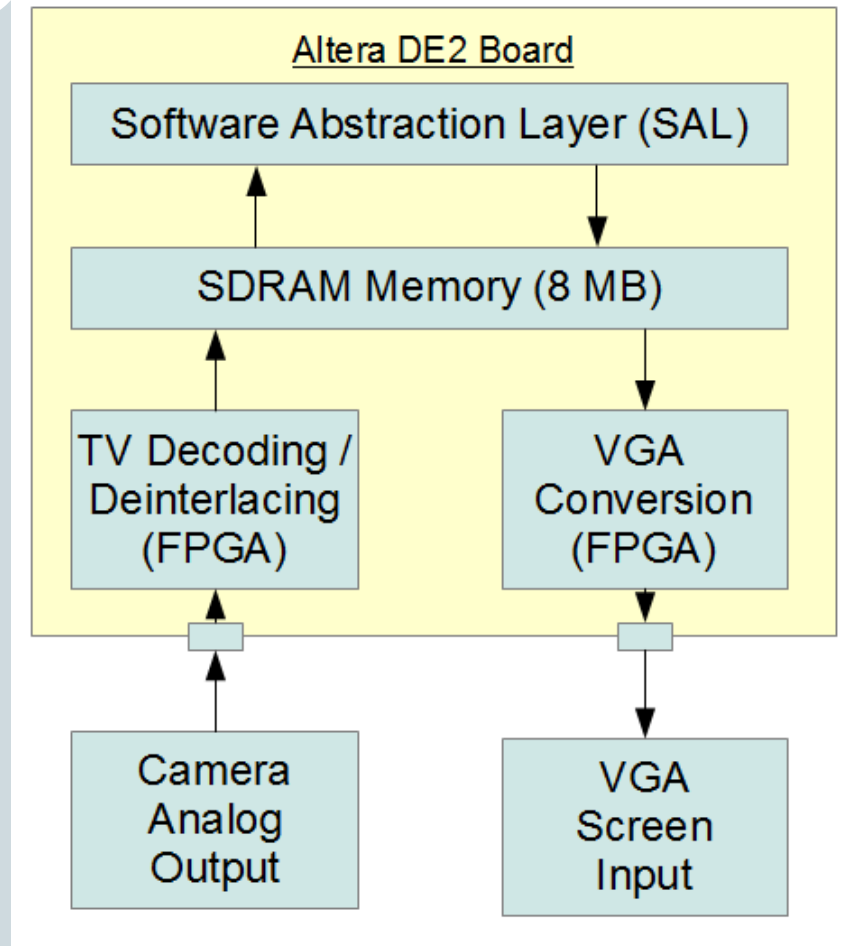


Screen

- Resulting video feed is displayed

Hardware Overview

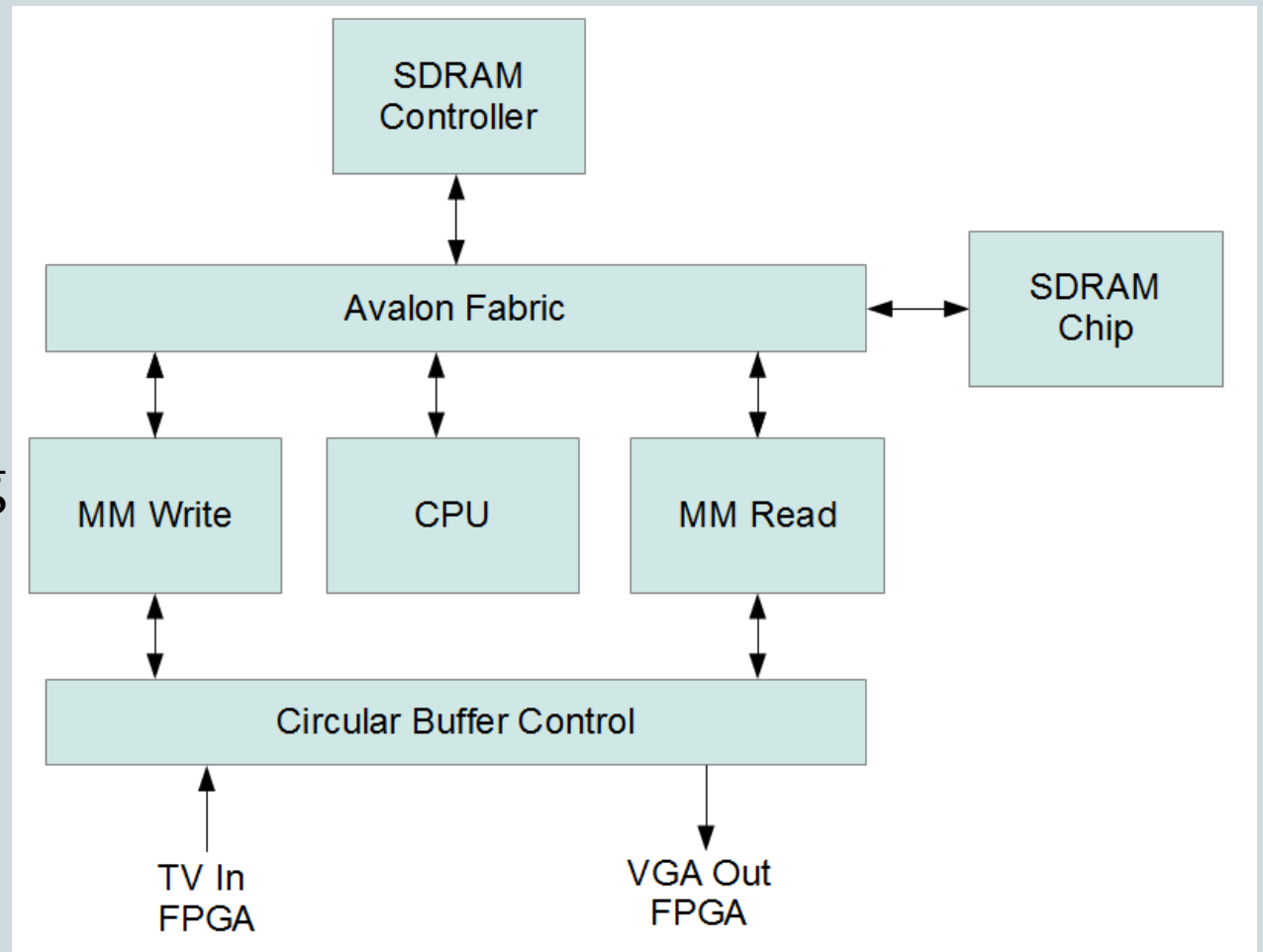
- Security camera with composite output plugged into the Altera DE2
 - Interfaces with the ADV7181B
- VGA monitor plugged into the onboard VGA port.
 - Interfaces with the ADV7123



