Robot Car

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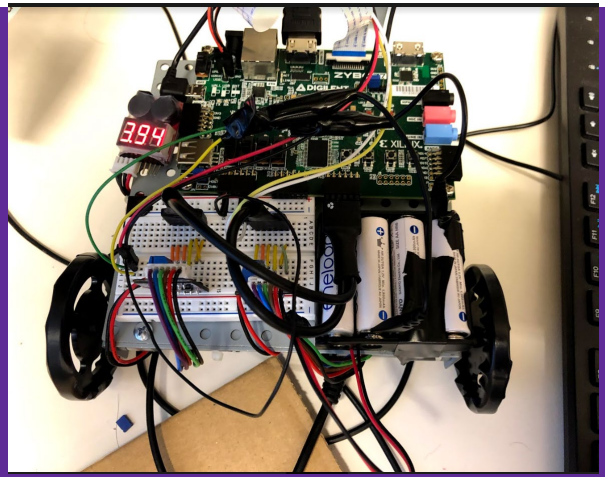
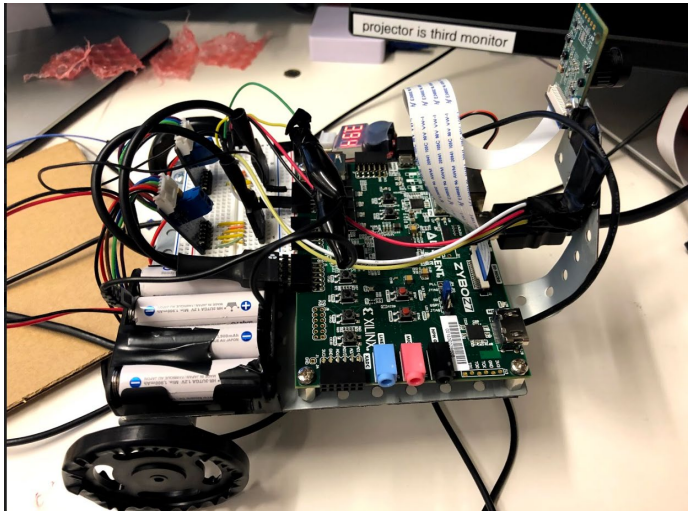
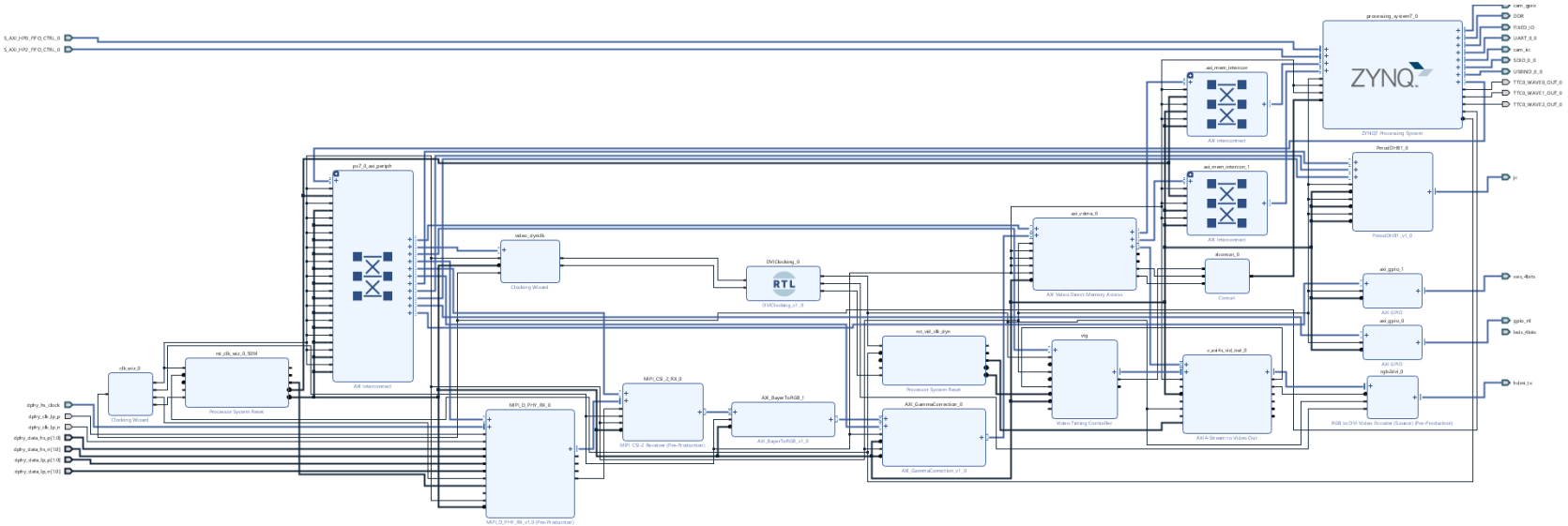


What is it?

