Electric Circuits

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Notes
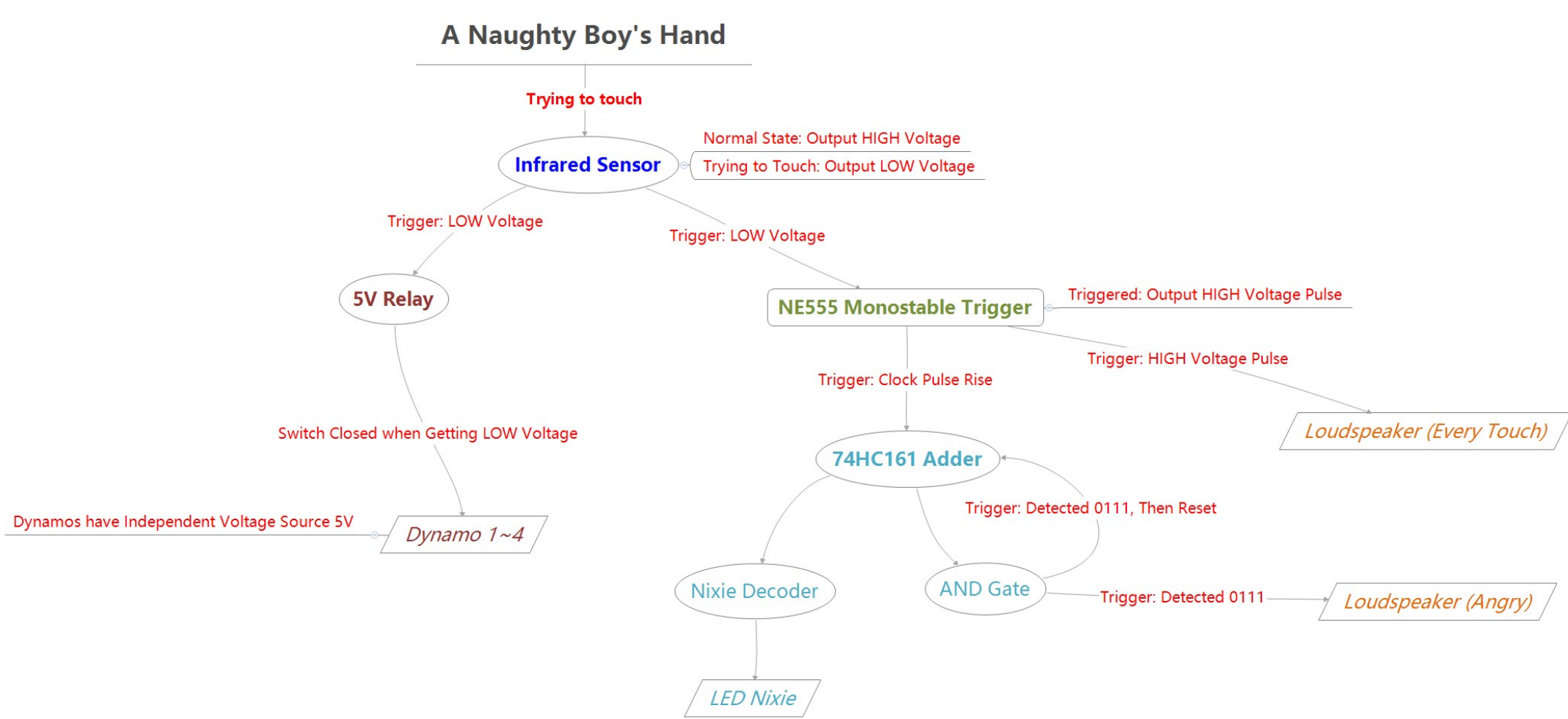
懒得整了。;)

Project Poster

See below.

