



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

KIDS SCREEN TIMER WITH ARDUINO

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

by

MOHAMMAD NAZRYEN BIN YACOB

B071310343

910822125623

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I hereby, declared this report entitled “Kids Screen Timer with Arduino” is the results of my own research except as cited in references.

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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 Electronics Engineering Technology (Telecommunications) with Honours. The member of the supervisory is as follow:

.....
(Madam Wan Haszerila Binti Wan Hassan)

ABSTRAK

Kids Screen Timer with Arduino berbeza dari bentuk yang sedia ada televisyen pemasa dengan kaedah yang mempunyai fungsi khas untuk mengawal menghabiskan masa di televisyen. Sistem ini membantu ibu bapa untuk memantau aktiviti anak-anak mereka dengan mengawal masa yang digunakan oleh kanak-kanak di televisyen. Tujuan projek ini adalah untuk memberikan sentuhan baru pemasa televisyen dengan menggunakan teknologi RFID. Dalam projek ini, peranti pintar berasaskan RFID yang memaparkan kuota menghabiskan masa untuk pengguna tertentu pada skrin televisyen dibangunkan. Peranti ini saling berkait bagi televisyen melalui suis HDMI. Apabila kanak-kanak mengimbas tag RFID khusus diperuntukkan kepada pengguna pada pembaca RFID, pengguna akan dibenarkan untuk menghidupkan televisyen semasa slot masa. Pada akhir projek ini, ianya boleh dikatakan bahawa, projek ini boleh berfungsi dengan baik tetapi masih memerlukan penambahbaikan untuk meningkatkan prestasi. Sistem ini diharapkan dapat menyelesaikan kanak-kanak membuang masa mereka di televisyen. tetapi boleh menghentikan perbalahan di antara keluarga untuk menonton televisyen. Semoga, produk ini juga boleh menjadi asas atau teras kepada kerja projek lain pada masa akan datang.

ABSTRACT

Kids screen timer with Arduino differs from existing television timer such a way that it has a special function to control the time spending on television. This system helps parents to monitor their children's activities by controlling the time spent by the children on television. The aim of this project is to give a new touch of television timer by using RFID technology. In this project, an RFID-based intelligent device that displays the spending time quota for a specific user on television screen is developed. The device is interfaced to the television through an HDMI switch. When a child scans a specific RFID tag allocated to him/her on the RFID reader, he/she will be allowed to turn on the television during a time slot. At the end of the project, we can say that the project can work properly but still need some improvement to enhance the performance. This system is hoped to solve the children wasting their time on the television but may stop the argument between the family to watching a television. Hopefully, this product also can be base or core to the other project in the future.

DEDICATION

Dedicated to my parents, Yacob Bin Aripin and Tiah Binti Alamin

My Supervisor, Madam Wan Haszerila Binti Wan Hassan and Collaborators

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CHAPTER 1

INTRODUCTION

1.0 Introduction

This chapter gives an introduction of the project embracing of the background, objectives, scope of the project and the report structure. The purpose of this project is to provide a method for parents to control the amount of time their children spend on the television. In this project, an RFID-based intelligent device that displays the spending time quota for a specific user on television screen is developed. The device is interfaced to the television through an HDMI switch. When a child scans a specific RFID tag allocated to him/her on the RFID reader, he/she will be allowed to turn on the television during a time slot. Since each of the RFID tags has its own quota, if the quota is already ticked down, the child cannot watch television anymore. However, the allocated time can be reloaded by the parents. With this device, it is hope that our children have a quality time to do anything else such study, spend time family rather than our children spend their whole day watching on television.

1.1 Problem Statement

Nowadays, there are many technology has been developed and many type of entertainment for children also be built. One of them is television. By introducing of console garming like X-Box and PlayStation, it will make the television become more attractive to the kids nowadays. Other than smart phones, television is one of the must have technology at our house. As we can see, many children watching television whole

day. Nevertheless, there also parents with their own children scramble to watch television. Therefore, we intend to provide an equipment that can control and monitor the time spent on television so that more quality time can be spent for other beneficial activities too.

