UNIVERSITI TEKNOLOGI MARA | Cawangan Melaka

PUBLICATION DATE | 1 SEPTEMBER 2021

i-JaMCSIIX 2021 Exploring ideas

International Jasin Multimedia & Computer Science Invention and Innovation Exhibition

International Jasin Multimedia & Computer Science Invention and Innovation Exhibition (i-JaMCSIIX 2021)

15 FEBRUARY 2021 - 31 MARCH 2021

VIRTUAL COMPETITION • INNOVATION & INVENTION • PUBLICATION OPPORTUNITIES

EXTENDED ABSTRACT

UiTM CAWANGAN MELAKA KAMPUS JASIN

ISBN:
978-967-15337-0-3

WEBSITE | https://jamcsiix.wixsite.com/2021

i-JaMCSIIX Exploring ideas 2021

International Jasin Multimedia & Computer Science Invention and Innovation Exhibition

PUBLISHED BY:

i-JaMCSIIX

Universiti Teknologi MARA Cawangan Melaka
Kampus Jasin

77300 Merlimau, Melaka

Tel: 062645000

Email: jamcsiix@uitm.edu.my

Web: https://iamcsiix.wixsite.com/2021

ISBN: 978-967-15337-0-3

ORGANIZING COMMITTEE

PATRON	ASSOC. PROF. DR. ISMADI MD BADARUDIN
ADVISOR 1	NOR FADILAH TAHAR @ YUSOFF
ADVISOR 2	DATO' TS. DR. MOHD NOR HAJAR HASROL JONO
PROJECT LEADER	TS. NURUL NAJWA ABDUL RAHID @ ABDUL RASHID
PROJECT LEADER 2	ANIS AFIQAH SHARIP
TREASURER 1	SITI MAISARAH MD ZAIN
TREASURER 2	NURUL ZAHIRAH ABD RAHIM
SECRETARY 1	NOR AIMUNI MD RASHID
SECRETARY 2	NUR NABILAH ABU MANGSHOR
PUBLICATION	**DR. RAIHAH AMINUDDIN**
	DR. NOR AIZA MOKETAR
	DR. SITI FEIRUSZ AHMAD FESOL
JURY	**TS. RAIHANA MD SAIDI**
	DR. ELIN ELIANA ABDUL RAHIM
	NOR INTAN SHAFINI NASARUDDIN
REGISTRATION	**FADZLIN AHMADON**
	HAJAR IZZATI MOHD GHAZALLI
	SITI AISYAH ABDUL KADIR
PROMOTION	**MOHAMAD ASROL ARSHAD**
	ZUHRI ARAFAH ZULKIFLI
	FADILAH EZLINA SHAHBUDIN
MULTIMEDIA	**NORSHAHIDATUL HASANA ISHAK**
	HAZRATI ZAINI
	NUR FARAHIN MOHD JOHARI
	FAIQAH HAFIDZAH HALIM
	MOHAMMAD BAKRI CHE HARON
	MUHAMMAD HAMIZ MOHD RADZI
AWARD	**FARAH NADZIRAH JAMRUS**
	FADHLINA IZZAH SAMAN
	NURULHUDA ZAINUDDIN
	HAZWA HANIM MOHAMED HAMZAH
	MOHD HAFIFI MOHD SUPIR
	ADI HAKIM TALIB
CERTIFICATE	**NUR SYUHADA MUHAMMAT PAZIL**
	MARIATHY KARIM
	UMMU MARDHIAH ABDUL JALIL
	NOOR WAHIDA JAMIL
TECHNICAL & PROTOCOL	**DR. AHMAD FIRDAUS AHMAD FADZIL**
	ALBIN LEMUEL KUSHAN
	MOHD NABIL ZULHEMAY
SPONSOR	**TS. NURUL NAJWA ABDUL RAHID @ ABDUL RASHID**
	SHAHADAN SAAD
	FARIDAH SAPPAR
	SYAFNIDAR ABDUL HALIM
	SITI NURAMALINA JOHARI
LANGUAGE EDITOR	NUR AQILAH NORWAHI
	MOHD AMIRUL ATAN

