Smart Water Pumping System

My project is a smart water pumping system which can automate water pumps in homes and industries.

The Problem: In Kochi, piped water from KWA first falls in an underground pit. The houses then have to pump the water to their overhead tanks. One way to check if the overhead tank is full is to manually go and check (but nobody does it). Other way to know is to hear the overflowing water. This way a little water gets wasted. But often people fail to notice because of their busy schedules. Elderly people and people with hearing difficulties often miss the sound and water gets wasted.

If the pump remains on for too long, the pit gets empty and the pump runs dry. This can damage the pump.

I got the idea of making such a system because of my grandparents. They always forget to turn off their pump and lot of water is wasted.

My solution: The best solution is to automate the whole process. To do it we would need sensors to sense the water inside the tank and also the pit, a relay to turn the pump on and off and a microcontroller to monitor and control the system. I am going to use an Arduino Mega development board as the microcontroller (ATmega 2560).

I had to develop a sensor myself due to current situation. I made it using a plastic scale and a bunch of wires. It makes use of conductivity of water to sense if water has reached specific levels set on the plastic scale.

Track: Exclusive track

As I am a first year student and also I am doing a project based on an Arduino board, I am choosing the exclusive track.

Uniqueness and practicality

My project is unique in the aspect of automating the process in a smart way. The system not only stops pumping when the tank is full, it starts pumping again when the water falls below a pre-set level. Also it stops pumping when the pit is almost empty, thus saving the pump from running dry.

Future Scope

This project has an immense scope in the home automation and green building sectors. Suitable modifications to the system can make it accurate enough to be implemented in industries.

Currently there is no demand for this system in Indian households. It is mainly because there was no such product introduced. This situation gives a great opportunity to create a market. The biggest benefit is the lack of competitors in the new market.

With proper advertisement and collaboration with government agencies (preferably water authorities and IGBC), enough demand can be created.

This project would cost me around Rs.400 including the price of an Arduino Uno. With mass production of control modules and using more cheap ICs, core cost of a full system will surely be below Rs.300 for the base variant.

Advanced variants would be IoT devices capable of real time water usage monitoring and flow optimization for maximum water savings.

For IoT variants a subscription based revenue model can be adopted. The base variants can be sold as off the shelf products with simple DIY setup.

Considering the simplicity of the system and sensors, research and development costs would be low. Suitable code modification can be made to clients wishing custom preferences.

The company can manufacture tanks preinstalled with sensors, pumps optimized for the system and water pipes fitted with suitable sensors, which can seamlessly integrate with already installed system. This essentially creates the company's own ecosystem.

Target clients include water authorities and pumping stations (automate their operations), industries (provide cheap and high standard custom solutions) and domestic use customers (save time, water, money and peace of mind). This can lead to the creation of the company's own ecosystem.

Pit
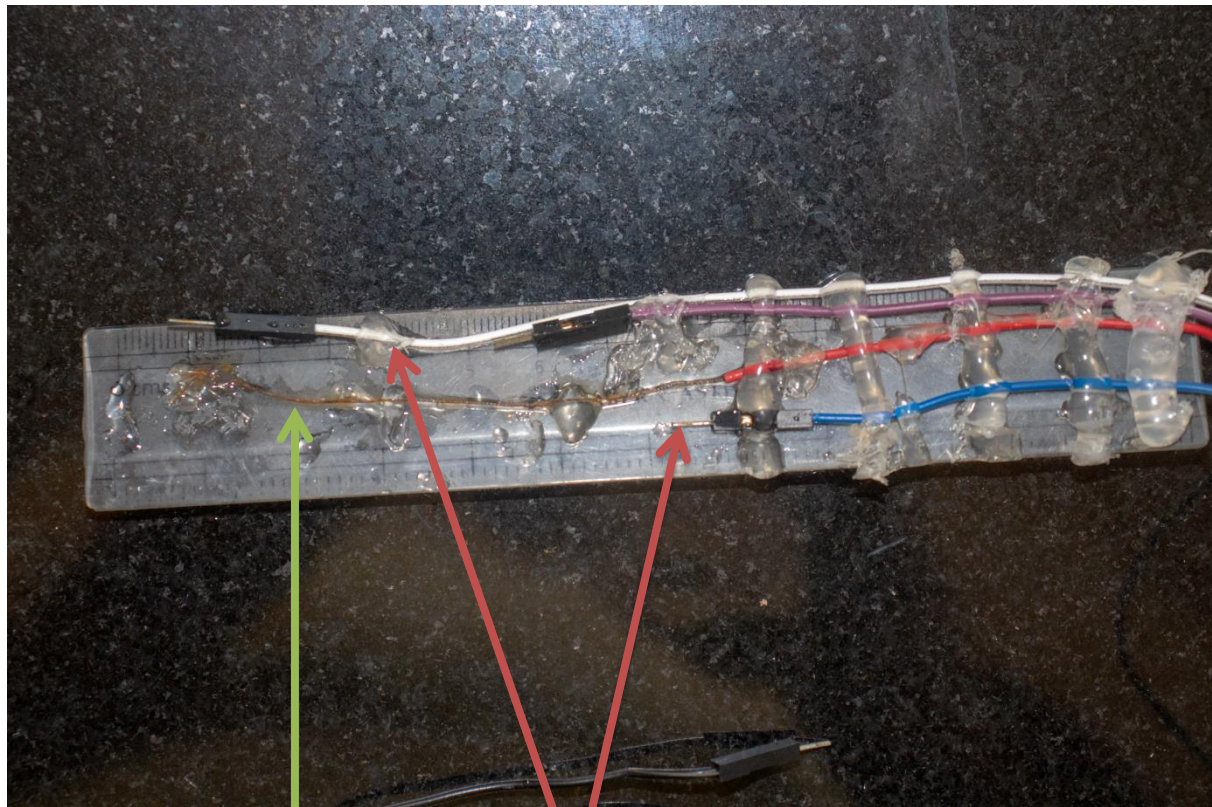
Main ground line

Level lines

CRUDE SENSOR

For videos of the working and demonstration of this project, please visit my youtube channel

Link: https://www.youtube.com/channel/UCEjjtKi0aAnZyqrGqz4Ebtw?view_as=subscriber

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