Team 3: Self-Powered Wireless Sensor

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Project Background

- Cummins has spent considerable funds for warranty claims on wiring harnesses.
- Wiring harnesses are unprotected and exist in harsh environmental conditions
- Solution: wireless sensors
- Task: powering these sensors

Project Scope

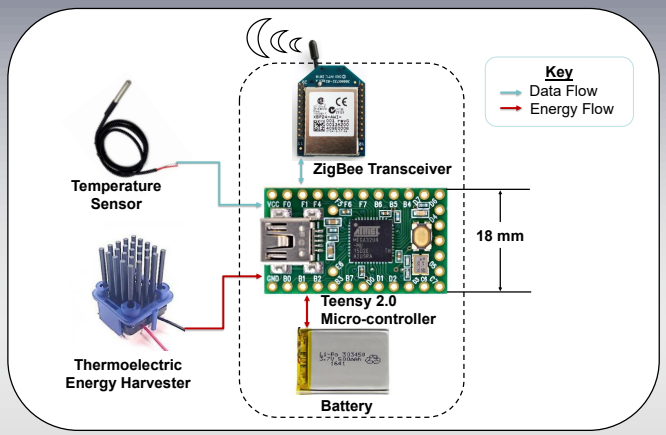
Design, manufacture, and demonstrate a method to power a sensor that will transmit data of a specific variable wirelessly to the Engine Control Module (ECM) in a Cummins' diesel engine

- Assumptions:
  - ECM is compatible with wireless communication method.
  - Focus on only one parameter for the sensor.
  - Design power generation for one wireless sensor, not a network.

Customer Needs

	Power	Transducer	Protection
Idle for 36 hours	X		
Communicate wirelessly		X	
Transmit frequency > 1 Hz		X	
Transmits distance ≥ 5 meters		X	
Operate under harsh conditions			X
Volume less than 6 in³	X	X	X

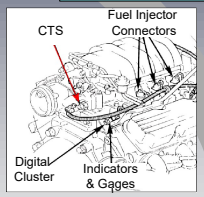
Selected Design



Future Work

- Analyze the selected design
- Purchase materials
- Program microcontroller
- Assembly and test design
- Optimize design with a protection system

Sensor Selection

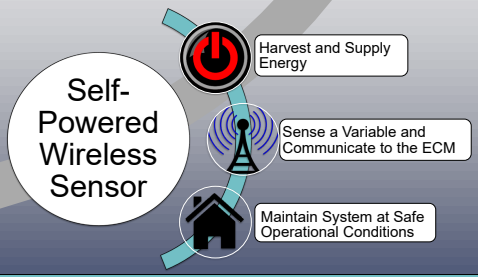


- Temperature Sensor:
  - Coolant (CTS)
  - HVAC Duct
  - Outside Air
  - Discharge Air
  - Evaporator
  - Water
  - Oil
  - Intake Air

Important Target Summary

Energy of System	Target
Power Supply	10 mW
Power Demand	10 mW
Voltage Demand	2 – 5 Volts
Energy Storage	100 – 500 mAh

Functional Decomposition



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