“Cam the Ram”

Parts List

Item	Part Number	Quantity	Price Each	Price Total
“Cam the Ram” doll with NO button, Speaker, and SPDT Switch		1	24.95	24.95
Lamp with Fiberoptic Pom and Blue LEDs		1	6.88	6.88
Microphone	CZ034P	1	Recycled	0
5V DC motor		1	Recycled	0
Battery Holder		1	Recycled	0
LCD Frame		1	Recycled	0
Pole for Frame and Pom-Pom		1	Recycled	0
Potentiometer		1	Recycled	0
Circuit Case		1	Recycled	0
Power Diode		1	Recycled	0
All Resistors		--	Provided/ Recycled	0
All Capacitors		--	Provided/ Recycled	0

Wires		--	Provided	0
Oscillator		1	Provided	0
PIC16F84	PIC16F84-I/P	1	Provided	0
PIC16F88	PIC16F88-I/P	1	4.58	4.58
Yellow LED	LTL-2R3VSKNT	2	0.43	0.86
LCD screen	LCM-S01604DSR	1	20.02	20.02
Power Transistor	2N2222	2	One provided/ 0.79	0.79
Voltage Regulator	PQ5-EV5	1	1.79	1.79
Batteries		1-10 pack	6.99	6.99
Op-Amp	LM741J	1	1.19	1.19
Ribbon Cable	41-687	1	0.55	0.55
8 Pin DIP IC holder	41-775	1	0.38	0.38
Crimp Pins	AIM 9852-P or AIM 9862-S	24	0.09	2.16
LCD Pins	PLD-80S	1	2.95	2.95
20 Pin DIP IC holders	41-779	2	0.72	1.44
Shipping Charge		--	5.88	5.88
Total				**81.41**

Instructions/Diagrams

The balls are actually delivered by an HP printer ink cartridge assembly. I modified the plastic piece that holds the ink cartridge to hold a piece of PVC that holds one ball. It also has a platform on both sides of the ball holder that moves with the carriage and keeps the other balls in the tube above from pouring out when it moves. When the short PVC attached to the carriage returns to the center after delivery, a new ball falls into the holder and waits until it needs to be delivered.

The DC motor is also just the motor from the HP printer that drives the ink cartridge back and forth (already attached to the piece). I used the H-bridge to give the motor current in either direction for a specified time to make it move both ways. I believe the motor is a 5V DC. I just played with the voltage on a DC power supply until I got some movement (around 3.5 V) and decided that 5V would be fast enough movement. The Xilinx board manages the movement duration and direction.

