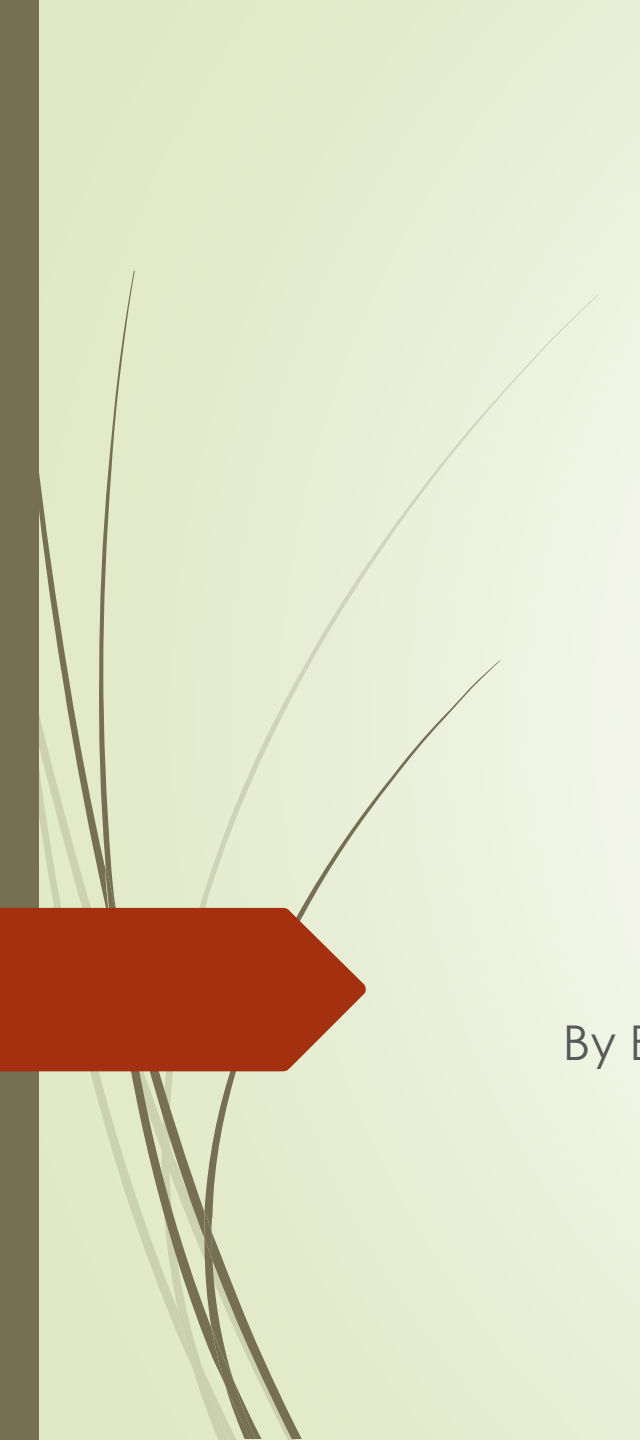




Monkey Deterrent System – Dynamics, Control and Instrumentation - GOEE4002

By Bradley Claringbold



Scenario

- Farmers in Zimbabwe losing crops to monkeys
- Traditional deterrents such as scarecrows and guarding no longer work
- The required deterrent needs to be humane and low-cost
- Limited access to electricity

Project Aim

- Develop a low-cost deterrent system
- Deterrent system that has multiple deterrents
- Deterrents must be variable to counteract monkeys' adaptability
- Reliable power source