BRONZE SPONSOR

AINON SYAZANA AB HAMID
ANITA MOHD YASIN
BUSHRA ABDUL HALIM
FARIDAH SAPPAR (Ts.)
FATIMAH HASHIM
HAZRATI ZAINI
MASTURA MANSOR
MASWATI SUFFIAN
NOORAZILAH IBRAHIM
NOR ADILA KEDIN
NOR AIZA MOKETAR (DR.)
NOR AZIDA MOHAMED NOH
NOR INTAN SHAFINI NASARUDDIN
NURUL HIDAYAH MAT ZAIN (Ts. DR.)
NURUL NAJWA ABDUL RAHID @ ABDUL RASHID (Ts.)
NURULHUDA GHAZALI (Ts.)
RAIHAH AMINUDDIN (DR.)
SALEHAH HAMZAH
SHAHITUL BADARIAH SULAIMAN
SITI AISYAH ABDUL KADIR
SITI NURAMALINA JOHARI
SITI RAMIZAH JAMA
SURYAEFIZA KARJANTO (DR.)
SYAFNIDAR ABDUL HALIM
UMMU MARDHIAH ABDUL JALIL
ZAINAB OTHMAN
ZURAH ABU

LIST OF REVIEWERS

FADILAH EZLINA SHAHBUDIN
FADZLIN AHMADON
FARAH NADZIRAH JAMRUS
HAJAR IZZATI MOHD GHAZALLI
HAZRATI ZAINI
NOR AIZA MOKETAR (DR.)
NOR INTAN SHAFINI NASARUDDIN
NURUL NAJWA ABDUL RAHID @ ABDUL RASHID (Ts.)
RAIHAH AMINUDDIN (DR.)
RAIHANA MD SAIDI (Ts.)
SHAFAF IBRAHIM (Ts. DR.)
SITI FEIRUSZ AHMAD FESOL (DR.)
SITI MAISARAH MD ZAIN
SITI NURAMALINA JOHARI
SURYAEFIZA KARJANTO (DR.)

CONTENTS

i-JaMCSIIX Exploring ideas 2021
International Jasin Multimedia & Computer Science Invention and Innovation Exhibition

Arduino-based Farm Feeder Helper

Nur Fareena Ezani As'ad[1], Noor Fadzilah Razali[2]

[1,2] Pengajian Kejuruteraan Elektrik, Kolej Pengajian Kejuruteraan, Universiti Teknologi MARA Cawangan Pulau Pinang, Kampus Permatang Pauh, Malaysia

fadzilah708@uitm.edu.my

Abstract— **Farmed domestic animals usually lives in cramped and filthy conditions with insufficient food, and drinks in enclosed areas. Instead of treating them as living beings, the modern industrial way in which this industry produces dairy and other animal products has turned them into mere production units. In this project, the animal will get its food based on the preset time in the programming. Other than that, it will ensure that animals in the farm will kept hydrated by providing enough water all the time inside the farm. Additionally, this project also ensures that the air inside the farm will remain fresh and clean from any unpleasant smell that have been produced by the animals inside the farm. As the result, animals in the farm will live a good life and act as the base in generating quality product in the future, as well as helping farm owners to control feeding time. This project utilizes the use of Arduino microcontroller to control the conditions in the farm by controlling proper ventilation system, feeding water level and appropriate feeding time. Both motor servo and exhaust fan are used to supply water and expel smelly odors respectively to achieve the optimal condition in the farm. Necessary information is displayed on the Liquid Crystal Display (LCD) unit.**

Keywords—Farm feeder, Arduino, MQ-02, ventilation, water level controller

I. INTRODUCTION

Automatic farm feeder is an innovation concept that refers to managing farms using modern information and communication technologies to increase the quantity and quality of products while optimizing the human labor required [1]. Whenever a farm was mentioned, people always think about it as overcrowded, dirty, and often in confined spaces. Upgrading the facilities regarding this matter must always involve human intervention and this can increase workload of a farm worker. Subsequently, the crowded space then leads to an inadequate living condition and amount of food among farm animals. The farm feeder project where farm animals will be provided with enough food and water along with good air ventilation. With this, the animals can sleep with a full stomach every single day. After all, good animal health will produce good quality food for humans [2]. Therefore, this project can ensure that the animal on the farm live in a good condition to produce good food in the future.