SDRAM

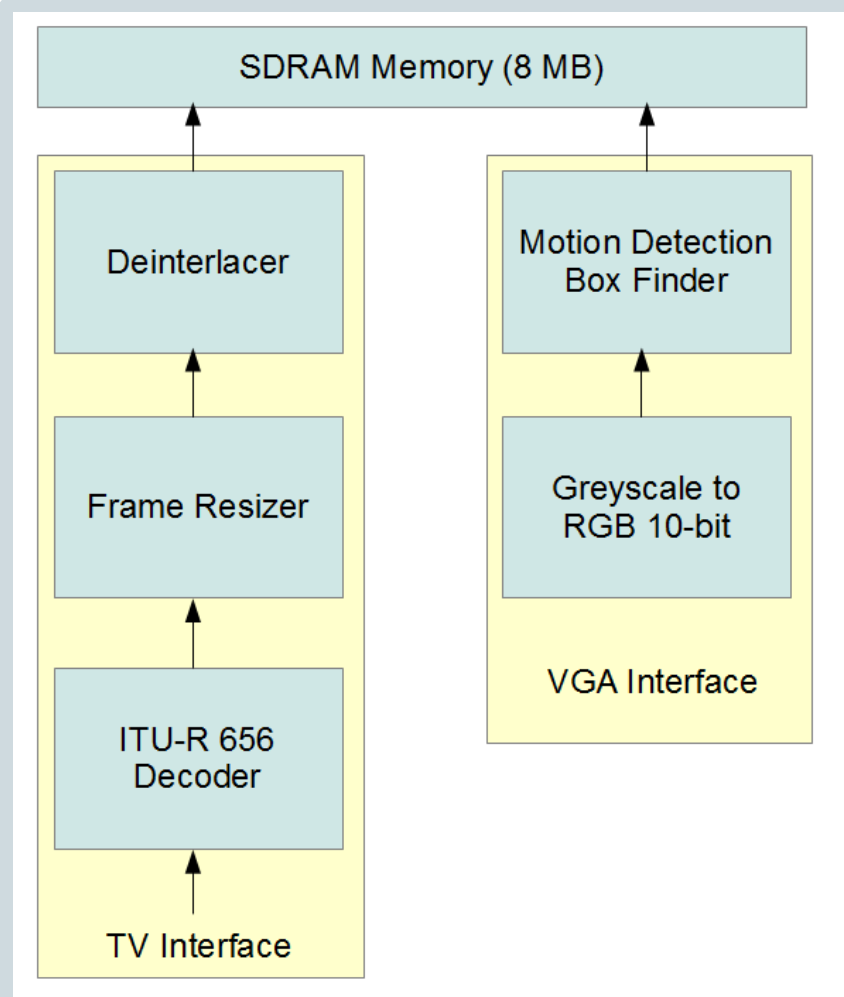


- Running at 100 MHz
- Three masters reading/writing from the SDRAM



Video In and Out

- TV and VGA side completely separated by the SDRAM
- SDRAM is managed as a circular frame buffer.
- No YCbCr conversion required since we only need grey-scale.

