



315/C

## Design of an ultra-user friendly domestic water pump controller

M.R.H.E. Bandara<sup>1\*</sup> and D.N. Balasuriya<sup>2</sup>

<sup>1</sup>*Department of Engineering Technology, Wayamba University of Sri Lanka, Kuliypitiya.*

<sup>2</sup>*Department of Electrical & Computer Engineering, The Open University of Sri Lanka, Nawala, Nugegoda.*

Water is one of the most important natural resources, which needs to be very carefully utilized in day to day life. In the domestic use of water, an overhead tank is filled using an electric water pump and the water is allowed to flow under gravity to the tap openings. In order to reduce both the wastage of water and the manpower, many automatic water pump control systems have been employed. In most of these systems, electrodes or vacuum balls placed inside the overhead tank measure the water level reading and it is conveyed to the controller which then activates an automatic on/off switch for the pump. However, among many drawbacks of these existing systems, the clogging of the sensors with the minerals in water and the resulting frequent maintenance requirements are prominent. At the same time, the installation of the system needs the knowledge of an expert. Further attempts to reduce the maintenance and to make the installation simple have been proposed by the use of ultrasonic distance measuring sensors and radio frequency (RF) based communication between the sensor at the overhead tank and the controller on the ground. But it does not provide an easy installation and maintenance mechanism. By considering these limitations, the ultra-user friendly water pump controller system was proposed, which does not require a sensor at the overhead tank; instead a sensor unit which can be fixed to a ground level tap opening measures the water pressure head to calculate the water level in the tank and send pressure head readings to the control unit via a wireless communication link. Further to the novel sensor node design, this pump controller consists of an easy to install modular design so that neither the technical expertise nor reaching the overhead tank is necessary. A prototype implemented demonstrates a slightly inferior accuracy in estimating the water level when compared to the existing systems. However, the obtained accuracy is sufficient in its practical domestic water pump control operation. Pressure readings are with low resolution and can be disturbed by the noise in readings, thus to increase the resolution, an averaging scheme is proposed, which averages the calculated water level estimates over six consecutive readings such that noise immunity is obtained. A prototype system employing this averaging demonstrated 100% pump on/off accuracy.

Keywords: Water, Overhead tank, Pressure reading, Pump control system

hasithae@wyb.ac.lk

+94 71496 8898