The other reason why the Farm feeder is created is to reduce human labor on the farm. This is because food chain workers are among the lowest-paid laborer in Malaysia, yet they face disproportionately high risks for injury, illness, and exploitation [3]. Workers can suffer long-term exposure to dangerously polluted air and diseases such as antibiotic-resistant superbugs at factory farms. Animals are not the only ones suffering because of these unnatural and inhumane conditions. Consumers, rural communities, farmers, workers, and the environment are being hurt by the intensive farming systems employed on factory farms. Non-properly maintained farms can be breeding grounds such as Salmonella, E. Coli, and other pathogens that can be transmitted to humans through meat, milk, and eggs, as well as through contact between people. To combat unsanitary conditions, animals are fed large doses of antibiotics. Misuse, overuse, and dependence on antibiotics in our food system create the potential for dangerous, drug-resistant strains of bacteria to develop and spread among people and animals [1,4]. So, we need to keep our farm clean in order to produce good quality food for humans. In order to keep the farm clean, this project suggest using the gas sensor as a medium to sense methane gas that have been produce from feces. Generally, feces contain a lot of bacteria. In order to clean it, this project also suggesting using ventilation fan which can make air inside the farm clean beside can also notify the workers about the presence of the feces inside the farm [5].

In existing system of feeder, manpower usually the one who will take care of providing the food to each cage in the farm [5,6]. The quantity for each cage might be slightly different or sometimes manpower forgot to deliver the food on time to those animals. This will lead to animals could not get enough food that they should have. In order to produce a good quality of product in the future, food and water need to be taken care for these animals inside the farm [1]. This project will ensure that animal inside the farm will be provided with enough food and water that will keep the animals hydrated.

II. METHODOLOGY

A. Project Block Diagram

Fig. 1: Hardware Block Diagram of Farm Feeder

In this project, Arduino Uno microcontroller is used as the main controller of the system. The hardware bock diagram is as shown in figure. It has two sensor inputs which are the gas sensor MQ-02 and water level sensor, while the outputs are divided into three main components, namely the ventilation fan, water pump and servo motor to control the food feeder. 20 x 4 Liquid crystal display (LCD) is also included to display necessary information to the user.

B. Flowchart of the project

The project's programming flowchart is shown in Figure 2. Three main functions of the system are simultaneously operating according to the program flow. Those three systems are; detecting methane gas, activating the timer for feeder motor as well as detecting the water level of the water tank.

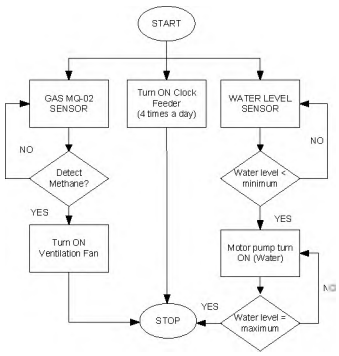

Fig. 2: Overall project flowchart

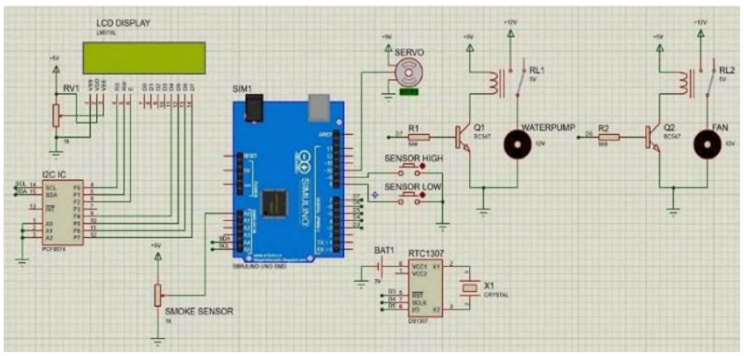

Fig. 3: Simulated schematic diagram for Farm Feeder project

The methane gas sensor (MQ- 2) sensed any methane gas released by faeces inside the farm. If the gasses concentration detected above the sensors' concentration ppm level, the ventilation fan will be turned ON to allow the gasses from inside the farm to be exhausted out. The fan turning ON could also be an indicator for the farm workers to do cleaning works. For this ventilation process, it will automatically turn on and off when the gas sensor senses the presence of faeces inside the farm making sure freshest air is available. As for the food dispenser, the timing are set through the Arduino by setting the actual time for the food dispense in each bowl at the same time all over the farm into four times daily. By that, animal in the farm will receive enough quantity of food per day without any delay. For the automatic water dispenser, this project uses gravity float switch systems as water level detector. The gravity float systems use "float switch" that acts as water level sensor that rises as the tank fills with water. This project uses two water level sensors. One of the water level sensors act as the minimum point of water level and the other one as the maximum level of water. When in the water container contains no water or the water in the water container was below than the minimum level of water, the water pump will start functioning by pump in the water from the water tank to the water container. Once the level of water reaches the maximum level, the water pump will stop pump in the water as the water container already full. When their water container reaches the minimum point of the water level or low water level which means almost no water in the bowl, then the water will automatically be filled to the tank using the water pump.