- Remote controlled robot
- Send controls to drive
- Receive image from bot to navigate
- Can move left, right, forward, backwards



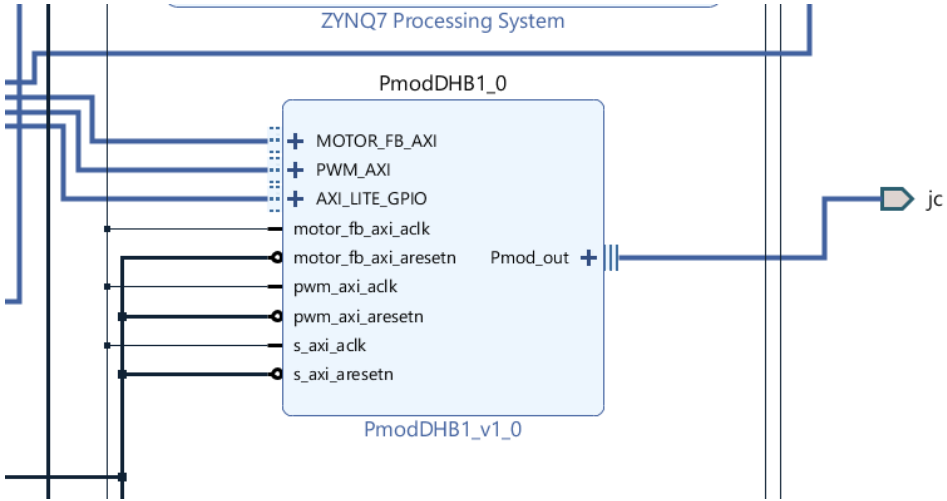
Overview of Hardware Pipeline



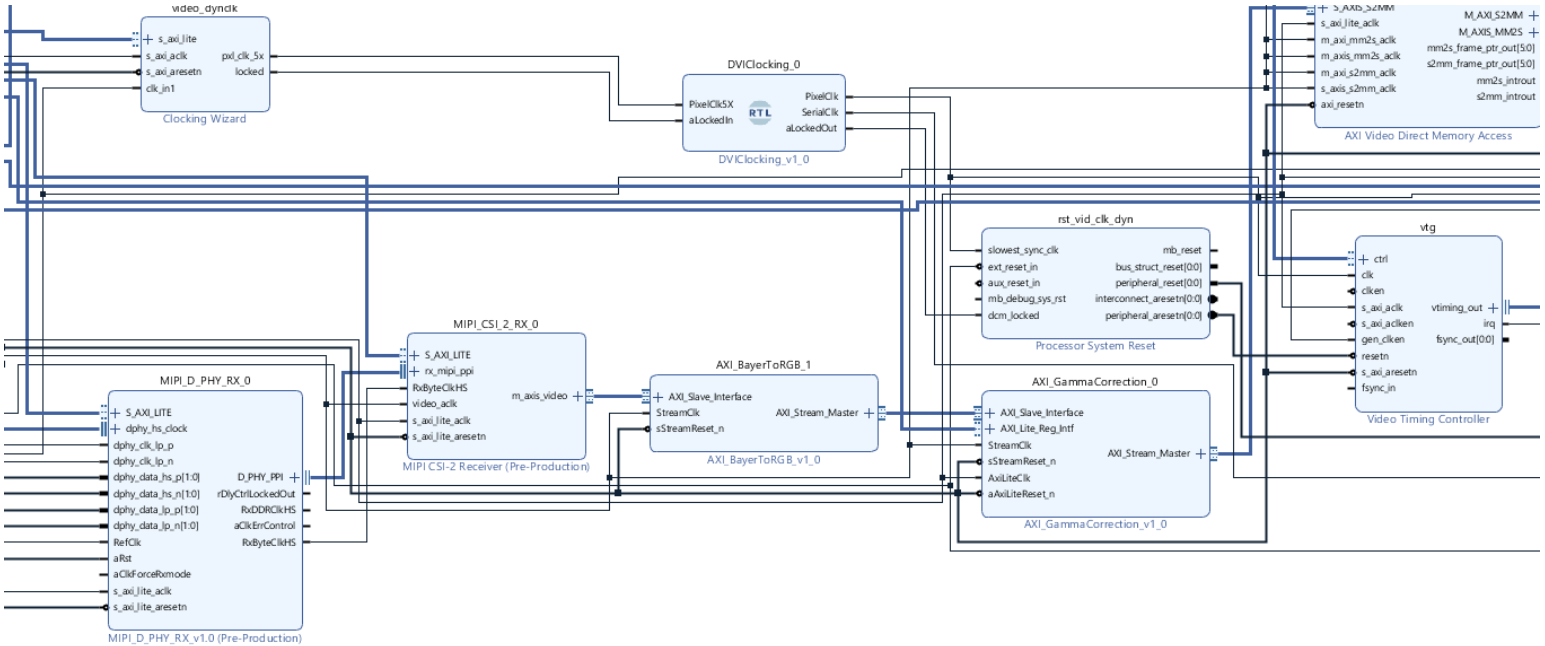
Online Resources Used

1-Zybo Z7 Pcam 5C Demo

2-Digilent Pmod IPs



Zybo Z7 Pcam 5C Pipeline (Modified for Z7 10)



