

# TABLE OF CONTENT

<b>STATEMENT OF APPROVAL .....</b>	<b>ii</b>
<b>DECLARATION.....</b>	<b>iii</b>
<b>ACKNOWLEDGEMENTS .....</b>	<b>v</b>
<b>ABSTRACT .....</b>	<b>vii</b>
<b>LIST OF FIGURE.....</b>	<b>x</b>
<b>LIST OF TABLES.....</b>	<b>xii</b>
<b>CHAPTER 1 INTRODUCTION .....</b>	<b>1</b>
1.1 Background .....	1
1.2 Formulation of the Problem .....	5
1.3 The objective of the Research .....	5
1.4 Benefits of the Research.....	6
1.5 Scope of the Constraints.....	6
1.6 Research Systematic.....	7
<b>CHAPTER 2 LITERATURE REVIEW .....</b>	<b>9</b>
2.1 Previous research .....	9
2.1.1 Suryono, Sulistyo Warjono, Baliyan I, Nouroddy Aulada, Retno Handayani Teknik Elektro Politeknik Negeri Semarang (2015) .....	9
2.1.2 Moh. Vita Nur Adhitya, Hafidudin, Ir. Mas Sarwoko Teknik Telekomunikasi, Universitas Telkom (2015).....	9
2.1.3 Andri Dewantoro Universitas Negeri Yogyakarta (2015) .....	10
2.1.3 ..... Gamis Pindhika Darma, Wisnu Wendanto STMIK AUB Surakarta (2015) .....	10
2.1.5 Adhitya Permana, Dedi Triyanto, Tedy Rismawan jurusan Sistem Komputer Universitas Tanjungpura (2015) .....	10
2.1.6 Siti Sulbiyah Kurniasih, Dedi Triyanto, Yulrio Brianorman Jurusan Sistem Komputer Universitas Tanjungpura (2016)....	11
2.1.7.. Sahidul Lukman, Rozeff Pramana, ST., MT Teknik Elektro (2017).....	11

2.2 Study of Hardware Theory.....	20
2.2.1 Arduino.....	20
2.2.3 Ultrasonic Sensors .....	20
2.2.4 Servo Motor.....	22
2.2.5 Relay.....	23
2.3 Study of Software Theory .....	24
2.3.1 Arduino IDE .....	24
<b>CHAPTER 3 METHODOLOGY OF RESEARCH .....</b>	<b>27</b>
3.1 Time and Place of Research.....	27
3.1.1 Research Time .....	27
3.1.2 Place of Research .....	27
3.2 Stage of Research.....	28
3.2.1 Study of Literature.....	28
3.2.2 Analysis .....	30
3.2.3 System Planning.....	30
3.2.4 System Testing.....	36
3.2.5 Maintenance .....	36
3.2.6 Writing Results Report .....	36
<b>CHAPTER 4 RESULTS AND DISCUSSION .....</b>	<b>37</b>
4.1 Test System Design.....	37
4.1.1 Trial Components of Automatic Water Fillers.....	37
4.1.2 Test The Components of The Automatic Faucet Design.....	45
4.1.3 Complete Trial of The First System Design.....	51
4.1.4 Complete Trial of The Second System Design .....	59
4.2 Discussion .....	62
<b>CHAPTER 5 CLOSING.....</b>	<b>65</b>
5.1 Conclusion .....	65
5.2 Suggestion.....	66
<b>BIBLIOGRAPHY .....</b>	<b>67</b>