1.2 Objectives

The main objective of this research is deeply concentrated on aspect as listed below:

- i. To design an equipment that can connect between HDMI TV port and Arduino.
- ii. To analyze the coding RFID.
- iii. To study timer function and Arduino function.

1.3 Project Scope

This project focuses primarily on the television as well the Arduino and RFID card as the additional features that can be use as the timer to television. RFID card hold by children and whenever the children want watch television, they have to scan the RFID card to turn on the television. Other aspects such as the interface of show the timer and HDMI ports will include in this project. One of component the for this project is RTC (Real Time Clock) which it will show time same as the user want set it.

1.4 Project Significance

This device gives a parent a really robust means of controlling the amount of screen-time (TV, DVD or console) their kids have each day. It works by having an intelligent time-switch which controls the HDMI signal passing between a device and the TV display. This project works really well, because it completely ends any argument about when the TV is turned off. It's not possible to negotiate, plead or argue with a machine.

1.5 Report Organization

This report consists of five chapters. The first chapter describes the project background, problem statement, objectives and the scope and limitation of this project.

Chapter 2 discusses the literature review of the project and related works. In addition, various methods and approaches that related to the project are discussed and reviewed.

Chapter 3 exploring the research methodology used in the project development including data gathering and analysis, flow charts and other related diagram.

Chapter 4 analyses the result and draws some discussion related to the projects outcomes. Finally, fifth chapter concludes the overall project implementation and outcome. In addition, we also include some future recommendation.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

This chapter will present the literature review on the Television Screen Timer with Arduino. The idea is to prevent kids nowadays spent their time too much in front of the television.

2.1 Related Projects

So this project will work as daily television timer and each child will get own quota to watching the television. Other than that, the advantages and disadvantages of this project also will be shown.

2.1.1 TV Go Sleep Universal TV Timer

This project has been developed for the people that always go for travelling and staying in any hotel or motel. Some of traveler cannot afford expensive room. So some television in some hotel does not have sleep-timer function. By using the product, a timer that turns off any television after whatever delay time the user want to command. Figure 2.1 show the device which been used in the hotel. The timer is built around an Arduino microcontroller that's been loaded with an open source TV-B-Gone library and a few lines of my own code. A simple pushbutton is used to set the delay time, which is shown on a 7-segment display. When the timer expires, the Arduino uses infrared LEDs to transmit all the TV "off" codes it knows, and the TV shuts down.

The TV-Go-Sleep Universal TV Timer is a new take on the classic TV-B-Gone kit. Frustrated about falling asleep with the television on, Tom Rodgers combined the TV-B-Gone library with some additional code to build what is essentially a countdown sleep-timer remote. Powered by an Arduino, TV Go Sleep Universal TV Timer will also instruct you on building a homemade perfboard shield. The Arduino's program will eventually cycle through every television's "off" code, transmitted through the IR LEDs at the front of the enclosure, turning off any television in range.



Figure 2.1: Device TV Go Sleep Universal

2.1.2 Remote Jamming Device

The project develops a remote jamming device which can jam the TV remote rays. It develops IR rays of 38 KHz usually emitted by a standard TV remote. The rays developed are powerful enough to overshadow the IR receiver in TV. This system is built by using a 555 Timer in the astable mode which is made to produce the higher power pulses in the range of 38 KHZ emitted by an IR diode. These rays while aimed at TV

receiver disables the IR sensor built in the TV. Thus, while any number is pressed on the TV remote, the IR rays sent will not have any effect on TV.

Further the project can be enhanced by using powerful IR diodes such that it can be operated from a long distance. But if this project is not enhanced by using powerful IR diodes, this project only can support the distance about 1 foot that equally to 0.3048 meter. For common knowledge, this device only can jam the functions of television IR receiving sensor.

2.1.3 System for Automatically Limiting TV Timer

Most of us spend far too much time in front of the television. The purpose this system designed is to make an automatically limit when and how much the television can be on. The system works by controlling the input signal going to the television. This is done by adding a relay switch to the input cable. When certain conditions are met, the relay is turned on and the television is able to receive the input signal. Using an Arduino microcontroller, users can program the system to only allow the television to be on for a certain amount of time each day or between certain hours. Figure 2.2 is the example of built in prototype between RCA cable, relay and Arduino Uno. Users also can setup a pin code so that only certain people can turn it on. The television will only be connected between certain hours (such as 9PM to 11PM). Another option is to set a certain number of hours each day that the television can be on. This limit the number of hours like the first option but is not restricted to a certain time of day.