III. RESULTS AND FINDINGS

This project uses Arduino Uno Integrated Development Environment (IDE) for programming, while Proteus Design Suite for designing purposes. All the hardware implementations are made using standard electronic components soldering and hardware troubleshooting techniques done in instrumentation and electronics laboratory.

A. Software Implementation: Cicuit simulation and programming

Figure 3 shows the general simulated schematic diagram of the Farm Feeder Project using Proteus software. It consists of an Arduino Uno as the main controller, 16x2 LCD with I2C module, MQ-2 gas sensor, Real Time Clock (RTC), Float sensor (high and low), servo motor, water pump, DC fan, and relay 2-channel. The float sensor is replaced by the push button for simulation purposes including the water and gas sensors. This simulation shows the hardware connections for the farm feeder circuit later. The programming of the circuit is made by using Arduino IDE software using C++ coding before uploaded into the circuit for testing and troubleshooting. Meanwhile, Figure 4 shows example of coding done including the input initialization and declaration of the pin of Arduino microcontroller and setting the feeding time of the feeder motor.

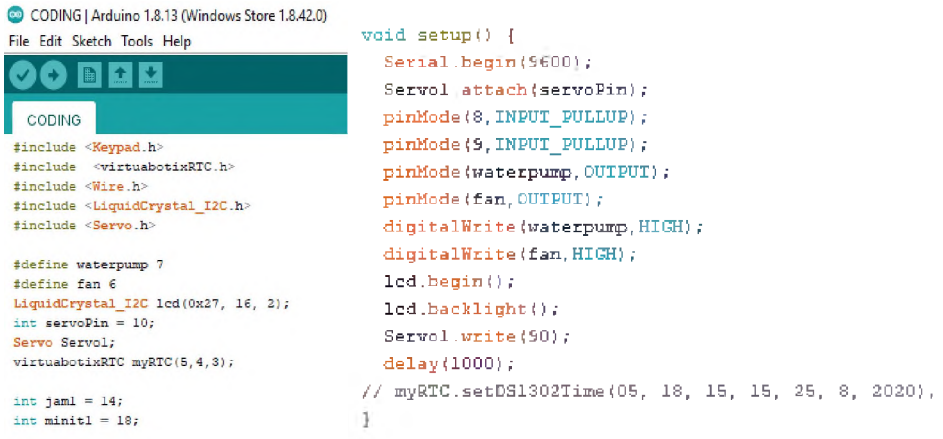

Fig. 4: Example of coding for the project

B. Hardware Implementation

In hardware implementation section, the circuit components are connected according to design of the simulated result. The result of the prototyping is divided into (a) Food dispensing process (b) Water level indicator and (c) Gas sensing / ventilation.

a) Food Dispenser Result: Figure 5 (a) shows that the LCD display words "READY" at 12:29 a.m. In Arduino IDE, this project already set the timer for the first batch of food dispenser at 12:30 a.m. The servo motor is in ready condition before the servo horn rotate 90 degree from the starting point at 0 degree. Meanwhile, figure (b) shows that the LCD display "FOOD DISPENSE" where servo motor followed the controller command to dispense food on 12.30 a.m. as it has been set the timer in Arduino IDE. The servo motor rotates to 90 degree to open the lid of the food container to release food inside the cage and stays in position for 4 seconds to dispense the food. After 4 seconds, the servo motor will rotate 90 degree back to it place at 0 degree. The LCD display will be changed to display "READY" means it ready for the second batch or another 4 hours to dispense the food.

