UNIVERSITI TEKNIKAL MALAYSIA MELAKA

SMART HOME SYSTEM: WATER SPRINKLER with RAIN SENSOR CONTROLLED by GSM SMARTPHONE

This report is submitted in accordance with the requirement of Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electronics Engineering Technology (Industrial Electronics) with Honours

by

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FACULTY OF ENGINEERING TECHNOLOGY
2015

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

TAJUK: **Smart home system: Water sprinkler with rain sensor controlled by GSM smartphone**

SESI PENGAJIAN: **2015/2016 Semester 1**

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This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Engineering Technology (Type your department's name here) (Hons.). The member of the supervisory is as follow:

…….

EN. KHAIRUL ANUAR BIN A RAHMAN

(Project Supervisor)

ABSTRACT

This project was built in order to control the used of water in our daily life routine. Based on the problem recorded, people nowadays is unaware of the benefits from the use of natural phenomenon (as in this case, water is the subject) where it also can become a component in completing the system built. Thus, based on the problem received, the smart home system of water sprinkler was created. The system is consists of components like Arduino UNO R3, GSM, LCD and rain sensor plat. One of the component is Arduino UNO R3 which works as the brain of the system and a platform for coding implementation. The coding program was created and implemented in the system in order to determine the expected operation done by the system using suitable platform or software and lastly, the body of interior and exterior part of project was done in order to proceed with the analysis which related with the system of the project. When all the hardware was successfully built, the observation of project's outcome made whether it is corresponding with the desired concept in which the machine works by using the GSM smartphone as its console and then the water sprinkler will operate depends on the time set by the user. But, the water sprinkler will stop its operation if the rain sensor plate detects water. Based on the result obtained, a few analysis was made in order to determine the main cause or problem which affect the efficiency of the system as long as the user's desire. Analysis related with the motor, power supply and the distance of water sprinkler reached was made.

ABSTRAK

Projek ini dibina bagi mengawal penggunaan air dalam kehidupan seharian. Berdasarkan masalah yang diperolehi, didapati bahawa masyarakat pada masa kini tidak sedar akan kelebihan daripada penggunaan alam semulajadi (air adalah mekanisma yang difokuskan dalam projek ini) di mana alam ia juga mampu bertindak sebagai sesuatu komponen bagi melengkapkan sesuatu system. Jadi, melalui masalah yang diterima itu, projek air pancut pintar dicipta. System ini mengandungi komponen seperti Arduino UNO R3, GSM, LCD dan plat pengesan hujan. Arduino UNO R3 adalah komponen yang bertindak sebagai otak kepada system yang dirangka dan pusat bagi peyimpanan arahan. "Coding" bagi menentukan operasi yang bakal dilakukan oleh system juga dicipta dengan menggunakan pelantar yang sesuai dan seterusnya diakhiri dengan proses pembinaan sepenuhnya dalaman dan luaran projek dan juga analisis bagi setiap pembolehubah yang berkaitan dengan system yang dirangka ini. Setelah selesai dengan pembinaan projek ini, hasil pengeluaran diperhatikan samada sejajar dengan konsep yang dimahukan iaitu mesin ini berfungsi dari kawalan telefon pintar dan apabila arahan diterima dari telefon pintar itu, system air pancutan akan berfungsi bergantung kepada masa yang ditetapkan pengguna. Akan tetapi, system ini akan terputus sekiranaya plat pengesan air terdapat air diatasnya. Analisis adalah perlu di dalam melengkapkan projek ini bagi menentukan apakah punca ataupun perkara yang dapat dikenalpasti bagi mengawal dan menghasilkan kepitusan yang dimahukan oleh pengguna. Berdasarkan projek ini, hal berkaitan motor, bekalan kuasa dan juga jarak pancutan air adalah salah satu analisi yang dilakukan.

DEDICATIONS

I would like to thank especially to my beloved parents, Ms. Zulaida binti Mohd Noor on top of her moral support and encouragement in order for me to start and pull out the success from this project. Also, I would like to dedicate this project to my precious supervisor, Mr. Khairul Anuar bin A Rahman that for willing to give a guidance and assists me through the hardship in developing this project. Besides, I also want to thank to my lecturers and friends that help me in brainstorming the idea, giving opinion as well as criticize the project in order for me to acknowledge the pros and cons during the process of developing the progress of the project each by each and from time to time.