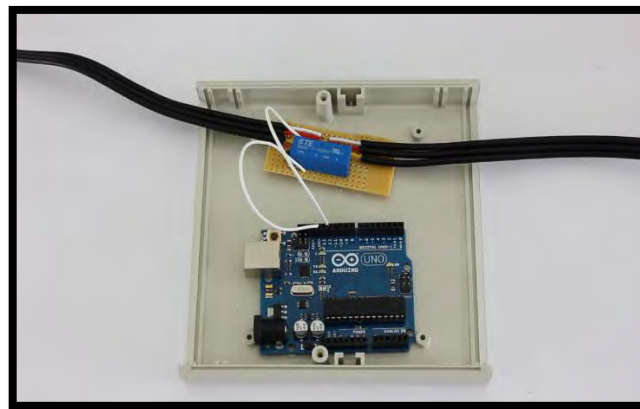


Figure 2.2: The Connection RCA Cable to Relay

2.1.4 The Television Timer BOB

Television Timer BOB helps parents manage and monitor the time their children spend using TV, video game consoles and computers. The power cord from one of these devices plugs into the back of BOB and is locked in place. Then, BOB plugs into an electrical outlet. After setup a process that takes about three minutes, the machine monitors the amount of time a child spends using that device

Parents can decide an acceptable amount of viewing time for each child per day or per week. Specific time periods can be blocked entirely for studying, chores, family time and/or sleeping. Each child in the house (up to 6 users plus 1 parent user) has a four-digit PIN that they enter before they can turn on the attached device. BOB tracks the time used. A "master pin" allows a parent to turn on the connected device at any time.

When a child's preset viewing time expires, BOB shuts off the attached TV, video-game system or computer monitor and won't allow it to be turned on by that user for the remainder of the day (or week).



Figure 2.3: The Television Timer BOB Device

2.2 Research Comparison Between Journals

The Table 2.1 show the all application, product and prototype related to the Kids Screen Timer with Arduino. Some the products already available on the market but did not last long because of technological change television.

Table 2.1: Comparisons between Four Application or Prototype

Application	Algorithm	Methodology
TV Go Sleep Universal TV Timer	Arduino, IR sensor, 7 segment.	Set timer using button and put towards television until the time is run out the Arduino send signal through IR sensor
Remote Jamming Device	IR Sensor. 555 Timer Astable.	This device will block any signal come from the remote television while this remote jamming device is on.
System For Automatically Limiting TV Timer	Arduino, Relay, RCA Cable	Arduino will connect with relay through donate board. This connection will connect with RCA cable. So when the time is run out, relay will turn off signal that come from RCA cable.
The Television Timer BOB	Plug 3 pin, Microcontroller Circuit	This device will connect the power supply (plug 3 pin) from television and lock the plug into the device. The user will set the time in this device and turn off when the run out.

2.3 Television Screen Timer with Arduino

The main idea behind this project is to help parents to control their own children spending time with television (DVD, Blue-Ray and console) by using RFID and Arduino. The user can set time quota for RFID card and give the RFID card to their children. When children want to use the television, they must scan the RFID card to the RFID reader to

turn on the television. When the timer is run out, the television will turn off. Thus, the application proposed in this project make the user or parents controlling their children spending to much in front the television.

2.3.1 Real Time Clock

Now-a-days people prefer digital clocks more than an analog clock because of their elegant outlook, inexpensiveness, small size and accuracy (RezaKhan et al. 2012). As a result, many smart digital clocks are manufactured by different popular companies. Because of its low price and tiny size, it is often incorporated into all kinds of devices such as cars, radios, televisions, microwave ovens, standard ovens, computers and cell phones to enhance the quality of that device. In this particular project, design of a smart multipurpose clock is provided. This clock is designed with two PIC microcontrollers and a Real Time Clock (RTC) IC. The display section is designed with Seven Segment display and LED. A temperature sensor is also integrated with the system to show the current temperature in Seven Segment.

