

WATER SAVING DEVICE FOR WASHING MACHINES

PROJECT OBJECTIVES

This project aims to design and construct a simple device that can divert drainage water from the washing machine's drainage pipe at the right time so that the collection of the last rinse water is effortless. The device should be cheap and simple, can be retrofitted to the washing machine and should not require any electricity to function.

PROJECT SUMMARY

A washing machine runs on a Wash-Rinse-Rinse cycle before spinning dry. A rinse cycle means that the machine will simply rinse the clothes with clean water. As part of energy efficiency efforts, Singaporeans have been encouraged to repurpose the water from the last rinse cycle for alternative uses, such as flushing the toilet or washing the floor. However, this is usually not practised as users have to wait for the completion of washing cycles first before diverting the washing machine's drainage pipe to a collection bucket, which is tedious and time-consuming.

The team's project is a device based on the buoyancy of a small ball which is carried by water through a small maze. As the water floods and drains in the device, the ball floats and sinks, making its way to its final position where it acts as a seal to close off one of two water outlets, to divert the flow of water.

Process during a typical Wash-Rinse-Rinse cycle:

1. The washing machine pumps out the dirty water after the first wash.
2. The dirty water will flow into the device, causing the ball to float. The water will be directed to the "To Drain" outlet. Once the water has been drained, the ball will settle in position (1) (see diagram).
3. The washing machine is then filled with clean water and proceeds with the first rinse cycle.
4. After the cycle is complete, this water is pumped out and flows into the device, causing the ball to float again. The water will be directed to the "To Drain" outlet.
5. Once the water has been drained, the ball will settle in position (2).
6. The washing machine is filled with clean water again for the final rinse.
7. After the final rinse cycle is completed, the water is pumped out and flows into the device. This water is usually clean and can be collected for reuse.

8. The water will flow into the device and float the ball to position (3), blocking the "To Drain" outlet. The water will be then directed to the other "To Collection Bucket" outlet.

If a user wishes to collect the rinse water during a wash and rinse cycle, the device can be reprogrammed by simply adjusting the initial position of the ball to position (1).

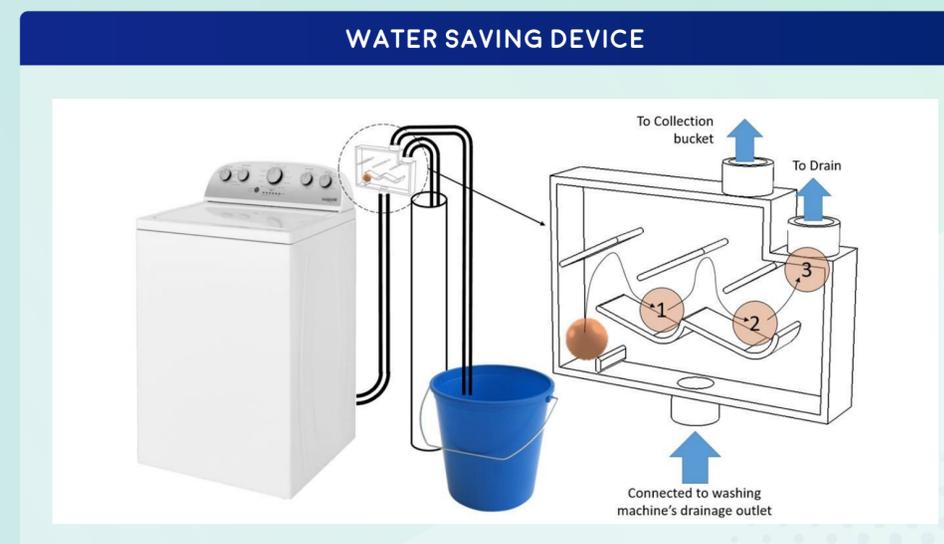
PROJECT OUTCOMES

The prototype is a simple and cost-effective device that makes use of the Archimedes Principle to solve a real-world problem.

The prototype is able to divert water from a washing machine with an output drainage flowrate of about 5L/sec. Based on a "Wash-Rinse-Rinse" cycle, it is able to direct the water from the first 2 rinses to the drainage outlet, while diverting the clean water from the final rinse to the collection outlet to be saved for reuse.

There are times when the ball does not settle in the right position due to the turbulence of the water. This can be rectified by incorporating one-way flaps to better guide the movement of the ball.

This prototype will facilitate the collection and repurpose the water from the last rinse cycle for alternative uses, such as floor washing.



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