ACKNOWLEDGMENTS

I would like to thank to Mr. Khairul Anuar bin A Rahman for his guidance and constant supervision as well as for providing necessary information regarding the project and also for his support in completing this project. Also, I would like to express my gratitude towards my parents and members for their kind co-operation and encouragement due to the assists for the completion of this project. Last but not least, my thanks and appreciations are also dedicated to my colleague in developing the project and people who had willingly helped me out with their own might.

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GSM	=	Global System for Mobile communication
NC	=	Normally Closed
NO	=	Normally Open
SMS	=	Short Message Service
SPDT	=	Single Pole Double Throw
SIM	=	Subsriber Identity Module
LCD	=	Liquid Crystal Display

CHAPTER 1
INTRODUCTION

1.0 Introduction

This chapter presents our overview and findings for overall description and information for this project. It includes the component such as the background of the project, the objective and as well as the scope of the project. The organisation of the report was also included as the reference or short preview of the report ahead.

1.1 Background

Water is basic need in every one's life. Saving and proper usage of water is very important. Even our country sometimes suffered from the lack of clean water supplied to any specific area. Here is an easy project which will give the alarm when there is rain, so that we can make some actions and wise solution in order to save the rain water. As a result, we can increase the water levels of underground water by using underwater recharge technique. Rain water detector will detect the rain and make an alert; rain water detector is used in the irrigation field, home automation, communication, automobiles and etc. Also, as we could manage the used of water and alert about the world weather, we could manage our daily life routine systematically. Here is the simple and reliable circuit of rain water detector which can be constructed at low cost.

This system will able to control the usage of water with the rain sensor implemented in the home system. The unique feature that's comes out from this project is it has the ability to work automatically where its system was triggered with the presence of the water from the rainfall. As the system was triggered, the user or the owner of the smart home will noticed that his neighbourhood was under the rain and all the

household chores which was unsettled before can be manage automatically with the help of this idea by means, define the title of smart home system.

This project was planned in detail specifically for the sprinkle water built for the home's garden..

1.2 Problem Statement

Nowadays, peoples are unaware of the benefits that could be used throughout the natural phenomenon (as in this project; rain) where most of them received them with ease without thinking that it is able to become one of the component that could triggered the automatic daily life system that is useful for all humanity. In addition, they just took the facts that the rain was significant for the purpose of producing clean water to be supplied to all parts of the country so then the entire daily life routine could be manage systematically. Besides, as mentioned earlier, the project was focused on the automatic water sprinkle implemented in the smart home system and also the windshield or window installed in the building. The sprinkle water will operate automatically in the morning as it is the best condition to water the plant because of its humidity and temperature. Thus, if it rains in the morning, there will be a lot of waste on the usage of water as the plant was already watered naturally by the natural phenomenon. Whereas, for the other case, sometimes the owner himself could not manage the condition of the house perfectly for every entire angle of the house. As example, they forgot to shut down the windshield or the window of the room or any area where is necessary to be reached. Thus, by using this project, a perfect management for the household chores and also the the daily life routine could be promoted.

1.3 Objectives of Research

The points below are the main objective as a guideline for this project;

- To put the use of GSM into another level and create the extension to the use of rain sensor.
- To promote a systematic daily life routine to all humanity.
- To implement new method of technology.

1.4 Scope of the project

This project will cover on designing one system that can be included in the smart home system by using the GSM smartphone with rain sensor interface as one of its important switch which will triggered the system. Besides, this is the new implement of a new method system. Instead of depending on the weather broadcast through media, this system will apply the accurate weather detector (rain) in a specific place at a small scale. Also, this research onto this project will practice the used of GSM into another level. This application will gives an alert to the user which then affect the plan of their daily life routine as well.

1.5 Project significance

The rain sensor of this smart home system manage to trigger the alarm and cut off the system's operation and lastly, achieve the objective of this project.

CHAPTER 2
LITERATURE REVIEW

2.0 Introduction

This chapter contains the preview for the critical information in order to pursue the objective of the project and the acknowledgement on the related information on enhance the understanding of the concept and certain terminology along the experiment undergo.