2.3.2 RFID Reader

RFID is not a new technology and has passed through many decades of use in military, airline, library, security, healthcare, sports, animal farms and other areas (Ahsan et al. 2010). Industries use RFID for various applications such as personal/vehicle access control, departmental store security, equipment tracking, baggage, fast food establishments, logistics, etc. The enhancement in RFID technology has brought advantages that are related to resource optimization, increased efficiency within business processes, and enhanced customer care, overall improvements in business operations and healthcare. Our research is part of a big project; its aim is to produce a model for mobile technology implementation of hospital patients' movement process. However, the focus of this paper is to explore the main RFID components, i.e. the tag, antenna and reader.

The results of the investigations conducted on the three RFID components will be used to develop our research model.

2.3.3 LCD 8 Segments

A seven-segment display, or seven-segment indicator, is a form of electronic display device for displaying decimal alphabets-numerals that is an alternative to the more complex dot-matrix displays (Genevra et al. 2013). Normally seven segment display letter from a-g then numbers from 0-9 quite unlike nine-segment, fourteen-segment and sixteen-segment. Due to these limitations, most display projects go for dot matrix display even with the advantages of sharp display and availability of seven segments. The Journal about LCD 8 Segments presents various ways of combining two seven segment display to achieve other letters from h-z using piece-wise continuous algorithm via an assembly coded microcontroller (AT89C51). The Journal about LCD 8 Segments also presents an achieved physical project with seven- segment for faculty of science in the form “FACULTY OF SCIENCE”. In the journal also show the codes in assembly language via notepad, which must be saved as .asm file. The saved file was built with an assembler (MIDI - 51) which generated three files; hex file, obj file and list file. The hex file was used for the simulation of the design in Proteus 7.7 VSM professional and burning of the microcontroller for construction. The results were overwhelming as the piece-wise continuous algorithm was implemented, creating rooms for manipulation of 7-segments to form nine – segment, 14-segments and sixteen-segment displays.

2.3.4 Arduino Nano

Stethoscope is a special device to hear heartbeat sound and monitor pulmonary disease (Ed Baker 2014). The most type of stethoscope used these days is the acoustic stethoscope. However, the problem with this acoustic stethoscope is the sound level very low. It is hard to analyze the heart sound and difficult to be diagnosed by a medical doctor. Therefore, Data Logging Functions was developed to monitor and display heartbeat sound

using wireless digital stethoscope. The condenser microphone is used as a sensor to capture the low sensitivity of heart sound signal and transmit the signal using Antenna Arduino ZigBee Pro Series 1. Microcontroller Arduino Nano and Arduino Mega were used as a platform to process the signal and sent the result to the computer. Graphical User Interface (GUI) was developed using MATLAB software to monitor real time electrocardiogram (ECG) waveform and for data logging purpose. The result shows that this device able to transmit and receive ECG waveform wirelessly. The ECG signal can be recorded through data logging application for further analysis by the medical personnel.

2.3.5 HDMI Switch

High Definition Multimedia Interface or HDMI in short, was first launched in 2002 (Cheong 2011) by a combination of various major manufacturers including, Phillips, Sony and Toshiba amongst others. It was designed to be the definitive interface for uncompressed digital audio and video signals. HDMI has quickly become the most important home-theater connection, media players and game consoles. The problem starts when more devices are becoming HDMI capable, most people are still stuck with only two or three HDMI inputs on their High Definition TV or receiver. The way to get out of this dilemma, without a new high definition TV or receiver, is to use a HDMI switch which allows 4 to 5 inputs to existing home theatre system setup. This project will focus on the use of a microcontroller to manipulate a HDMI switch. The microcontroller aims to sit in between the various HDMI inputs (Transmitter Tx) of various media players, game consoles, etc and manipulate the output (Receiver Rx) accordingly via the I2C bus. The microcontroller interfaces with the user via a keypad, responding to user input to select the correct channel from the input to display on the output. User selection will also be displayed on a console showing the current selection. Such a system offers cost effective solution to users.