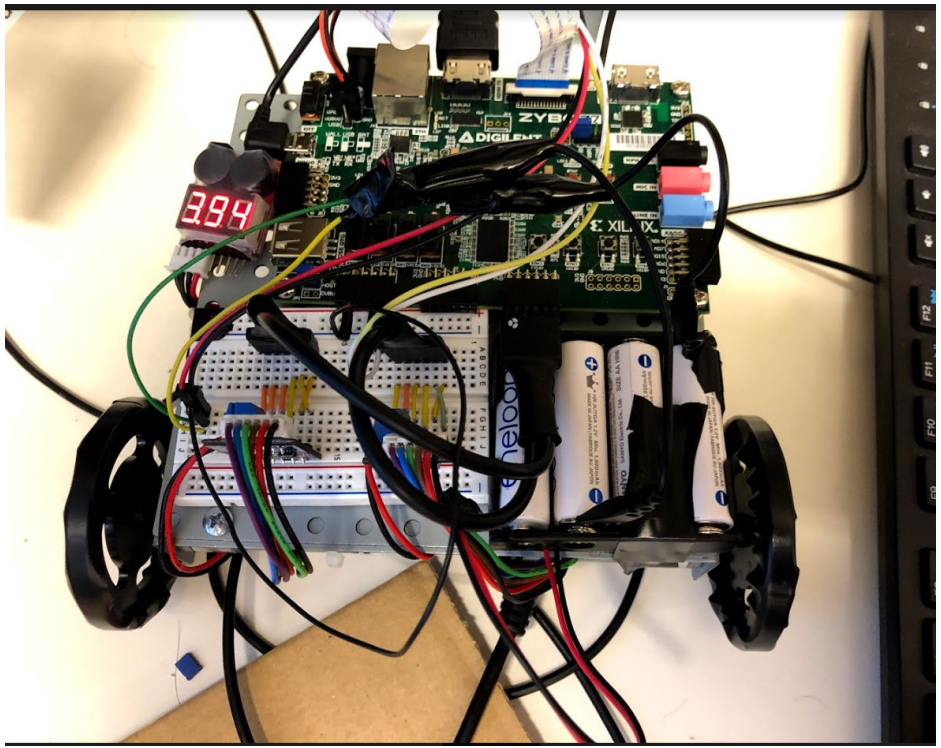
Challenges of Pcam Demo on Zybo Z7 10

- Original Demo used for Zybo Z7 20 Needs a lot more than 17,600 LUTs (about 18k-22k)
- Was able to reduce down to only using 8k+ LUTs

	Zybo Z7-10	Zybo Z7-20
FPGA part	XC7Z010-1CLG400C	XC7Z020-1CLG400C
1 MSPS On-chip ADC	Yes	Yes
Look-up Tables (LUTs)	17,600	53,200
Flip-flops	35,200	106,400
Block RAM	270 KB	630 KB
Clock Management Tiles	2	4
Available Shield I/O	32	40
Total Pmod Ports	5	6
Fan Connector	No	Yes
Zynq Heat Sink	No	Yes
HDMI CEC Support	TX port only	TX and RX ports
RGB LEDs	1	2

What makes it work?

- Zybo Z7-10 fpga
- Pmod camera
- Motors hooked up to pmod
- ESP-01s wifi chip
  - Baudrate: 115200



Challenges

- Integrating different camera project with wifi and motor drivers
  - VHDL Wrapper wasn’t updating
- Pmod camera IP cores had to be modified to fit on Zybo z710
- Powering the board with all the components
  - Too much power draw would cause the board to reset
  - Had to use seperate batteries for wifi
- Couldn’t get wifi pmod to work
  - Had to use different wifi module
  - Video transmitted slower than we hoped

Rubric

Attributes	Performance		
	Low 25pts	Medium 50pts	High 75pts
Controls	Robot is controllable in some form	**Robot can be controlled remotely through wifi from zedboard**	Robot can be controlled through wifi using android app
Camera	Camera works	**Camera streams video over wifi with low quality**	Camera streams video with high quality
User Interface	Video output to monitor Control through gpio	**Video output to monitor control through**	Video output to android app
Demo and Report	Demo shows some parts working	**Demo shows the full system working**	Demo shows full system working and includes a clean overview of how everything works