



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

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Project Title Soil Moisture Level Detector	
Abstract Objectives/Goals Fresh water is a limited but important source that we depend on to live. However, 50% of outdoor water usage is wasted due to inefficient watering systems. Due to these alarming circumstances, I was motivated into making a soil moisture level detector. The goal of this invention is to develop a soil moisture level detector that will turn on or off the sprinklers based on the the electricity generated by the detector. Methods/Materials One zinc and one copper rod, an amplifier/comparator chip, several copper wires, two electrical relays, 1 liter soil with various degrees of wetness, 1 liter of acidic (pH 6.4) soil, 1 liter of basic (pH 8.4) soil, and a multimeter are needed. Connect the rods, amplifier/comparator chip, and relay1 with copper wires. Insert relay1 between the timer and the actual watering system of the existing sprinkler system. Insert relay2 between the two rods and connect relay2's control to the sprinkler timer. To test the system, connect the rods, amplifier/comparator chip, and multimeter. Submerge in soil with various degrees of wetness, and measure the current generated. Repeat the same process with the acidic and basic liters of soil. Results Higher soil moisture content produces a higher current, and the detector can turn on or off the sprinklers with the current. The detector's voltage increased slightly int he acidic and basic soil. This is due to the electrochemistry process that takes place when he rods are submerged in a soil and water mixture. Conclusions/Discussion The detector's materials don't noticeably corrode after several uses. The threshold can be adjusted by the owner. The current generated is strong enough to turn on or off the relay. The detector works similarly under different conditions, such as the pH level of the soil differing. Furthermore, the detector stops generating electricity after the sprinklers have stopped, thus slowing down the rusting of the material. Finally, the detector is inexpensive, at only \$33.	
Summary Statement My soil moisture level detector helps farmers and homeowners save water by turning on or off the sprinklers based on the water content in the soil.	
Help Received I researched how the detector generated electricity and how that corresponded with the moisture content of the soil and how to create the detector.	