Homework 1: Smart Pet Feeder - Project Documentation

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Problem

Pet owners nowadays might have busy lives and sometimes forget to feed their pets on time. This can cause:

- Irregular feeding schedules that are bad for pet health
- Not knowing when food container is empty
- Difficulty controlling food portions

Solution Design

I built an automatic pet feeder that solves these problems by:

- **Feeding pets automatically** (adjustable time period)
- **Monitoring food levels** with an ultrasonic sensor
- **Alerting owners** when about to run out of food
- **Allowing manual feeding** with a button press
- **Showing status** on an LCD screen

Parts Used

Component	Purpose
Arduino Uno	Main controller
Servo Motor	Opens/closes food dispenser
Ultrasonic Sensor HC-SR04	Measures food level in container
LCD Display 16x2	Shows food level and status
Push Button	Manual feeding control
Red LED	Warning light when food is low
Piezo	Makes sounds for alerts and feeding
Resistors & Wires	Connections

How It Works

1. **Sensor measures** food level every second
2. **Automatic feeding** happens every 5 seconds if food available
3. **Manual button** allows immediate feeding
4. **LCD shows** current food level and time to next feed
5. **LED turns red** when food is low
6. **Buzzer makes sounds** for feeding and alerts
7. **Safety feature** prevents feeding when container is empty

What Works Successfully

- Measures food level accurately (0-20cm range)
- Dispenses food automatically every 5 seconds
- Manual button feeding works instantly
- CD displays all information clearly
- LED warning activates when food is low
- Buzzer provides audio feedback
- System prevents feeding when empty

Current Limitations
- Uses simple timer (not real clock)
- Needs constant power supply
- Portions controlled by time, not weight

Possible future improvements
1. **Add real-time clock** for specific meal times (7am, 6pm)
2. **Add weight sensor** for precise portion control by grams
3. **Bigger LCD screen** with more information
4. **Battery backup** so it works during power outages
5. **Multiple food containers** for different pets

Connection map