



Water Conservation using Porous Road and Sensors

Pratyusha Banerjee, Ayan Banerjee and Sristi Pal

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Water Conservation using Porous Road and Sensors

Ayan Banerjee 1, Pratyusha Banerjee 2, Sristi Pal 3

1 Third Year Student In Dept. Of Automobile Engineering, MCKVIE

2, 3 Third Year Students In Dept. Of Information Technology Engineering, MCKVIE

Abstract : *Water is another name of life. But nowadays we are facing lot of problems due to the lack of water. Even though earth is filled with 97% of water, but the quantity of pure drinkable water is going lesser day by day. Mumbai & Chennai were flooded due to heavy rain and they also suffered from deficiency of drinking water. But this project would have helped them to harvest the rain water and use it for drinking.*

I. Introduction

Permeable solutions can be based on: porous asphalt and concrete surfaces, concrete pavers (permeable interlocking concrete paving systems – PICP), or polymer-based grass pavers, grids and geocells. Porous pavements and concrete pavers (actually the voids in-between them) enable storm water to drain through a stone base layer for on-site infiltration and filtering. Polymer based grass grid or cellular paver systems provide load bearing reinforcement for unpaved surfaces of gravel or turf. Permeable paving surfaces have been demonstrated as effective in managing runoff from paved surfaces. Large volumes of urban runoff cause serious erosion and siltation in surface water bodies. Permeable pavers provide a solid ground surface, strong enough to take heavy loads, like large vehicles, while at the same time they allow water to filter through the surface and reach the underlying soils, mimicking natural ground absorption. They can reduce downstream flooding and stream bank erosion, and maintain base flows

in rivers to keep ecosystems self-sustaining. Permeable pavers also combat erosion that occurs when grass is dry or dead, by replacing grassed areas in suburban and residential environments.

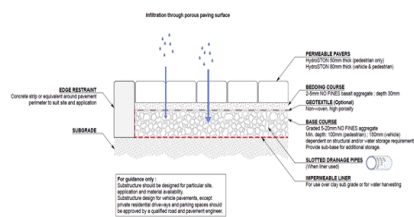
Permeable paving surfaces keep the pollutants in place in the soil or other material underlying the roadway, and allow water seepage to groundwater recharge while preventing the stream erosion problems. In the void spaces, naturally occurring micro-organisms digest car oils, leaving little but carbon dioxide and water. Rainwater infiltration is usually less than that of an impervious pavement with a separate storm water management facility somewhere downstream a porous surface admits vital air and water to the rooting zone. This integrates healthy ecology and thriving cities, with the living tree canopy above, the city's traffic on the ground, and living tree roots below.

The Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 Analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.

Infrared technology addresses a wide variety of wireless applications. The main areas are sensing and remote controls. The basic concept of an infrared sensor is used as an obstacle detector is to transmit an infrared signal. This infrared signal bounces from the surface of an object and the signal is received at the infra red receiver.

Proposed System

Porous Road- Rain water harvesting is an old process to recycle impure water, in this project there will be a porous road which will strain a huge amount of rain water and store it underground. Porous Roads are made of pervious concrete, porous asphalt, paving stones and interlocking pavers.



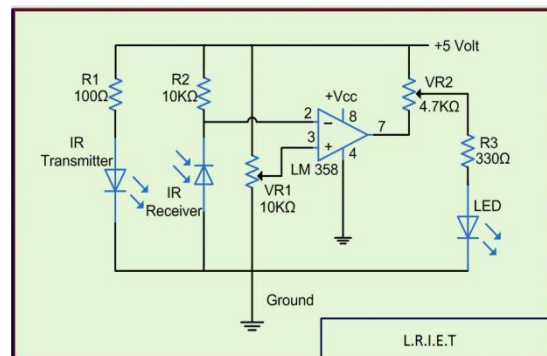
Arduino-UNO - Arduino is an open-source prototyping platform based on easy-to-use hardware and software. Arduino consists of both a physical programmable circuit board and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.

Pump- The pump adds the energy to the incoming fluid, that's mean that it will increase the pressure energy and reduce a velocity of the fluid. The pump is Energy Consuming device. It needs the power to work on the fluid. The pump adds the energy to the incoming fluid, that's mean that it will increase the pressure energy and reduce a velocity of the

fluid. The pump is Energy Consuming device. It needs the power to work on the fluid.

Relay- Relay controls one electric circuit by opening and closing contacts in another circuit. When a relay contact is normally open, there is an open contact when the relay is not energized. When a relay is normally closed, there is a closed contact when the relay is not energized. It works on the principle of an electromagnetic attraction. When the circuit of the relay senses the fault current, it energizes the electromagnetic field that produces the temporary magnetic field.

IR Sensor – An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings.



Water Filter- it will be used to purify the stored water before supplying to the locality.

Valve – A valve is a device that regulates, directs or controls the flow of a fluid by opening, closing various passageways. In an open valve, fluid flows in a direction from higher pressure to lower pressure.