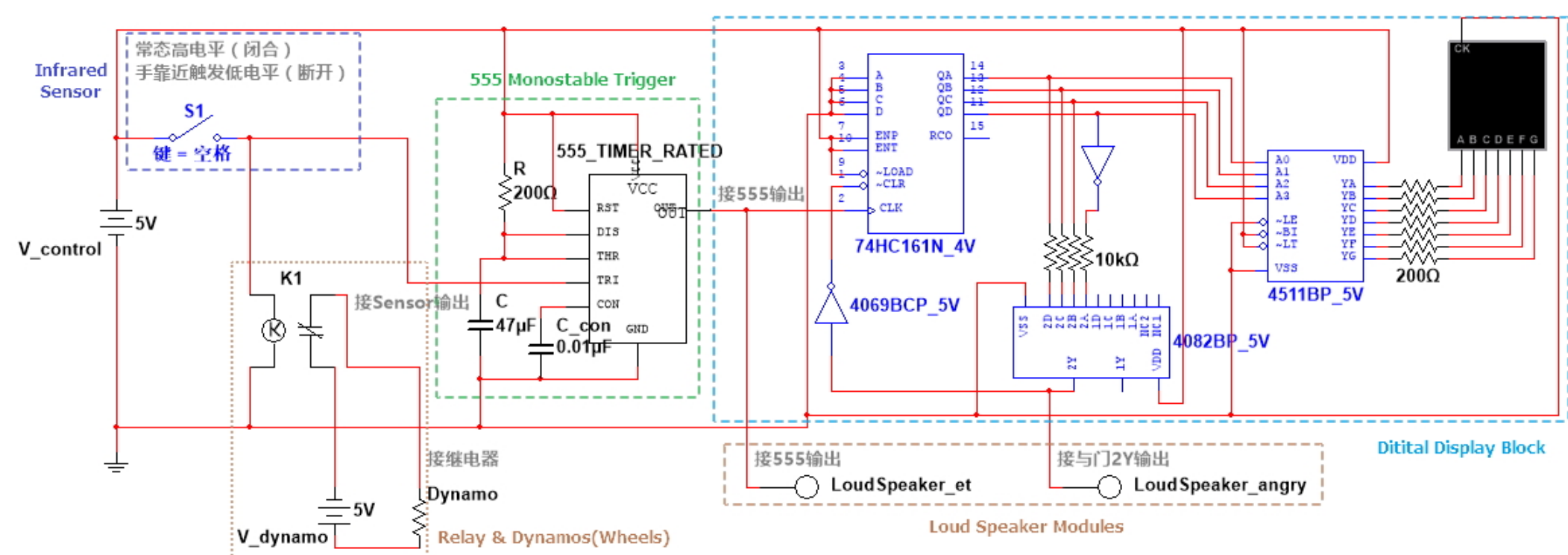# EE111 Project – "DON'T TOUCH ME" ROBOT

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1. Design Requirements

a. When touched (or approached), the robot yields a "Don't Touch Me" signal, and runs back away.

b. The robot counts the number of times being touched, and display it with Digital tube.

c. The robot gets angry when the number hits a threshold value. Behavior of "getting angry" can be defined by yourself.

d. You may not need to use any microcontrollers and should try to build with basic components.

2. Circuit Schematic

A Naughty Boy's Hand

Trying to touch

Infrared Sensor — Normal State: Output HIGH Voltage / Trying to Touch: Output LOW Voltage

Trigger: LOW Voltage

Trigger: LOW Voltage

5V Relay

NE555 Monostable Trigger — Triggered: Output HIGH Voltage Pulse

Trigger: HIGH Voltage Pulse

Trigger: Clock Pulse Rise

Switch Closed when Getting LOW Voltage

Loudspeaker (Every Touch)

Dynamos have Independent Voltage Source 5V

Dynamo 1~4

74HC161 Adder

Trigger: Detected 0111, Then Reset

Nixie Decoder   AND Gate — Trigger: Detected 0111 — Loudspeaker (Angry)

LED Nixie

## 3. Simulation Diagram

Descriptions:

Every time the hand tries to touch the robot, the *Infrared Sensor* outputs LOW Voltage. As long as the hand is still too close to the robot, the *5V Relay* is triggered and wheels spin backwards to avoid touching. Also, every touch triggers the *555 Monostable Trigger* once, outputs a HIGH (Clock Rising) pulse signal, which makes *Loudspeaker1* shout and *74HC161 Adder* increases by one.

