LOW-COST WATER LEVEL SENSOR FOR EDUCATIONAL APPLICATIONS

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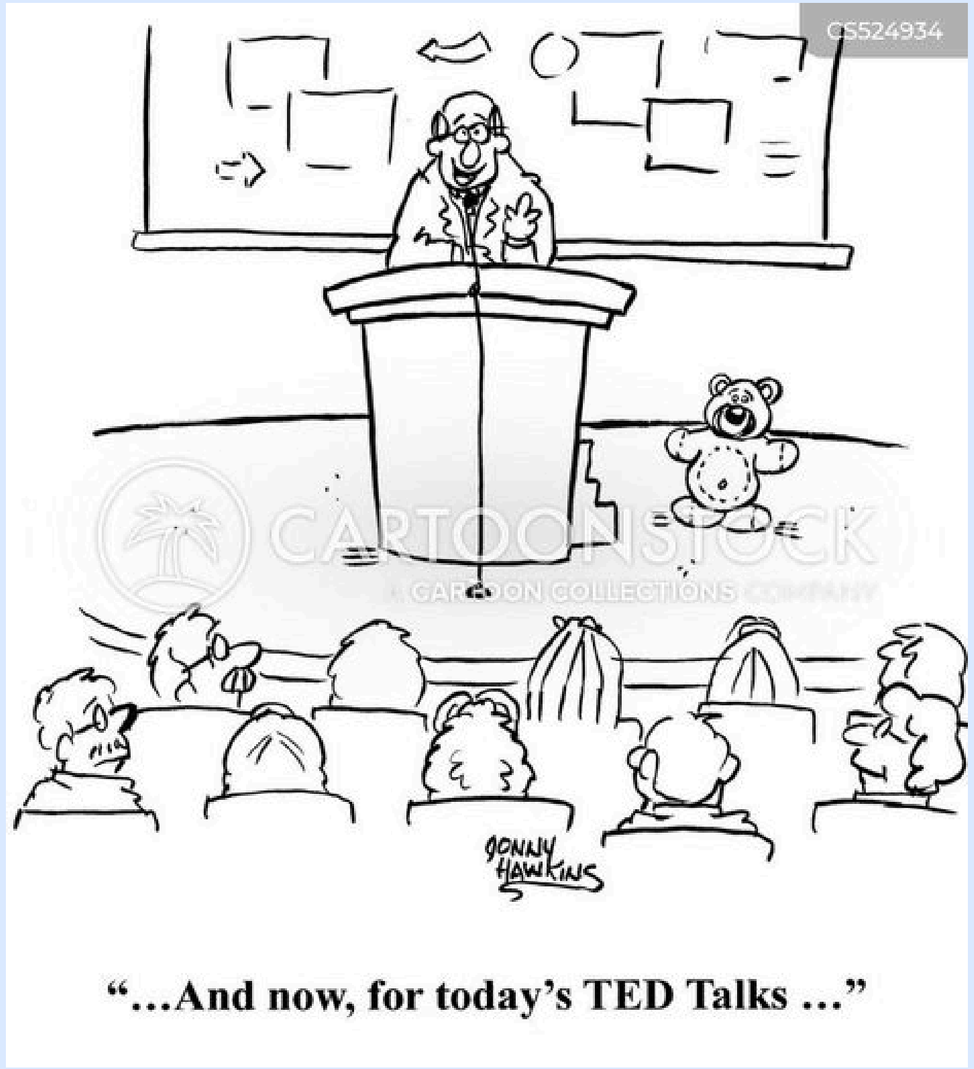

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GOALS OF PROJECT

- Create a prototype Water Level Sensor for educational purposes
  - Create a stand and screen to display “water level”
- Develop a lesson plan for Water Level Sensor demonstration
  - Designed to demonstrate how the sensor works to students
    - Cater towards the different age demographics

How it is Built

EQUIPMENT:

- POLY CASE
- WIRING (4-PIN CABLE)
- SD CARD AND ADALOGGER FEATHERWING
- ADAPTER PCB
- SOLAR PANEL/BATTERY
- SHORT STACKING HEADER PINS
- ADAFRUIT FEATHERWING OLED
- CIRCUIT BOARD (IO RODEO)
- ULTRASONIC RANGEFINDER
- USB-A TO MICRO-B CABLE

STEPS:

- COMPILE CODE AND FLASH TO THE BORON
- RUN CODE WITH THE ULTRASONIC RANGEFINDER TO ENSURE CODE WORKS
- SOLDER THE ADAPTER PCB TO THE ULTRASONIC RANGEFINDER
- STACK BORON, OLED DISPLAY, AND ADALOGGER FEATHERWING ON IO RODEO CUSTOM PCB
- ATTACH ULTRASONIC RANGEFINDER TO CIRCUIT BOARD USING 4 PIN CABLE
- PLACE COMPLETE SENSOR INTO PROVIDED POLY CASE SET
- SEAL THE POLY CASE WITH PROVIDED SCREWS

REQUIREMENTS:

- BASIC SOLDERING EXPERIENCE
- NAVIGATION OF GITHUB
- BASIC CIRCUIT FLOW NAVIGATION
- PATIENCE

PURPOSE:

- LOW-COST WATER LEVEL SENSOR
- USED TO EDUCATE STUDENTS, CIVILIANS, ETC.
- DISPLAYS THE CHANGES IN WATER LEVEL AND PROVIDES RELIABLE DATA

HOW THE SENSOR WORKS

- Has options for analog (AN) and PWM (PW) measurement using different headers on the sensor.
  - Our code utilizes the analog header.
- Automatically calibrated during each reading—converts voltage to distance using time of flight.
  - Measurement is dependent on the voltage of the power source.
    - 3.3V - 3.2 mV/cm; 5V - 4.9mV/cm
- Range: Min - 20cm; Max - 600cm on 3.3V; 700cm on 5V
- Average/peak current draw:
  - 3.3V - 2.1/50mA; 5V - 3.4/100mA
- Accuracy and precision not specified.
- Refresh rate - 6.6Hz

EXPECTED PERFORMANCE

ACCURACY

- PROVIDES RELIABLE MEASUREMENTS OF MAJOR WATER LEVEL CHANGES WITH REASONABLE ACCURACY

PRECISION

- MODERATE PRECISION SUITABLE FOR EDUCATIONAL DEMONSTRATIONS
- CONSISTENCY IN READINGS DEPENDS ON STABLE VOLTAGE SOURCE

STABILITY

- RELIABLE UNDER CONTROLLED CONDITIONS WITH LOW POWER CONSUMPTION
- POTENTIAL VARIANCE DUE TO ENVIRONMENTAL FACTORS (E.G., TEMPERATURE, HUMIDITY)

RESPONSE TIME

- QUICK DETECTION WITH THE ULTRASONIC RANGEFINDER FOR REAL-TIME WATER LEVEL CHANGES
- NEAR-INSTANTANEOUS DISPLAY UPDATES ON THE OLED SCREEN

IMPROVEMENT AND UTILIZATION

Add Built-in Display	Display current water level measurement on screen.
Data Logging	Save data to the SD card for tracking changes over time.
Make it Classroom-Friendly	Create hands-on lesson plans for students to explore water levels
Use Solar Power	Power the sensor with solar energy to use it anywhere without charging

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