2.1 Introduction of the rain sensor

A rain sensor or downpour switch is an exchanging gadget initiated by precipitation. There are two primary applications for downpour sensors. The principal is a water preservation gadget joined with a programmed watering system framework that causes the framework to close down in the occasion of precipitation. The second is a gadget used to shield the inside of an auto from downpour and to backing the programmed method of windscreen wipers. An extra application in expert satellite correspondences reception apparatuses is to trigger a downpour blower on the opening of the radio wire food, to expel water beads from the spread that keeps pressurized and dry air inside the wave-guides.

2.1.1 Type of rain sensor: (irrigation sensor)

Rain sensors for irrigation system frameworks are accessible in both remote and hard-wired renditions, most utilizing hygroscopic circles that swell in the vicinity of

downpour and therapist withdraw again as they dry out — an electrical switch is thusly discouraged or discharged by the hygroscopic plate stack, and the rate of drying is ordinarily balanced by controlling the ventilation coming to the stack. Notwithstanding, some electrical sort sensors are likewise promoted that utilization tipping basin or conductance sort tests to gauge precipitation. Remote and wired forms both utilization comparable components to incidentally suspend watering by the watering system controller — particularly they are joined with the watering system controller's sensor terminals, or are introduced in arrangement with the solenoid valve normal circuit such that they keep the opening of any valves when downpour has been detected. Some watering system downpour sensors additionally contain a stop sensor to keep the framework from working in solidifying temperatures, especially where watering system frameworks are still utilized over the win

2.1.2 Type of rain sensor: (automobile industry)

In 1958, the Cadillac Motor Car Division of General Motors experimented with a water-sensitive switch that triggered various electric motors to close the convertible top and raise the open windows of a specially-built Eldorado Biarritz model, in case of rain. The first such device appears to have been used for that same purpose in a concept vehicle designated Le Sabre and built around 1950–51. For Model Year 1996, Cadillac once again equipped cars with an automatic rain sensor; this time to automatically trigger the windshield wipers and adjust their speed to conditions as necessary.

The most common modern rain sensors are based on the principle of total internal reflection: an infrared light is beamed at a 45-degree angle into the windshield from the interior — if the glass is wet, less light makes it back to the sensor, and the wipers turn on. Most vehicles with this feature have an "AUTO" position on the stalk.

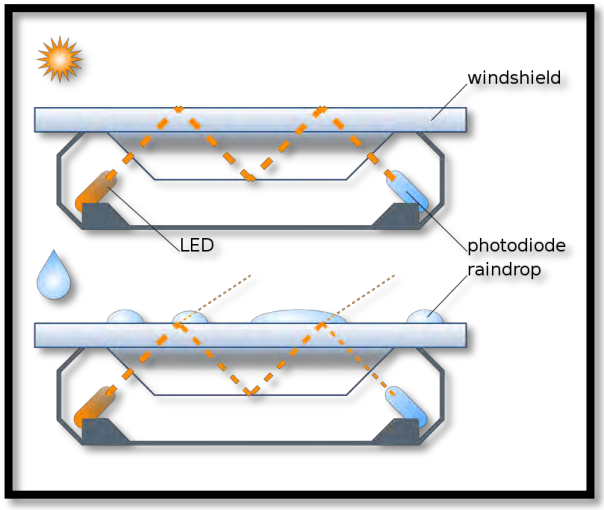

Figure 2.1: Windshield with rain sensor

2.2 The smart home system

A smart home, or keen house, is a home that fuses propelled computerization frameworks to give the occupants complex observing and control over the building's capacities. For instance a brilliant home may control lighting, temperature, multi-media, security, window and entryway operations, and numerous different capacities. In 2003 the UK Department of Trade and Industry (DTI) concocted the accompanying definition for a brilliant home:

"An abode joining an interchanges arrange that unites the key electrical apparatuses and benefits, and permits them to be remotely controlled, checked or got to."

Shrewd homes utilization 'home mechanization' advancements to give mortgage holders" "smart" input and data by observing numerous parts of a home. Case in point, a keen home's cooler may have the capacity to inventory its substance, propose menus, suggest sound options, and request substitutions as sustenance is spent. A shrewd home may even deal with sustaining the feline and watering the plants.