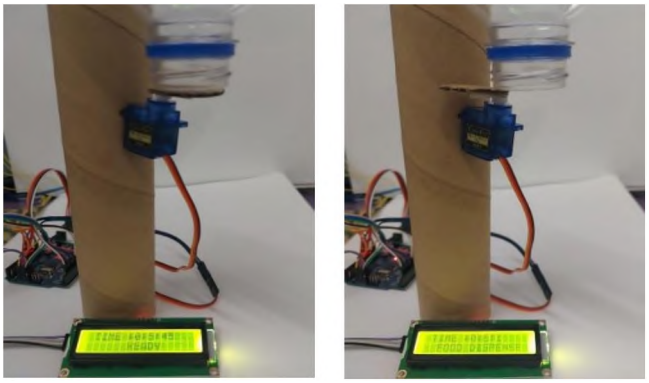

Fig. 5: (a) System ready mode (b) Food Dispense Mode

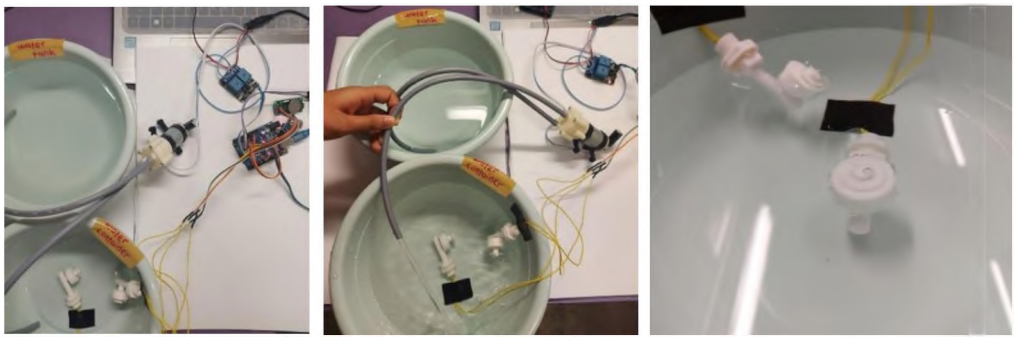

Fig. 6: (a) Minimum water level (b) Water filling process (c) Maximum water level

b) Water level dispenser Result: Figure 6 (a) shows clear water tank at minimum without any water inside. There are two float sensor used for minimum and maximum water level sensor with 3 cm and 10 cm programmed respectively. As the sensotr detects minimum water level, the controller will turn on the pump through motor relay circuit and fill the water from water tank to water container as in Figure 6 (b). It will continue to fill up until the second sensor detects the maximum level and stops as in Figure 6 (c).

c) Gas Sensor and Automatic Ventilation Fan: Figure 4.10 shows that the circuit connection of gas sensor and automatic ventilation fan. The DC fan is connected to the relay and have been supported by the adaptor (12Volt). Meanwhile the MQ-2 gas sensor is connected to the controller which is Arduino Uno. Practically, it needs to be methane gasses that is released by the animal's feces but for simulation purpose, butane gas is used instead. In Arduino IDE, the MQ-2 has been set until the reading of gasses reach 400. Once it reaches 400, the relay will be turned on and the ventilation fan will automatically be turned on. As conclusion, once the MQ-2 gas sensor detects gasses in the farm, the DC fan will automatically be turned on to notify the workers about the presence of feces (methane gas) as well as keep the farm's air clean and fresh from unpleasant smells.

IV. CONCLUSIONS

In summary, the objective of this project is accomplished where the project is capable to provide a comfortable barn for the farm animals. This project will benefit farm owners as it will boost the growth of the farm animals as well as their environment and surrounding. In this project, future recommendation of implementing internet of things (IoT) is suggested for easier management for the end user of this project.

REFERENCES

[1] Goldberg AM. Farm Animal Welfare and Human Health. Curr Environ Health Rep. 2016 Sep;3(3):313-21. doi: 10.1007/s40572-016-0097-9. PMID: 27344143.

[2] Salobir, Janez & Korošec, Tamara & Rezar, Vida. (2012). Animal nutrition for the health of animals, human and environment. Acta Agriculturae Slovenica. 100. 41-49.

[3] Global Wage Report 2020–21: Wages and minimum wages in the time of COVID-19. International Labour Office – Geneva: ILO, 2020.

[4] Wahyudi, Bambang & Edy, Duwi & Wiyono, Wiyono. (2020). Automation of Welding Fumes based on MQ-2 Sensor in Welding Laboratory.. Jurnal Temapela. 3. 1-9. 10.25077/temapela.3.1.1-9.2020.

[5] Dey, Namrata & Mandal, Ria & Subashini, M.. (2013). Design and Implementation of a Water Level Controller using Fuzzy Logic. International Journal of Engineering and Technology. 5. 2277-2285

[6] Spamast-Malita, Iteit. (2018). Automated Poultry Feeder with SMS Notification. 10.13140/RG.2.2.32489.39521.