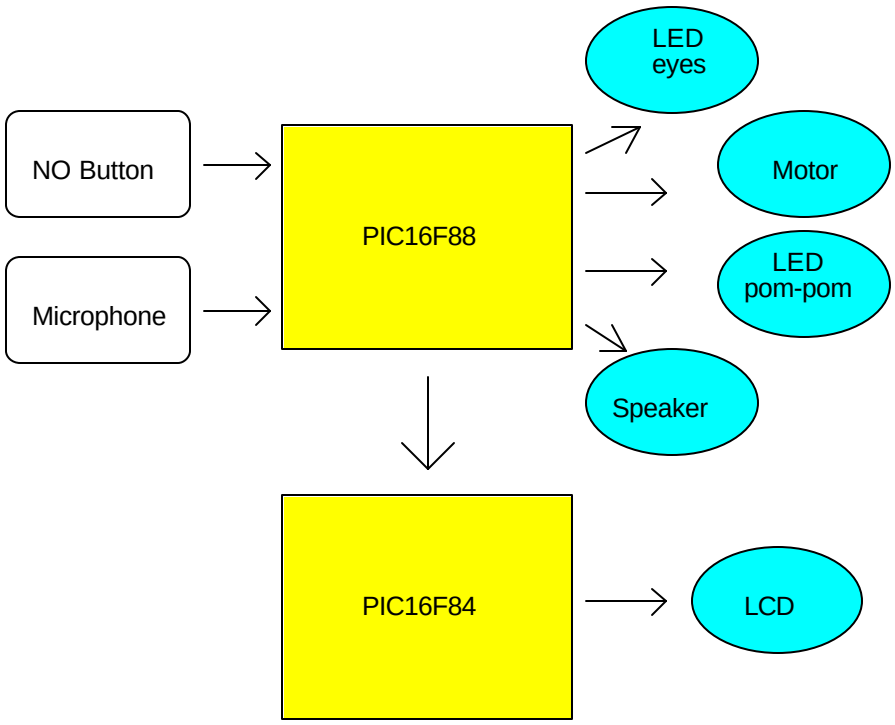

Figure 12: Functional Flowchart

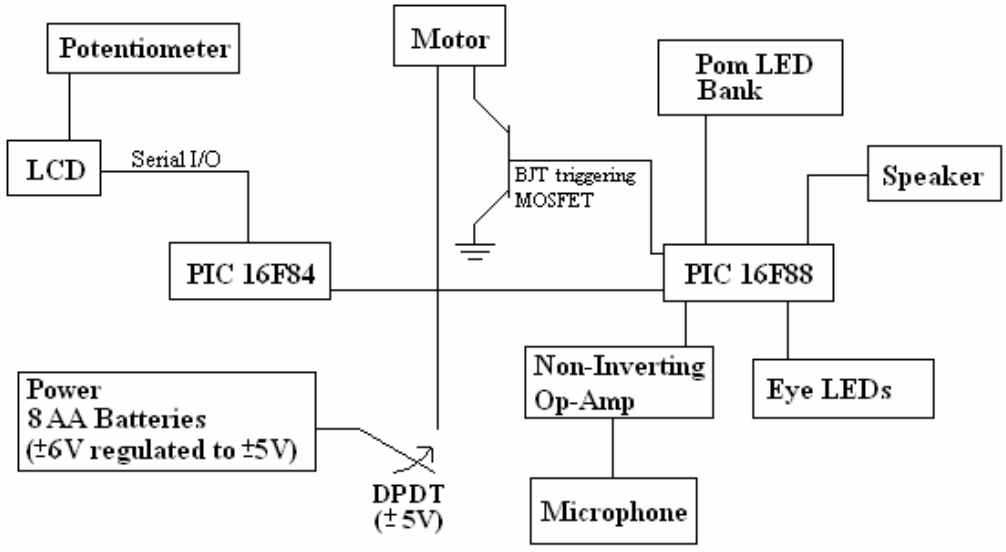

Figure 13: Connections Diagram

