

# Investigating the Biological Impacts of Radio Spectrum Transmissions

The bee project group



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Instructor: Richard Martin;

Richard Howard

# Objectives & Current Phase

- Species (migrating birds, salmon, sea turtles) use Earth's magnetic field for navigation.
- Bees use Earth's magnetic field for navigation and orientation.
- Explore if RF(Radio Frequencies) has any impact on the behaviors of the bees.

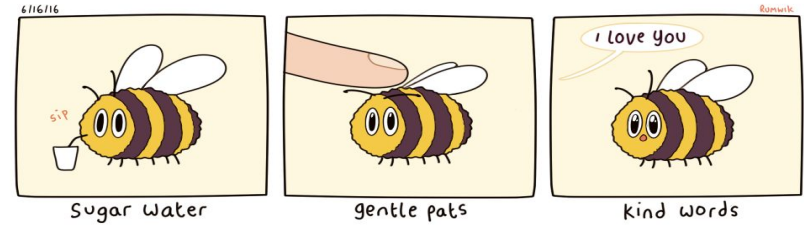


What we have so far:

- A Method to conduct the experiment.
- Basic equipment design: camera, feed pump

State	Meaning	Apparatus State
CS+	Positive Conditioned Stimulus	RF is on
CS-	Negative Conditioned Stimulus	RF is off
US+	Positive Unconditioned Stimulus	Sugar water in reservoir
US-	Negative Unconditioned Stimulus	Distilled water in reservoir

# Tasks completed/on-going this week



- Finished a prototype of a magnetometer sensor...see slide (4).
- Had a meeting with Dr. Rich Howard about the schematic of the board for controlling feeder pumps detail presented in slide (5).
- Familiarizing with KiCad & Eagle softwares for designing the circuit board.

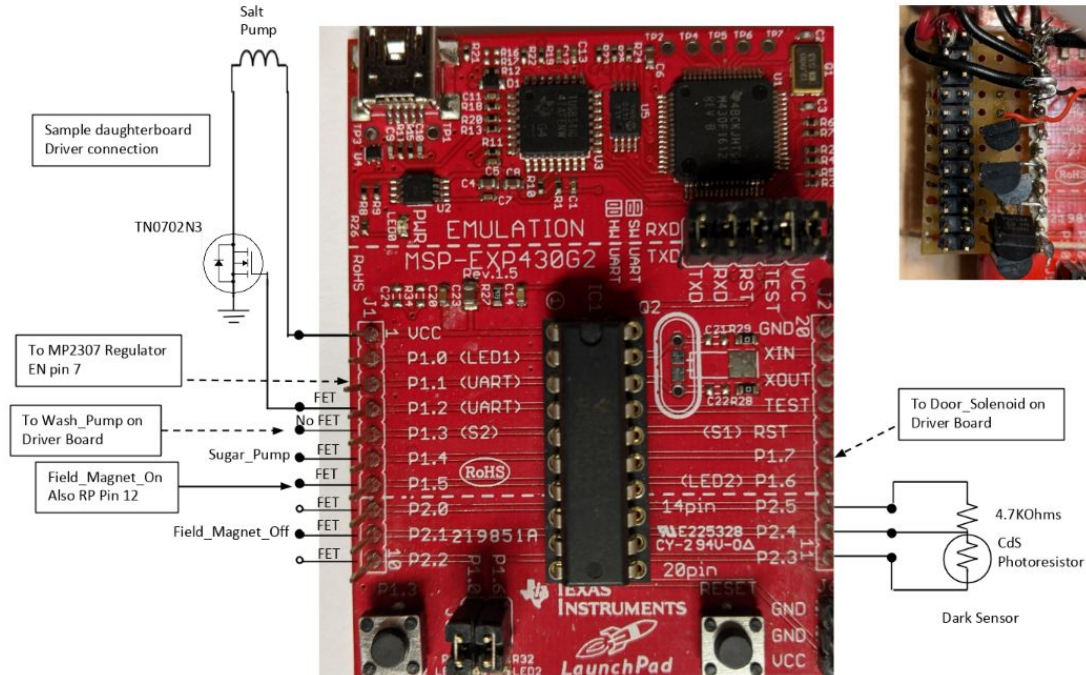
# Tasks completed/on-going this week



- To measure the magnetic field strength we built a prototype made of:
  - 1- PIP-Tag (a low power mote developed at Winlab)
  - 2- BNO055 (an IMU with multiple sensors. However, we use the magnetometer only).

# Tasks completed/on-going this week

- Developed an understanding of the functionalities for each pin and came up with the following questions we intend to solve:
- Regulator for coil 2.2V @ 100-120mA
- How can we get a regulated 12V or regulated 10V off of our lead-acid battery?
- 1-100MHz RF oscillator?
- Physical dimensions for the launchpad board. (Pin pitch and size and the like)



# Goal Next Week

- Checking the code of the magnetometer (we use a code developed before by Murtadha Aldeer that used the other sensors of the BNO055).
- Converting the data from Hex to  $\mu$ Tesla.
- Sketch of the circuit board.

# Questions?