System Overview

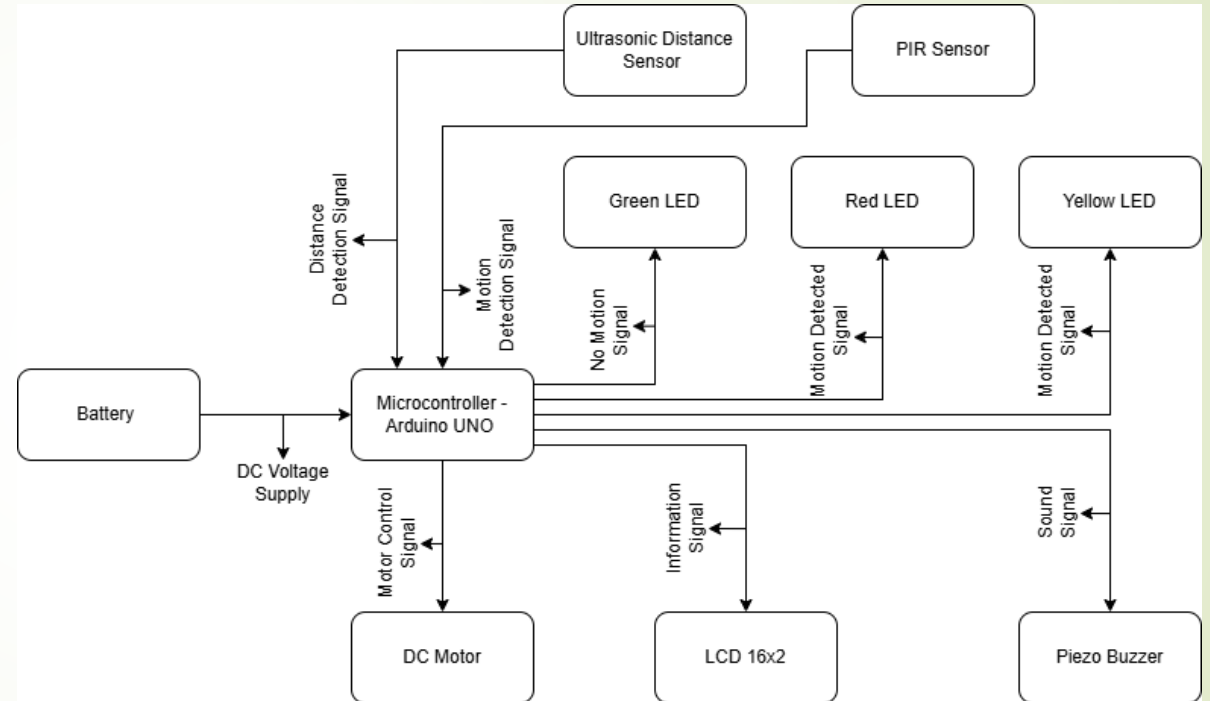
- Microcontroller – Brains
- PIR sensor and Ultrasonic distance sensor – Detection sensor
- DC motor and Piezo Buzzer – deterrent