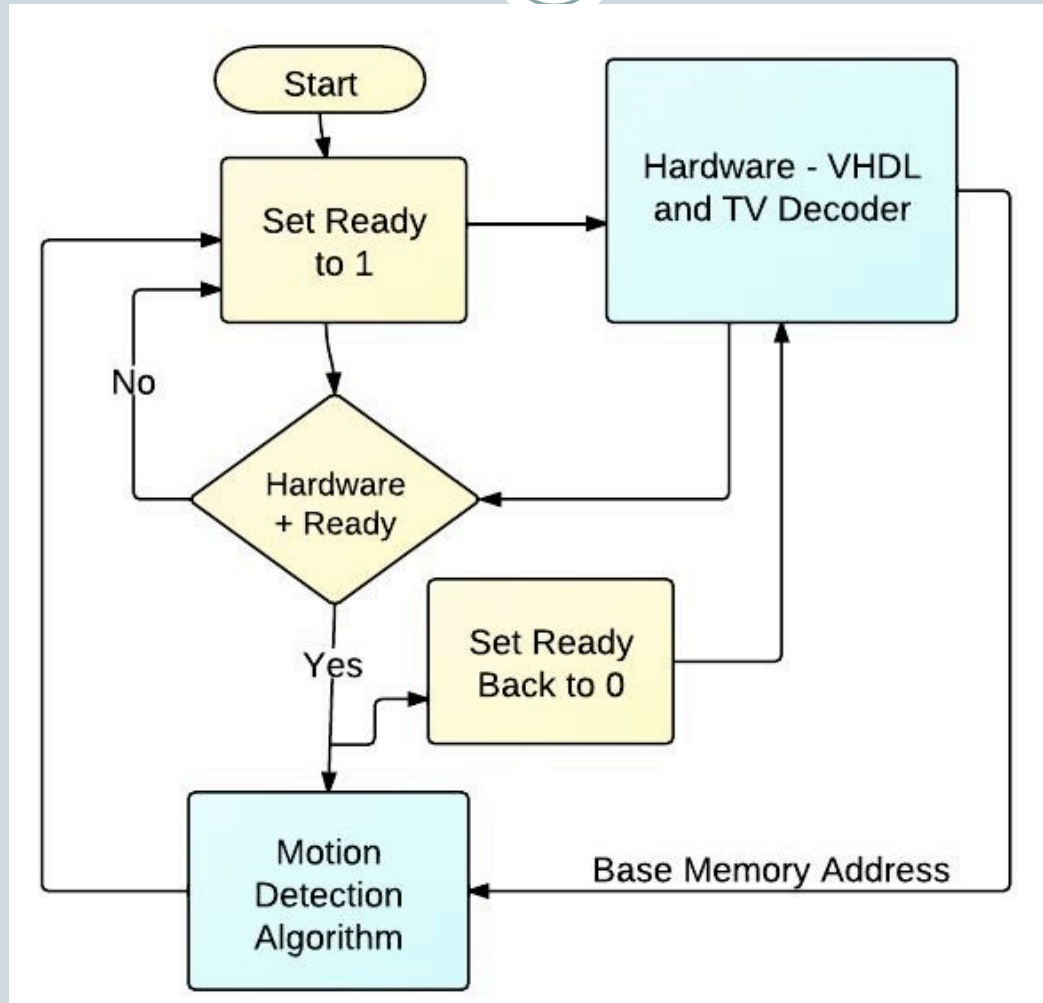


Hardware: Challenges Faced



- SDRAM write issue with respect to speed
 - Currently running the SDRAM at 100 MHz
- TV Deinterlacing problem – shaky feed
- Memory requirements for the frame buffer
 - Limited onboard space

Software Overview



Motion Detection Algorithm



- The image is divided into smaller rectangular slots
- Pixels in each slot are compared to the background.
- If they exceed the threshold, then the slot is flagged
- Check for adjacency:
 - If yes, outline non-shared boundaries
 - If not, outline all boundaries



Software: Challenges Faced



- **Outlining the moving subjects**
 - The aim was to outline the subject completely and not have different boxes outlining different moving parts of a subject
- **Checking adjacency**
 - A number of approaches were attempted
 - Finally, we implemented a way in which a slot will be flagged first, followed by a check for adjacency and then outlining

Testing



- Initial unit testing split into two blocks, software and hardware:
 - Software testing will be done with simulated graphics data
 - Hardware will test by pushing the input video straight to the monitor
- Integration testing will add feature by feature onto hardware from the software end.

Demonstration



Future Implementations



- Increase video quality from 320x240 to 640x480
- Achieve higher frames per second video feed
- Color video display instead of greyscale

- A web server for remote viewing
- Better algorithm to handle sun changes (non-motion).

Questions?