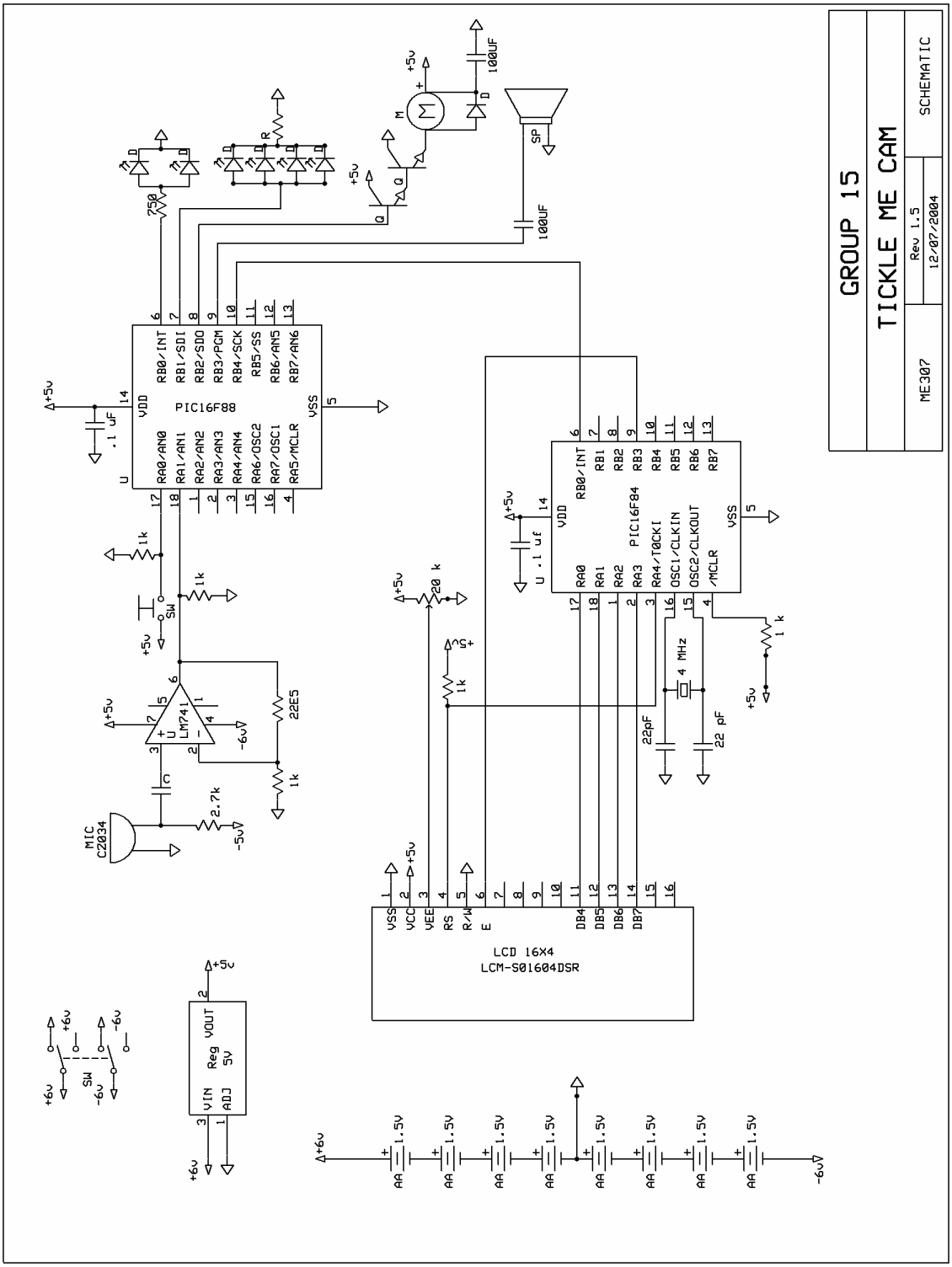

Figure 14: Wiring Diagram

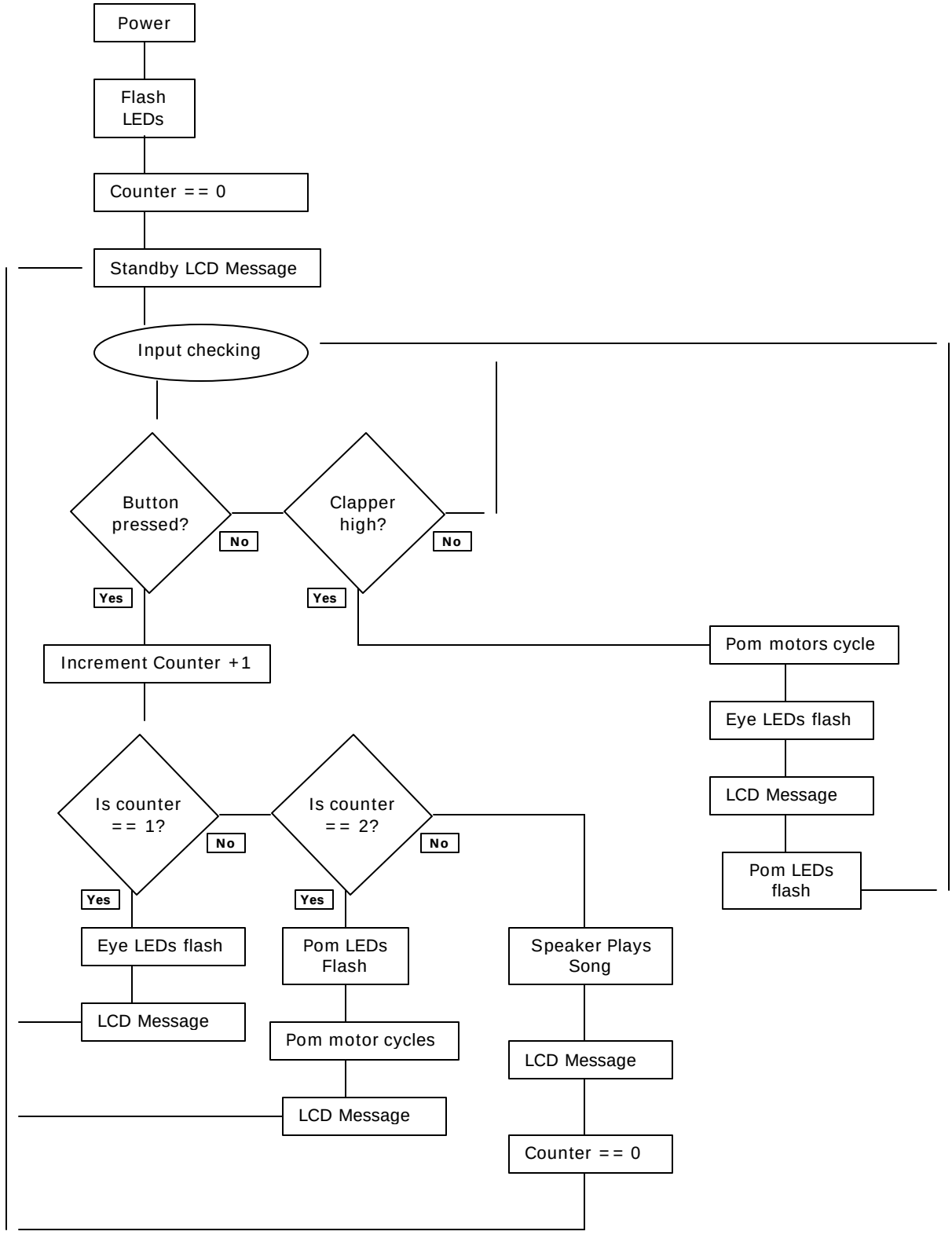

Figure 15: Software Flowchart