- LEDs and LCD – Alert system



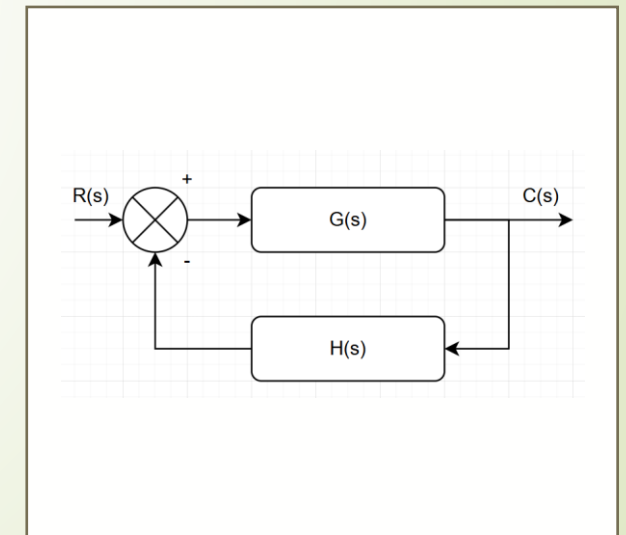
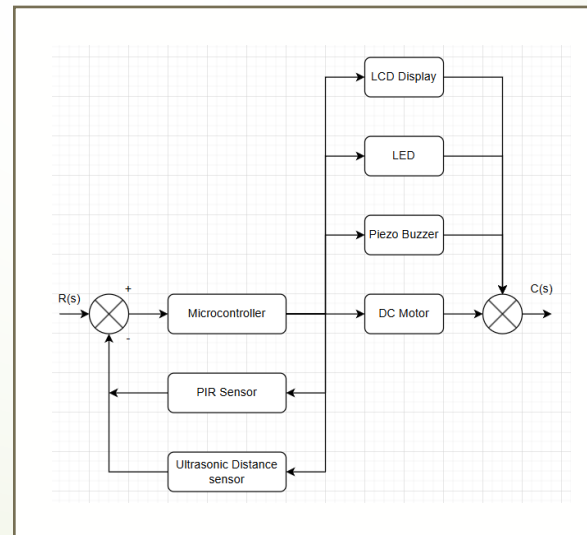
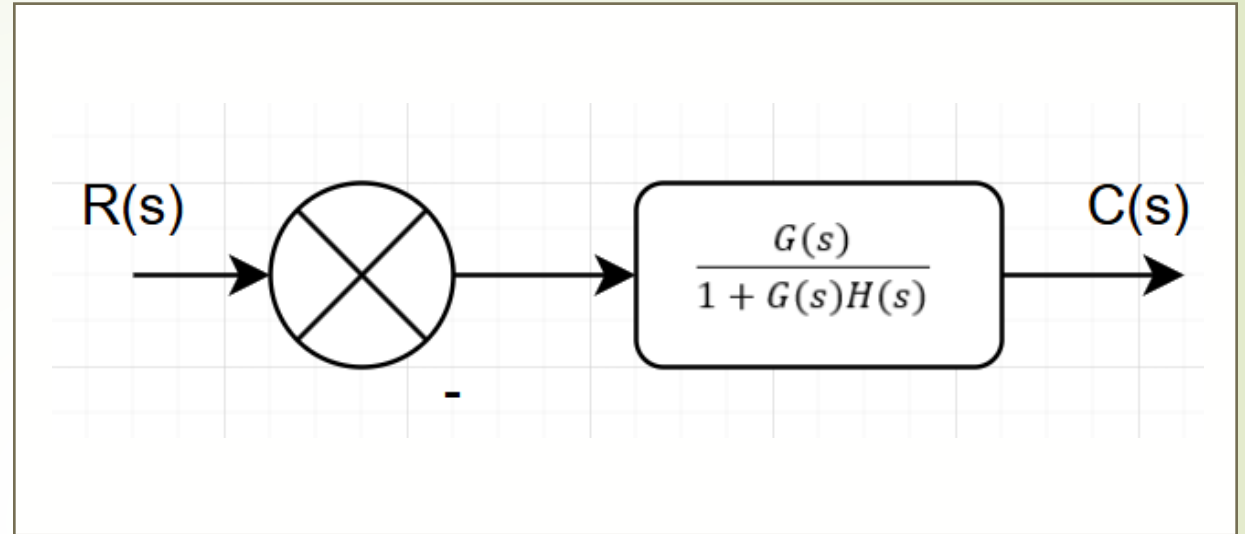
Components Used