Numerous new homes are being assembled with the extra wiring and controls which are obliged to run propelled home computerization frameworks. Retro-fitting (adding savvy home innovations to a current property) a house to make it a shrewd home is clearly altogether more exorbitant than adding the obliged advancements to another home because of the difficulties of directing wires and putting sensors in suitable spots.

The scope of diverse shrewd home advancements accessible is extending quickly alongside improvements in PC controls and sensors. This has definitely prompted similarity issues and there is consequently a drive to institutionalize home mechanization advances and conventions. In Europe, Installation Bus, or Instabus is turning into a perceived savvy home innovation convention for advanced correspondence between keen gadgets. It comprises of a two-wire transport line that is introduced alongside ordinary electrical wiring. Instabus lines joins apparatuses to a decentralized correspondence framework and capacities like a phone line over which machines can be controlled. The European Installation Bus Association is a piece of Konnex, an affiliation that plans to institutionalize home and building systems in Europe.

Despite the innovation, shrewd homes display some exceptionally energizing chances to change the way we live and work, and to diminish vitality utilization in the meantime. Envision having the capacity to check messages, open windows, work lights and window ornaments and screen the amount of cash your home has made you from your renewable vitality framework, through your advanced mobile phone, from anyplace on the planet! Home robotization innovation has grown so far that as far as possible is your creative energy.

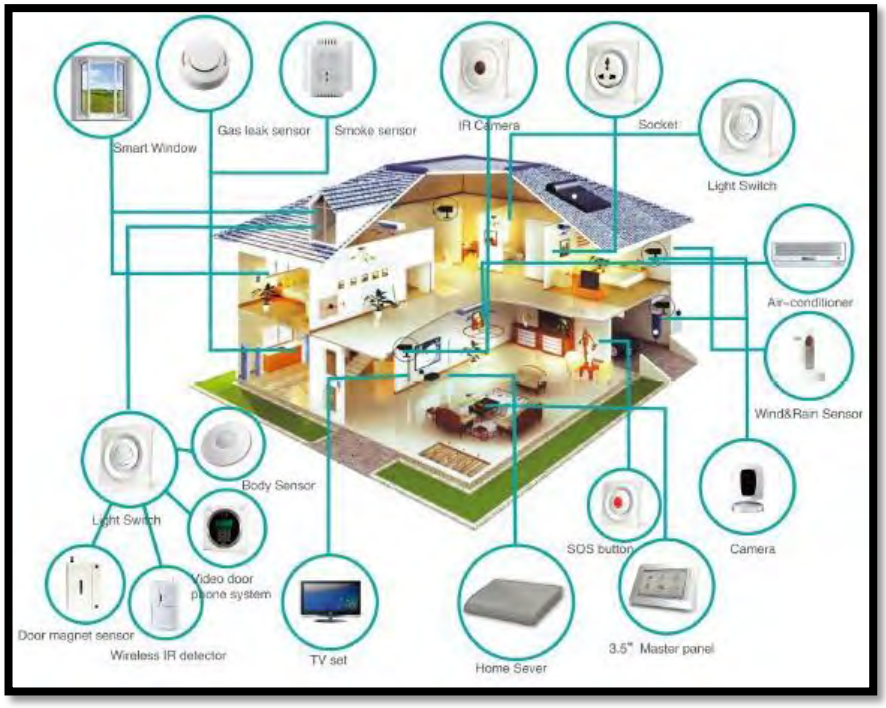

Figure 2.2: Smart Home System

2.3 The smart home technology

Swapping out old home machines and supplanting them with new "savvy" innovations and frameworks can be a decent move by opening up the way to sparing a significant measure of cash on utilities. Every family unit will be distinctive and will oblige a remarkable investigate the needs and employments of these potential advances. Not every arrangement recorded here will advantage each family similarly. For instance, little homes which don't utilize all that much power may not profit by introducing sun oriented boards like a huge home. The future searches brilliant for vitality protection and keen contraptions are entering the business sector for customers at a regularly expanding rate.

2.3.1 Example of smart home technology: Renewables

Solar energy. Sun oriented boards change over the vitality from the sun into power which is utilized as a part of the home. Homes situated in geological ranges with