CHAPTER 1 INTRODUCTION

1.1 Background

The progress of science and technology has a role in creating a better life. Electronic technology is one of the technologies that has been inherent in human life, a variety of practical and flexible electronic devices have been created so that it is easier for humans to meet their needs. Various types of equipment with manual operating systems are increasingly being left to switch to fully automated equipment so that automatic equipment dominates more in human life.[1] With so many automated technologies, human work will be easier and won't take much time.

The University of Darussalam Gontor (UNIDA), is a waqf college under the auspices of Darussalam Gontor modern training college and has been accredited. Therefore, in carrying out the *Tri Dharma*, UNIDA Gontor also applied the vision, mission, and spirit of the *pesantren*. The understanding of the *pesantren* is an Islamic educational institution with a dormitory system, *Kyai* as its central figure, the mosque that lives its surrounding.[2] Islamic boarding schools are led by a *Kyai*, the life of the *pesantren* is governed by the leadership of the *pesantren*. The purpose of the *santri* is separated from their parents and families so that they learn to live independently in order to improve good relations with the *Kyai* and also God.

UNIDA Gontor also implements a full boarding system where mosques, dormitories, lecture halls, libraries, sports facilities, public kitchens, and other facilities are located within an integrated campus. Thereby creating an environment conducive to learning and interaction between students and intensive lecturers.[3]

---

1   Tegar Bhakti Prihantoro and Wijaya Charli, Rizky Husni, "Alat Pendeteksi Tinggi Permukaan Air Secara Otomatis Pada Bak Penampungan Air Mengunakan Sensor Ultrasonik", *Teknik Komputer*, vol. 1 (2011).

2   Staf Sekertaris Pondok Modern Darussalam Gontor Ponorogo, *Serba Serbi Serba Singkat tentang Pondok Modern Darussalam Gontor* (Percetakan Darussalam, 1997).

3   Tim Penyusun (ed.), *Panduan Universitas* (Ponorogo: Unida Press, 2017).

Public kitchen facilities, places to eat everyday UNIDA Gontor students, which they eat for breakfast, lunch, and dinner. They provide mineral water tank facilities in the kitchen for mineral water needs of students, students take mineral water from the tank that has been provided by the public kitchen to store mineral water there. **Figure 1.2** describes the condition of the drinking water tank in the public kitchen. The tank is used to fill mineral water so students can drink it after meals or after activities. And students cannot drink. Not only that, to fill water into the tank is still not efficient, namely by manually flowing water bottles into the mineral water tank described in **Figure 1.1**. When the pump engine wants to be turned on by the kitchen staff, they use a plug that is plugged into an outlet, this method is very inefficient. So it is necessary to design a water filling that can automatically fill the mineral water tank.

The use of mineral water tanks in the kitchen is not optimal, because the water source is taken from the water bottle that is carried by U3 staff (UNIDA Business Unit). U3 is a campus-owned business unit that provides mini market, canteen, photocopying and refill water facilities.[4] Filling the water must wait for the water bottle of water delivered, if there is no water bottle delivered then the tank will not be filled with water .
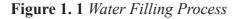
Figure 1. 1 *Water Filling Process*	**Figure 1. 2** *Water Container*

---

4   *Ibid.*

The tank has a faucet that serves student to pour water into the glass. There are several obstacles to using this manual tap. Some users forget to turn off the faucet after use and the faucet in the public kitchen is not always durable because of irregular use by students. With a period of approximately one month, there is a broken faucet as the students often open/close the tap when they want to drink from the water container.

Water filling devices in various places are not found in many systems by adjusting the volume of water. According to the container and also the system to show the water level, which means that the user does not know how much water is in the water container. From this problem, we need a system that can carry out the process of automating water fillers according to the volume value entered. If the water is less than the specified volume, the pump automatically fills the water into the tank to hold the mineral water. Conversely, if the volume has reached a predetermined limit then the water pump will stop automatically so that not much water is spilled due to excessive water.[5]

So in this study, a tool was made to automatically control the filling of water into the water tank, and also control the opening/closing of water on the tap. To avoid the behaviour of *tabdzir* waste and also make the best use of time for public kitchen staff. There is one of the sura in the Holy Al-Qur' a which explains to prohibit doing *tabdzir* because doing it includes devil friends, not only that the water used can also be for more useful things

Islam forbid the behaviour of *tabdzir*, it is related to what Allah said in the Holy Quran as follows:

$$اِنَّ الْمُبَذِّرِيْنَ كَانُوْٓا اِخْوَانَ الشَّيَاطِيْنِ وَكَانَ الشَّيْطَانُ لِرَبِّهِ كَفُوْرًا$$

"Surely those who are in vain are brothers of satan and satan does not believe in his Lord."

