Ninja Labs

Hydration Meter

Hydration Meter is a device used to measure the conductivity of urine and determine if a person is dehydrated or hydrated.

PROBLEM STATEMENT

Access to safe drinking water is a fundamental right of every human being. Children from government schools in India often do not have this privilege. A large number of schools do not even have a proper connection. Almost 200 million students are enrolled in elementary government schools in India. It is important to ensure that these students are provided with safe potable water to avoid the risk of dehydration, diarrhoea etc. Studies have shown that early childhood diarrhoea is linked to malnutrition, stunted growth and development. Dehydration in children can cause drowsiness, irritability, low energy levels and also a loss in cognitive performance. Dehydration causes several side effects in adults as well, like memory lapses, which can occur when we lose just 1% of water from our bodies.

AIM

Once the meter is installed, we will collect data on the average hydration content of all the students of a school and determine the average hydration content. If the average falls below the benchmark value, we can analyze if the school has proper drinking water supply.

If student(s) consistently falls below the average hydration level, we can also monitor the progress of that student.

The hydration meter can typicallly be installed in a waterless urinal for men/boys or in a western toilet bowl for women/girls.
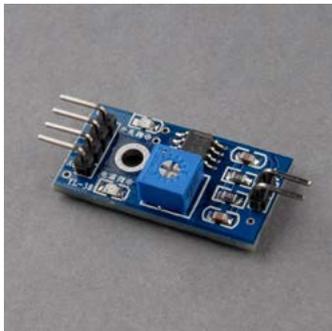
COMPONENTS

1. NodeMCU microcontroller (with ESP8266 WiFi SOC)
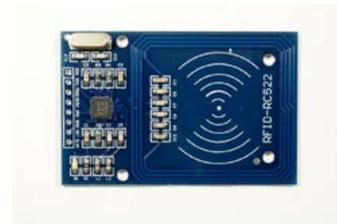

2. LCD with I2C backpack


3. Moisture sensor YL-38

4. MFRC522 RFID sensor

PROCESS

1. Student enters washroom with RFID tag.

2. They swipe the RFID tag in front of the RFID sensor in the hydration meter.

3. The hydration meter begins sensing moisture in the urinal/toilet bowl.

4. Student urinates on the moisture sensor.

5. Moisture sensor senses hydration level of student and displays the value, indicating if the student is dehydrated ("Drink more water!") or hydrated enough ("You're hydrated!")

6. Data specific to student is sent online using GScript service.

7. Hydration level of student can be tracked on Google Sheets.
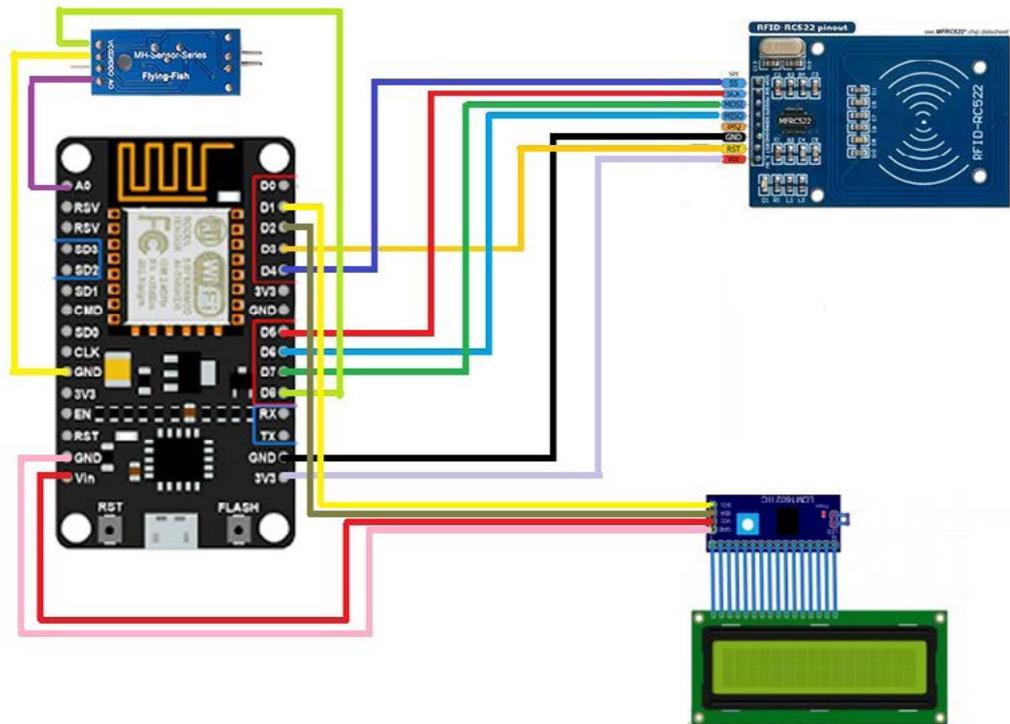
Circuit Diagram

TESTING

The meter has been in alpha-testing in Reap Benefit's office, in both men and women's washroom. The results can be viewed in the Google sheet here.

The values obtained will be pitched against the specific gravity of urine, which is the standard for measuring dehydration. This will be done using a refractometer.

NEXT STEP

The next step of the project is to use a PIR sensor(HC-SR501) instead of RFID sensor, which eliminates the need for the user to carry his/her tag, and also reduces the cost of the system.

All the codes for the hydration meter can be found here.

Find out more about using the hydration meter along with the Solve Ninja Techno Kit here.