## LIST OF FIGURE

<u>Figure 1. 1 Water Filling Process with Water Bottle.....</u>	3
<u>Figure 1. 2 State Public Kitchen Water Container .....</u>	3
<u>Figure 2. 1 FishBone Diagram .....</u>	20
<u>Figure 2. 2 Arduino Uno .....</u>	21
<u>Figure 2. 3 Ultrasonic Sensors HC-SR04 .....</u>	22
<u>Figure 2. 4 Servo Motor GS90.....</u>	24
<u>Figure 2. 5 Relay.....</u>	24
<u>Figure 2. 6 Limit Switch .....</u>	25
<u>Figure 2. 7 Arduino IDE Software.....</u>	26
<u>Figure 2. 8 Arduino IDE Software Toolbar.....</u>	26
<u>Figure 2. 9 Display For Making Microcontroller Circuits .....</u>	27
<u>Figure 3. 1 Stages of Research with Waterfall .....</u>	29
<u>Figure 3. 2 Automatic Water Filling Design .....</u>	33
<u>Figure 3. 3 Design of Automatic Faucet .....</u>	34
<u>Figure 3. 4 Overall Design.....</u>	34
<u>Figure 3. 5 Automatic Water Filler Design Flowchart.....</u>	36
<u>Figure 3. 6 Automatic Faucet Design Flowchart .....</u>	37
<u>Figure 4. 1 The First Design Program.....</u>	40
<u>Figure 4. 2 Automatic Water Filler Design .....</u>	41
<u>Figure 4. 3 The First Ultrasonic Sensor .....</u>	42
<u>Figure 4. 4 Test of The First Ultrasonic Sensor on The Monitor Serial.</u>	43
<u>Figure 4. 5 Trial Relay .....</u>	44
<u>Figure 4. 6 The Relay that is On is Marked by a Led on The Relay.....</u>	44
<u>Figure 4. 7 Water Pump is Lit to Fill the Water Bottle. ....</u>	45
<u>Figure 4. 8 Trial of Green, Yellow and Red LEDs.....</u>	45
<u>Figure 4. 9 Design of Automatic Faucet .....</u>	47
<u>Figure 4. 10 The Second Design Program .....</u>	48
<u>Figure 4. 11 Testing of the Second Ultrasonic Sensors.....</u>	48
<u>Figure 4. 12 The Results of Data from the Second Ultrasonic Sensors.</u>	49
<u>Figure 4. 13 The Design of a Servo Motor is Combined with a Faucet.</u>	50
<u>Figure 4. 14 Limit Switch for Automatic Faucet Design.....</u>	50

<b>Figure 4. 15</b> Test of the Faucet in a 0 Degree State .....	52
<b>Figure 4. 16</b> Test of the Faucet in 180 Degrees.....	52
<b>Figure 4. 17</b> The Height of the Water in the Red Sign Indicates that the Water is in LOW or Slightly.....	54
<b>Figure 4. 18</b> A Bright Red LED Indicates Water in a Little Amount of Water.....	54
<b>Figure 4. 19</b> Test of the Ultrasonic Sensor Output Distance $> = 22$ Marked the Red LED is On. ....	55
<b>Figure 4. 20</b> The Height of the Water in the Yellow Sign Indicates that the Water is in NORMAL State or Filled in Half.....	55
<b>Figure 4. 21</b> A Bright Yellow LED Indicates that the Water is Half Filled. ....	56
<b>Figure 4. 22</b> The Output Test between Distances $> = 22$ cm and $<= 12$ cm is Indicated by a Yellow LED lit. ....	56
<b>Figure 4. 23</b> The Water Level in the Green Sign Indicates that the Water is in a HIGH State or Fully Charged.....	57
<b>Figure 4. 24</b> A Bright Green LED Indicates that the Water is Full .....	57
<b>Figure 4. 25</b> The Test Output Distance $<= 12$ cm is Marked as the Green LED is Lit. ....	58
<b>Figure 4. 26</b> Water Height Shows 22 cm Using a Ruler. ....	58
<b>Figure 4. 27</b> Water Level Shows 17 cm Using a Ruler. ....	59
<b>Figure 4. 28</b> The Height of the Water Shows 12 cm Using a Ruler .....	60
<b>Figure 4. 29</b> Test the Filling of Water into a Glass.....	61
<b>Figure 4. 30</b> The Water will Stop and the Tap Closes when the Water in the Glass is Full .....	62

## LIST OF TABLES

<u>Table 2. 1</u> Table of Previous Research Comparison.....	13
<u>Table 2. 2</u> Explanation of each symbol on the Toolbar .....	26
<u>Table 4. 1</u> The First Ultrasonic Sensor Pin.....	42
<u>Table 4. 2</u> Relay Pin Table.....	43
<u>Table 4. 3</u> LED Pin Table .....	46
<u>Table 4. 4</u> Data from the First Results of Component Testing .....	46
<u>Table 4. 5</u> The Second Ultrasonic Sensor.....	49
<u>Table 4. 6</u> Pin Limit Switch Table .....	51
<u>Table 4. 7</u> Servo Motor Pin Table.....	51
<u>Table 4. 8</u> Data from the Second Results of Component Testing.....	53
<u>Table 4. 9</u> Data Results from the First Trial Design.....	60
<u>Table 4. 10</u> Data Results from the Second Trial Design .....	62