**Literature Review**

In the literature review, I read and summarized the following articles:

1. **Cognitive Control of Escape Behaviour,** Dominic A. Evans, A. Vanessa Stempel, Ruben Vale and Tiago Branco
2. **Escape responses of fish: a review of the diversity in motor control**, kinematics and behaviour, Paolo Domenici and Melina E. Hale
3. **Long-term Behavioral Tracking of Freely Swimming Weakly Electric Fish**, James J. Jun, André Longtin, Leonard Maler, Department of Physics - University of Ottawa, Department of Cellular and Molecular Medicine - University of Ottawa, Centre for Neural Dynamics - University of Ottawa
4. **Kinematics and Behaviour in Fish Escape Responses: Guidelines for Conducting, Analysing, and Reporting Experiments**, Paolo Domenici et al.
5. **Landmark Use and Development of Navigation Behaviour in the Weakly Electric Fish Gnathonemus petersii**, Peter Cain, Sapna Malwal
6. **Finding Food: Senses Involved in Foraging for Insect Larvae in the Electric Fish Gnathonemus petersii**, Gerhard von der Emde, Horst Bleckmann

The objective was to study research and experiments that examine the escape responses of fish or similar animals, in order to gain inspiration and understanding for building a similar system.  
In the following section, I will present the main points of each article and focus on the experiments conducted and the construction of the system used to study the responses of the animals being examined.

1. **Cognitive Control of Escape Behaviour:**
   1. **General:** This paper highlights the complexity of escape behaviors, showing they are modulated by neural decision-making mechanisms rather than being purely reflexive. The authors discuss the role of sensory integration, where different sensory inputs are prioritized to guide escape strategies based on context.
   2. **Experiments Conducted:**
      1. Escape behaviors were elicited using precise stimuli (e.g., visual threats, predator simulations) in controlled settings.
      2. Behavioral metrics, such as reaction time, movement trajectory, and endpoint choice, were recorded using high-speed cameras. Neural activity was also tracked to understand decision-making circuits.
      3. Tests varied stimulus strength and location to observe how fish weigh threat proximity versus intensity.
   3. **System Setup:**
      1. Fish were placed in experimental tanks equipped with a stimulus-delivery system, such as automated mechanical actuators or light pulse generators.
      2. A neural recording system was implemented using electrodes implanted in specific brain regions to monitor activity during escape behavior.
2. **Escape Responses of Fish: A Review of the Diversity in Motor Control, Kinematics, and Behaviour**
   1. **General:** This review examines the diversity of escape responses in fish, focusing on the physiological and behavioral mechanisms that drive these actions. The authors categorize various escape strategies, such as fast-start responses, and discuss how these behaviors are shaped by evolutionary, ecological, and environmental factors.
   2. **Experiments Conducted:**
      1. Species-specific escape responses were studied using varied stimuli, such as water jets, visual "looming" stimuli, or sudden mechanical taps.
      2. The angular velocity, tail-beat frequency, and C-start patterns (initial body curvature in escape) were recorded and analyzed.
   3. **System Setup:** 
      1. Tanks were designed to eliminate external distractions and allow for precise stimulus application.
      2. High-speed cameras were essential to capture detailed kinematics.
      3. force plates were used to measure the force generated during escapes.
3. **Long-term Behavioral Tracking of Freely Swimming Weakly Electric Fish**
   1. **General:** This study presents a novel method for tracking the long-term behavior of weakly electric fish in semi-natural conditions. It highlights the role of electrical signaling in social interaction and navigation, offering insights into how these fish adapt their behavior over time in response to changing environments.
   2. **Experiments Conducted:**
      1. Fish were placed in large tanks outfitted with electrode arrays to capture their electric field emissions.
      2. Behavioral patterns, including diurnal activity, social interactions, and foraging, were analyzed by correlating motion tracking with electrical discharge data.
   3. **System Setup:**
      1. The tank design included strategically placed electrodes to maximize signal capture without impeding fish movement.
      2. A custom data acquisition system was used to record and synchronize electric signal data with behavioral video footage.
4. **Kinematics and Behaviour in Fish Escape Responses: Guidelines for Conducting, Analysing, and Reporting Experiments**
   1. **General:** This paper provides comprehensive guidelines for studying fish escape responses, emphasizing the importance of standardized methodologies. It outlines best practices for designing experiments, analyzing kinematics, and reporting results to ensure consistency and reproducibility across studies.
   2. **Experiments Conducted:**
      1. Various escape response metrics, including reaction latency, escape speed, and trajectory, were systematically analyzed.
      2. Standardized experiments used repeatable stimuli and controlled environmental conditions to reduce variability.
   3. **System Setup:**
      1. Guidelines stress the importance of using calibrated stimulus generators, uniform lighting, and high-speed cameras capable of capturing at least 500 frames per second.
      2. Experimental tanks were fitted with grids to help measure movement precisely.
5. **Landmark Use and Development of Navigation Behaviour in the Weakly Electric Fish Gnathonemus petersii**
   1. **General:** The study investigates how weakly electric fish use landmarks for navigation, shedding light on the development of spatial orientation and memory in these animals. It highlights the importance of environmental cues, including both visual and electrical signals, in guiding their movement and decision-making.
   2. **Experiments Conducted:**
      1. Fish were trained in mazes with distinct electrical and visual landmarks. Their ability to navigate was tested under different configurations and with landmarks removed or altered.
      2. Fish learned to associate specific landmarks with reward locations over time.
   3. **System Setup:**
      1. Mazes were constructed from modular components to allow for flexibility in experimental design.
      2. Electrodes were embedded within the maze to track electrical discharges, while overhead cameras recorded movement patterns
6. **Finding Food: Senses Involved in Foraging for Insect Larvae in the Electric Fish Gnathonemus petersii**
   1. **General:** This paper explores the sensory modalities weakly electric fish use to locate food, focusing on the integration of electric, mechanosensory, and visual inputs. It provides insights into how these fish use their electrical sense to detect prey and adapt their foraging strategies based on environmental conditions.
   2. **Experiments Conducted:**
      1. Fish were presented with insect larvae under varying conditions, such as obscured vision, reduced electrical signals, or dampened mechanosensory cues.
      2. The fish's ability to locate prey was measured based on time taken and success rate.
   3. **System Setup:**
      1. The experimental tank was divided into compartments to control sensory input. For example, some areas were shielded to block electric signals or darkened to remove visual cues.
      2. Larvae were placed in consistent positions to standardize prey location.