The essence of the content of Sura Al-Isra 'verse 27 "Surely those

---

who are wasteful are satan and satan is very disbelieving to his Lord that is, brother in waste, ignorance, neglect in obedience, and disobedience to Allah".[6] This section explains about warnings from Allah SWT not to behave wastefully, squander, waste of possessions. Thus in order not to waste water, especially for drinking water, so that it does not include people who are losing money. And also with this tool can save our time to do work or other activities, how it has been explained in Al Quran sura Al-Asr verse 2:

$$اِنَّ الْاِنْسَانَ لَفِيْ خُسْرٍ$$

"Surely humans are truly in loss"

In the explanation of the verse above shows that many people lose money. It is unfortunate that not many people are aware of this loss, so Allah SWT swore on it to convince people that they really were at a loss.[7] The loss experienced by humans is that they cannot use the time in the world as well as possible. It is unfortunate if we humans cannot use the time as well as possible in this world. Because we can use other time for other jobs.

According to Al Syathibi's perspective, there are three kinds of *maqashid*: *dharûriyât* (vital necessities), *hajiyat* (urgent necessities), and *tahsiniyat* (improving necessities). *Dharuriyat* aims to preserve worldly and afterlife interests (*maslahah*). The absence of this *maqashid* will cause an imbalance in world structure. *Maqashid al dharuriyat* had five parts: *hifzu-din* (preservation of religion), *hifzu-an nafs* (preservation of soul), *hifzu-nasl* (preservation of descendant), *hifzu-mal* (preservation of wealth), *hifzu-aql* (preservation of mind).[8]

In conclusion, the purpose of *maqashid dharuriyat* is avoiding

---

6   Dr Abdullah bin muhammad, *Tafsir Ibnu Katsir 5.2*, ed. by M. Yusuf Harun (Bogor: Pustaka Imam Asy-Syafi'i, 2004).

7   Dr Abdullah bin muhammad, *Tafsir Ibnu Katsir 8.5*, ed. by M. Yusuf Harun (Bogor: Pustaka Imam Asy-Syafi'i, 2004).

8   Moh Toriquddin, "Teori Maqasid Syari'ah Perspektif Al-Syatibi", *Journal de Jure*, vol. 6, no. 1 (2016).

tabdzir (excess, negligence) in every aspect of life, one of them is water usage and management. Islam suggests and guides humanity to avoid this *tabzir* because it is one of destructive behavior. Islam aims to protect wealth, *hifzu-mal* (preservation of wealth).

Based on the above problems, the author has the idea to make a research prototype entitled "Automatic Mineral Water Filling Using Arduino-Based Ultrasonic Sensors". This tool will work automatically to fill water into a water tank in a common kitchen by setting it and will to maximize water filling according to the volume of water specified, also minimize water spill if the water is full. Make it easier for kitchen staff to use their time for another job.

1.2 Formulation of the Problem

By the background of the problem described, the author formulates several problems will be examined:

1. Water filling is still done manually taking water sources from ordering water bottle, the tank is also rarely filled and turns on the water pump using a plug that is plugged into a power outlet.
2. The use of a faucet that doesn't last long and some users forget to turn it off after the use.

1.3 The objective of the Research

From the formulation of the problem that has been written above, the author's objectives of the research conducted are as follows:

1. Create an automatic control system for the convenience of kitchen staff, so they no longer worry about running out of water or excess when filling water.
2. Reduce wasted water when the tap is still on and damage the tap, using a tap automation system that can open and close the tap automatically and Prevent water that runs out during student meals or at other times.

1.4 Benefits of the Research

The benefits expected by the authors of this study are:

1. For Writer
   a. As a condition to fulfil the final assignment of the lecture or thesis.
   b. Add experience and skills to be creative.
   c. This Study Can prove the extent of the student's ability to practice real in society.
2. For Universities (Campus / Public Kitchen staff)
   a. Implementing a new system that can be used in public kitchens.
   b. Minimizing excess water in water storage containers, and save the use of water for others.
   c. Minimizing damage to the faucet by operating automatically and also facilitates part of the work from the public kitchen staff.
3. For Users (UNIDA Students)
   a. Makes it easy for students to drink after meals or at other times, and students are not worried about running out of the water.
   b. Makes it easy for students to drink when filling water into a glass without having to open/close the tap manually.

1.5 Scope of the Constraints

Some of the problem constraints that the researchers adopted in the study to complete this final project were:

1. The object examined in this study was UNIDA Gontor public kitchen water container.
2. The sensor system used is the HC-SR04 ultrasonic sensor.
3. The microcontroller used is Arduino.
4. The prototype was made as an automatic mineral water filler system to the drinking water tank and also automatic taps in the public kitchen of the UNIDA Gontor campus.

1.6 Research Systematic

This study will use the systematics of writing as follows:

CHAPTER 1 INTRODUCTION

    1.1 Background of the Research

    1.2 Formulation of the Problem

    1.3 Objective of the Research

    1.4 Benefits of the Research

    1.5 Scope of the Problem

    1.6 Research Systematic

CHAPTER 2 LITERATURE REVIEW

CHAPTER 3 METHODOLOGY OF RESEARCH

CHAPTER 4 RESULTS AND DISCUSSION

CHAPTER 5 CLOSING AND SUGGESTION

    5.1 CONCLUSION

    5.2 SUGGESTION

BIBLIOGRAPHY

ATTACHMENTS