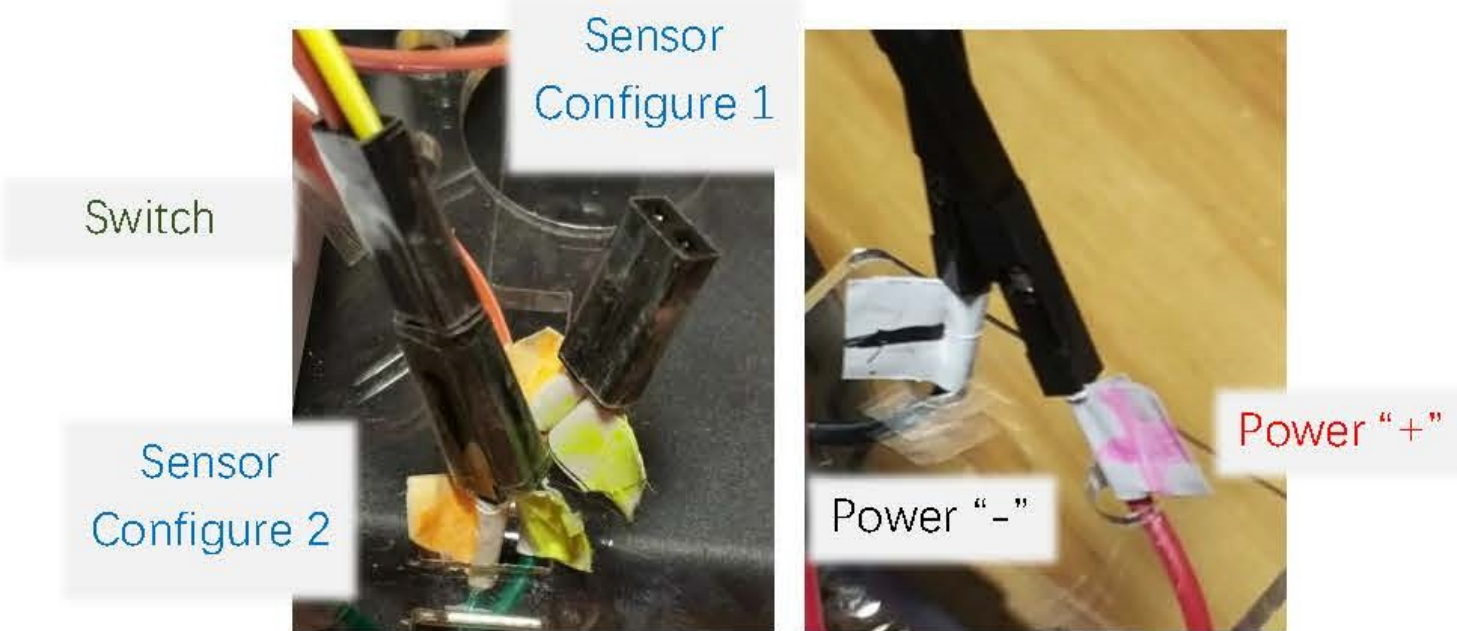If "6" touches are recorded, the next touch will produce 0111

(i.e. 7 in decimal) on Adder output, then by the *AND Gate* it triggers *Loudspeaker2* to shout an "angry" sound and resets the Adder.

