Chapter 14
Smart Water Level Monitoring System for Farmers

Nalina Suresh
University of Namibia, Namibia

Valerianus Hashiyana
University of Namibia, Namibia

Victor Panduleni Kulula
University of Namibia, Namibia

Shreekanth Thotappa
JSS Science and Technology University, India

ABSTRACT

With advancement in technology and ever-changing weather conditions, accurate and affordable water level measurement systems has become necessary for farmers. This therefore brings about the need for a system incorporating the use of IoT technology that will monitor water levels at a cost-effective price with accurate and dependable results. The prototype will monitor water levels on a regular basis and the data captured will be stored in a database to help farmers improve the way they manage their water resource. Farmers will be able to monitor the water levels from any location at any given time. This chapter focuses on a Smart Water Level Monitoring System for Farmers and provides a smart way to manage water resources on farms in the most cost-effective and convenient manner for farmers.

INTRODUCTION

Water is the most important resources for human survival and is essential for agriculture, industry and domestic consumption. According to Nepomilueva (2017), the shortage of water affects around 2.8 billion people around the world at least one month out of every year. Water shortage can be defined as a lack of sufficient water, or not having access to safe water supplies (Paulson, 2015). Namibia is a country

DOI: 10.4018/978-1-5225-9246-4.ch014

where more than 1.5 million people rely on subsistence farming and the country is experiencing its worst drought in recent history, which has led to the government declaration of a national drought emergency (Crisp, 2017). Thus, it is essential for Namibians to conserve water.

Water shortage is affecting the productivity of the agricultural sector in arid and semi-arid regions at large. Considering the case of Namibia, this sector consumes about 75% of the water in the country, with the commercial agriculture being the largest sub-sector and communal farmers being the least consumptive (Dirkx et al., 2008). It is difficult for staple crops such as wheat, mahangu and white maize to mention few, be grown as they require large volumes of water for growth, resulting in household food security being compromised. This is because Namibia depends on cereals as our staple food. According to Pérez-Hoyos et al. (2017), Vision 2030 of the country emphasizes the need to increase agricultural productivity in order to achieve food security.

Rainfall harvesting is a way of combating water shortages but, Pérez-Hoyos et al. (2017) argued that only 2% of Namibia's land receives sufficient rainfall to grow crops, most rivers flow only occasionally, hence the need for irrigation and other innovative technologies such as water level monitoring systems that can help with the efficient use of water.

Storing water in water tank reduces the need for the Namibian government to construct new dams. People in the rural areas especially in the farming sector store water in tanks. Most water tanks can be seen at schools and hospitals in these areas. The water is used for cooking bathing and farming. Although people in these areas have water tanks, they do not get notified on the current status of the water level in the tanks and these results in water shortage for long period of time. The methods of monitoring water levels in water storage tanks in rural areas are simple and cheap but not accurate nor dependable.

This research is based on the current challenges that the agricultural sector faces in terms of shortages of water in their water tanks. Thus, this research study focused on providing an innovative technology that will help farmers manage their water resource. This will reduce or prevent water shortages on their farms. Farmers are more likely to be motivated and active with their agricultural activities if they have water access, as they can see that these activities have a chance of succeeding.

In this chapter, we look at how a Smart Water Level Monitoring System (SWLMS) can be designed that will monitor water levels on a regular basis and the data captured will be stored in a database to help farmers improve the way they manage their water resource. Farmers will be able to monitor the water levels from any location at any given time. The Prototype will measure water levels in real time and give feedback to the farmers, warning them on when water levels are at critical points through a short message services (SMS).

LITERATURE REVIEW

There are various advanced technologies for monitoring water. The researcher believes that traditional methods are time-consuming and labor-intensive and is one of the reasons that result in water shortage. Relevant stakeholders do not get alerted early enough on the current water level resulting in water shortages. Previous studies have covered a variety of solutions on how to monitor water levels effectively. This chapter will focus on three Remote Sensor Networks that have been developed to monitor water, outlining the significance of water monitoring systems.