PIR Sensor
Ultrasonic Distance sensor
DC Motor
LCD Display
Piezo Buzzer
LEDs
ELEGOO UNO R3
9V battery connector
Arduino Battery connector
9V Battery
Jumper Wires

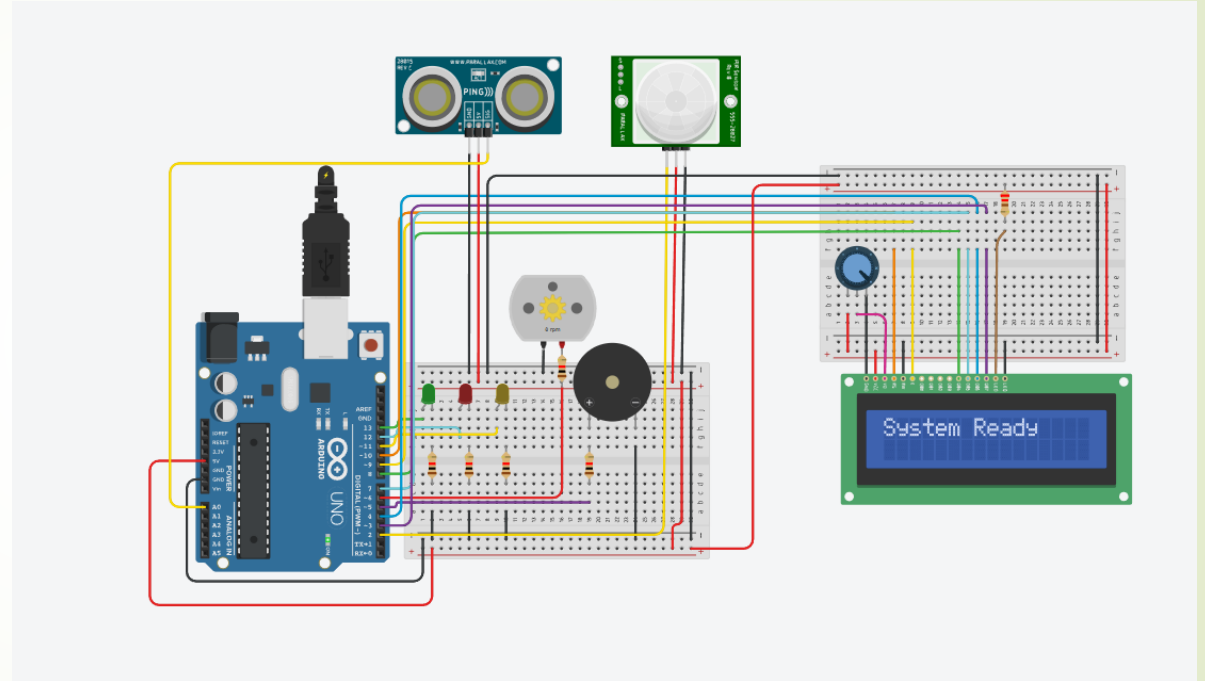
System Block Diagram



Feedback Loop Diagram



Simulation Results



Power supply supply

- 9V Battery supply
- Snap-on cables to connect the 9V batteries to the system
- Replace able
- Low-cost





Cost Analysis

Component/Kit†	Cost	Notes	Shop	Reference
ELEGOO UNO R3 Project Super Starter Kit	£37.99	Original kit that has everything used except for the PIR Sensor	Amazon	(ELEGOO, ELEGOO UNO R3 Project Super Starter Kit Compatible with Arduino IDE with Tutorial for Beginner, 2026)
PIR Sensor	£6.49	Motion sensor	Amazon	(Hailege, 2026)



Sustainability and Practicality

- Low power consumption
- Humane and non harmful
- Easy to maintain
- Parts are cheap to replace
- Suitable for areas with limited access to electricity
- Weatherproof housing recommended

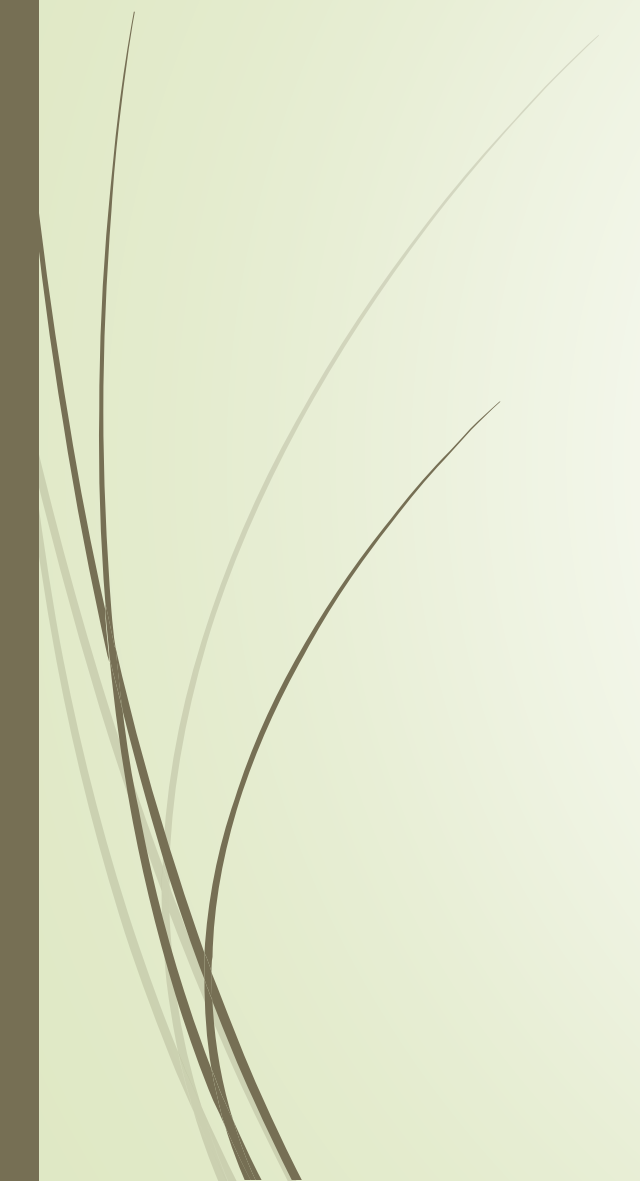
Limitations and Future Development

- Code is fixed – adjustments can be made
- Possible AI implementation to keep the systems deterrents variable
- No weatherproof housing included with the prototype
- Battery requires frequent replacement
- Sensor's accuracy could be affected by weather conditions
- System does not log monkey's visits and how close they got before turning back
- Circuit protection
- More humane deterrents



Conclusion

- Designed low cost, humane deterrent system
- System uses PIR sensor and Ultrasonic distance sensor as a detection system
- Outputs such as LEDs, LCD, DC motor and Piezo buzzer that respond based off distance
- System is suitable for environments that have limited access to electricity
- Future developments that could include AI functions, weatherproof housing, circuit protection and more humane deterrents



Q & A