4. Implementation (with Bonus)

Robot Overview
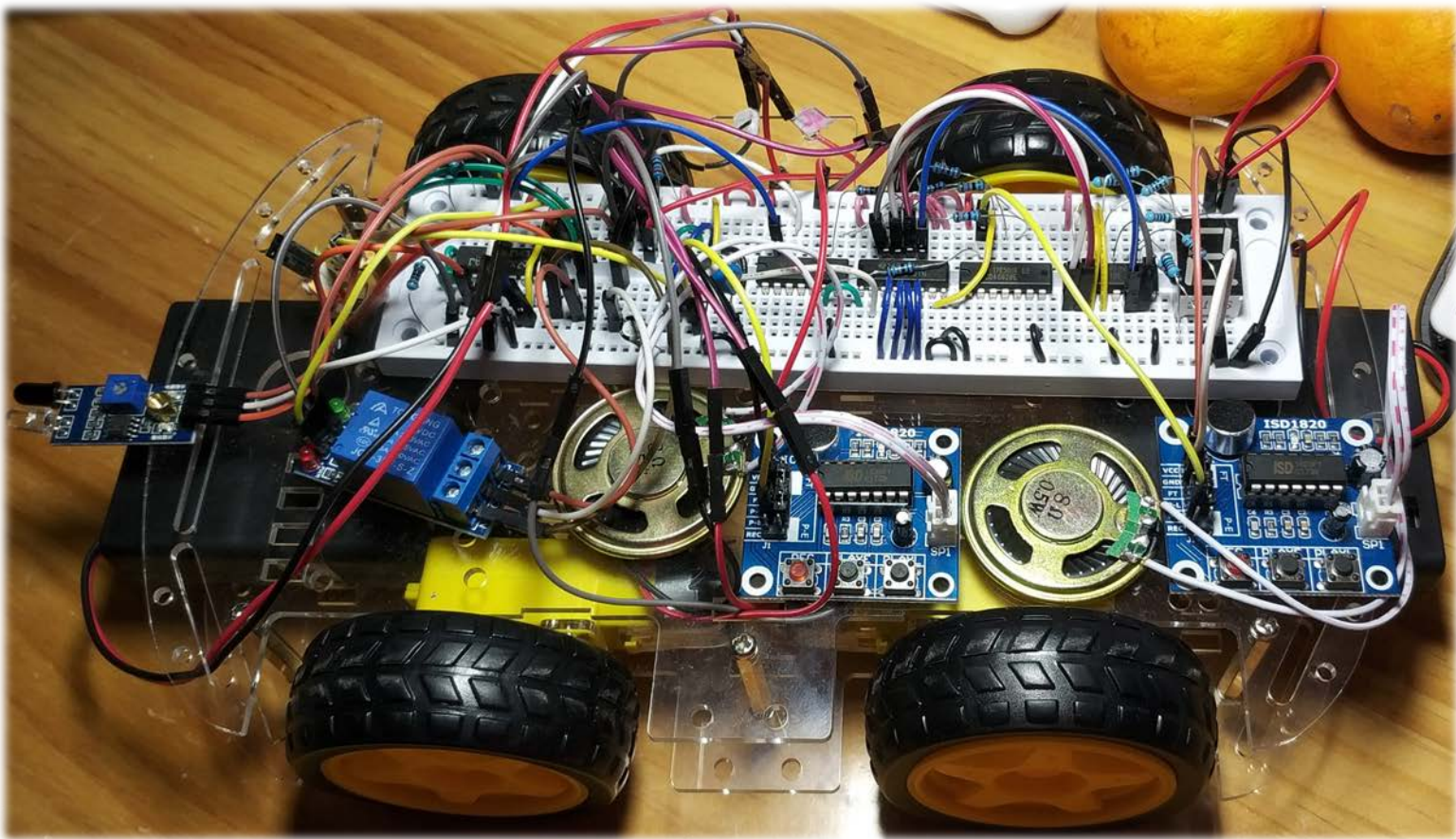
Control Ports

➤ **"Don't Touch Me – Robot" Mode**

Switch → Sensor Configure 1, V_{dynamo} → Normally connected

The original mode, avoids your touch.

➤ **"Please Touch Me – Robot" Mode**

Switch → Sensor Configure 2, V_{dynamo} → Oppositely connected

As you move your hand back, the robot will try to get close, acting like it is eager for your touch.

➤ **"Come & Chase – Robot" Mode**

Switch → Sensor Configure 2, V_{dynamo} → Normally connected

When you move your hand away, the robot will run away from you, and you must try to chase it and put your hand close to the robot again.

List of Components

Component Name	Amounts	Component Name	Amounts
Car Suite	1	CD4082 (AND Gate)	1
5V Dynamo	4	CD4511 (Decoder)	1
Battery Box (with Switch)	2	Nixie LED (1 digit)	1
1.5V Battery	8	Loudspeaker Module	2
5V LOW-Trigger Relay	1	Resistor - $10k\Omega$	4
Infrared Sensor Module	1	Resistor - 200Ω	8
NE555	1	Capacitor - $0.01\mu F$	1
74HC161 (Adder)	1	Capacitor - $47\mu F$	1
CD4069 (NOT Gate)	1	Dupont & Jump Wires	∞