Center for Embedded Systems

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Feasibility Study for an RF-Based Proximity Sensor using Embedded Antennas in High Velocity Projectiles

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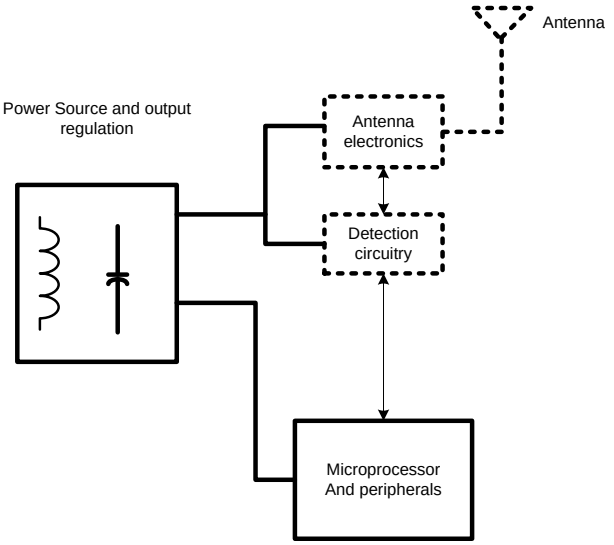
Project Overview and Description

- **Study the feasibility for embedding into a projectile an RF antenna and related electronic circuitry for proximity detection. The scope of the study includes:**
  - (a) the sensor RF antenna. The project will investigate what frequencies and emission patterns are suitable for the particular application given the limited size and operating conditions of the sensor;
  - (b) the signal processing algorithm which will provide the proximity detection threshold. The primary challenge here is the necessary accuracy and speed of the detection method in order to produce a reliable and easily implementable sensor.
- **The proposed project will lay the necessary ground work for developing a functioning prototype in a future project.**



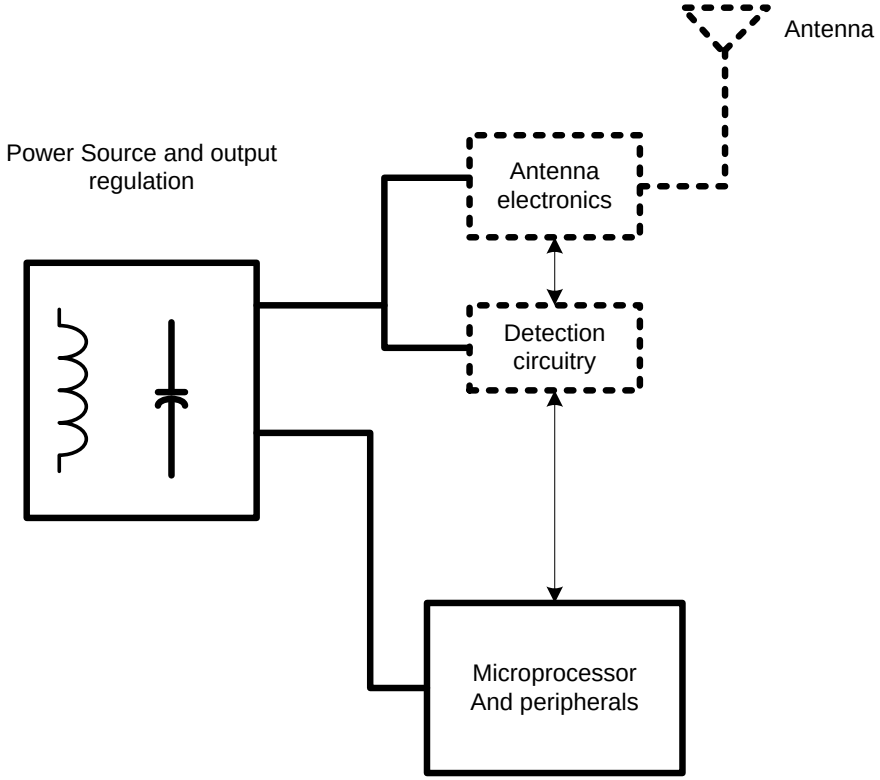
Approach

- **Antennas that could be used include:**
  - longitudinal or ring-type (for horizontal trajectories)
  - transverse or bar-type (for vertical trajectories)
  - the body of the projectile
- **Challenges: (a) variable environments yielding variable return ratios from the antenna; (b) interference from asynchronous emissions from other RF sensors operating in proximity; returns due to multiple; (c) the requirement for quick response, given the projectile high velocity and the short proximity of operation required.**
- **Specific Benefits from the project: An accurate and reliable RF-based proximity sensor that can significantly improve the accuracy of the projectile and its effectiveness.**

Project Tasks/ Deliverables

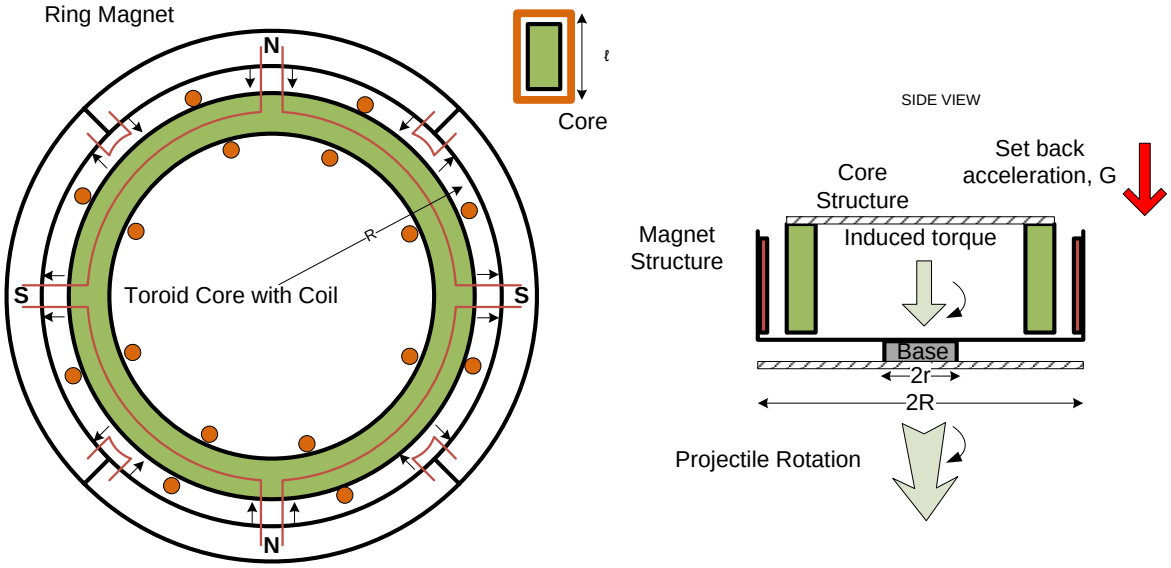
	Description	Date	Status
1	Investigation of the antenna	Aug-Jan	
2	Anechoic Chamber tests	Jan-March	
3	Preliminary antenna design	March-May	
4	Detection algorithm	Aug-May	
5			
6			

System OverView



Power Supply

- **Spin Generator can yield a high power supply.**



A Detection Circuit

- **Response Speed**
- **Multipath reflections**