I. Objective of Our Work

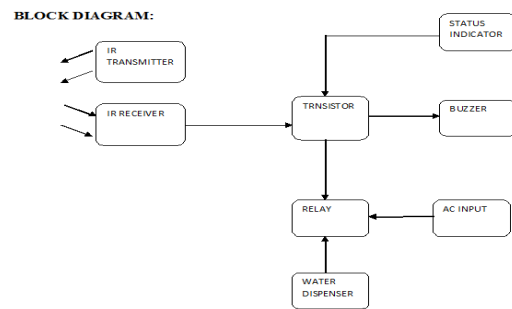
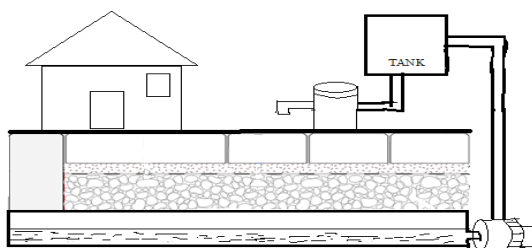
This project of ours is to harvest the rain water along with our daily usage water. Water drained through the porous road will be stored in the underground reservoir. We will use a pump to raise the water from ground level to upper level. Then the water will be purified and stored in a tank. That purified water will be supplied to the locality. In order to reduce

the wastage of water of taps in street, we will use digital tap instead of normal tap. An arduino board, an IR sensor and a ultrasonic sensor will be installed in the tap. IR sensor will sense if there is any object like hand or bucket under the tap. Then it will give a signal to arduino board and arduino will allow to flow the water through the tap. Valve and relay will be used to control the flow of the water. Water will flow for 10-20 secs. Ultrasonic sensor will check the water level of the bucket. If there will occur any condition of overflow then ultrasonic sensor will sense that and it will send a signal to arduino. Water flow will be automatically stopped then.

This is a period of mechanization where it is extensively characterized as substitution of manual exertion by mechanical power in all degrees of robotics. The activity remains a basic piece of the framework in spite of the fact that with changing requests on physical contribution as the level of automation is expanded.

The IR TRANSMITTER circuit is to transmit the Infra-Red beams. On the off chance that any snag is there in a way, the Infra-Red beams reflected. These reflected Infra-Red beams are gotten by the recipient circuit is called “IR RECEIVER”.

The IR collector circuit gets the reflected IR beams and giving the control flag to the control circuit. The control circuit is utilized to actuate the solenoid valve. The working guideline of a solenoid valve is clarified in the above part.



II. Contribution

Water crisis is now a big deal all over the world. Especially India is suffering from water crisis. Also pollution is a huge factor nowadays. Porous pavement is an extremely eco-friendly and affordable surfacing option for low-traffic, low-speed roads.

The proper management of surface water is a priority for any town or community that’s subject to heavy rainfall. This precipitation can prove severely harmful in areas with a limited or insufficient storm drain infrastructure in place. When roads are paved with asphalt or concrete, the water cannot soak into the ground, resulting in significant runoff. Not only does this storm water runoff cause dangerous flooding and the erosion of fragile ecosystems, it also often carries with it pollutants found in traditionally paved surfaces.

2) Local Heat Island Effects: An additional drawback of dark, impermeable pavements like asphalt is that they create distinct pockets of heat in developed areas. Called the heat island effect, these temperature disparities can significantly affect local communities and natural ecosystems. Porous pavements combat this effect by 1) allowing water to penetrate the pavement, and 2) utilizing the open pore structure of its system to absorb and store solar radiation, rather than releasing it into the air and driving up temperatures.

Automatic taps contribute to a more sustainable world in two main ways: Water conservation: Finding ways to save water is very important. Electronic taps are usually designed with a low flow rate, an aerator in the spout and system or materials that prevent leakage. For instance, while traditional basin taps pour between 10 and 15 liters per minute, Giampieri sensor taps would not use more than 6 liters and their solenoid valve is closed by default (and placed before the hose, which in this case supports up to 15 bar). Bear in mind that a dripping tap can waste between 300 ml and 1 liter per hour.

Energy saving in the long term: Each sensor tap requires 6, 9 or 12 volts, depending on the brand. This expense is unavoidable, whether hardwired or battery operated. Nonetheless, e-taps can make a difference during activation. Selecting the preferred flow and temperature every time a traditional faucet is activated wastes energy, among other things. In this regard, automatic basin taps with a constant temperature (cold, warm or premixed) are a great choice for commercial washrooms. Likewise, thermostatic faucets would be more energy efficient in showers than mixer lever ones..

III. Conclusion

This digital tap and porous road is flexible and effective system which is helpful in everyday life especially in present scenario of water crisis. It is helpful in conservation of water which can be efficiently reused in our daily life.

IV. Reference

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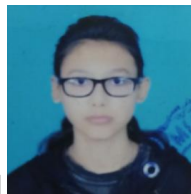
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V. Author :



[1]

Ayan Banerjee is a Third year student, Dept. Of Automobile Engineering from MCKV Institute of Engineering, Liluah, Howrah.



[2]

Pratyusha Banerjee is a Third year student, Dept. Of Information Technology Engineering from MCKV Institute of Engineering, Liluah, Howrah.



[3]

Sristi Pal is a Third year student, Dept. Of Information Technology Engineering from MCKV Institute of Engineering, Liluah, Howrah.