JSS MAHAVIDYAPEETA

JSS SCIENCE AND TECHNOLOGY UNIVERSITY

SRI JAYACHAMARAJENDRA COLLEGE OF ENGINEERING

MYSORE-570006

Subject name: Communication Lab(EC-46L)

Report on mini project

HOME AUTOMATION USING WIFI (Hardware)

Submitted by

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MYSORE-570006
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Subject name: Sensors and Actuators (EC320)

Report on Event – 2 & Event 4

urse outcome covered in this event:

CO3: Develop and exhibit basic programming skills in Virtual Instrumentation.

CO4: Implement a system using sensor and instrumentation configuration

CO5: Work in a team, complete the assignment and present the results in written and oral forms

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Submission Date	

Evaluation Component	**Max. Marks**	**Marks Scored**	
		Event 2	**Event 4**
Presentation skills	**7**		
Documentation	**8**		
Interaction/Viva	**5**		
Total	**20**		

Signature of the student **Signature of the faculty**

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MYSORE-570006

Subject name: Sensors and Actuators (EC320)

Report on Event – 2 & Event 4

urse outcome covered in this event:

CO3: Develop and exhibit basic programming skills in Virtual Instrumentation.

CO4: Implement a system using sensor and instrumentation configuration

CO5: Work in a team, complete the assignment and present the results in written and oral forms

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Submission Date	

Evaluation Component	**Max. Marks**	**Marks Scored**	
		Event 2	**Event 4**
Presentation skills	**7**		
Documentation	**8**		
Interaction/Viva	**5**		
Total	**20**		

Signature of the student **Signature of the faculty**

Abstract

This paper gives a brief idea about the automatic hand wash sanitizer. The motor pumps the sanitizer liquid or solution to the human while detecting the IR Sensor. The IR Sensor is the photodiode used for sensing the human hand detection and it is used to control the motor pump from the liquid. The motor is connected to an RC timer delay setup and the pipe connected to a reducer are used to control the flowing liquid of the sanitizer. It has three modes of Control LED's in the system, White LED is used for the user to understand that the setup is in working mode and battery is in use. Red LED is used for the user to understand that Battery is in charging mode. Green LED is used for the user to understand that battery is in full charged mode. It has an On/ Off switch to control the whole setup from the battery supply. The consumer is convenient to use the setup and the user also saves costs and power.

Chapter 1:

INTRODUCTION

Technology is improving at a faster pace and automation is starting to gain entry in every domain. One such entry is to the field of sanitizer dispensers where integrated sensors and actuators work correlatively to automate the system. They use infrared sensors and microcontrollers to dispense controlled amount of sanitizer or soap solution.

What is automation?

Automation is the technology by which a process or procedure is performed with minimal human assistance. Automation, or **automatic control**, is the use of various control systems for operating equipment such as machinery, processes in factories, boilers, and heat-treating ovens, switching on telephone networks, steering, and stabilization of ships, aircraft, and other applications and vehicles with minimal or reduced human intervention.

Automation covers applications ranging from a household thermostat controlling a boiler, to a large industrial control system with tens of thousands of input measurements and output control signals. In control complexity, it can range from simple on-off control to multi-variable high-level algorithms.

Automation has been achieved by various mean including mechanical, hydraulic, pneumatic, electrical, electronic devices, and computers, usually in combination. Complicated systems, such as modern factories, airplanes, and ships typically use all these combined techniques. The benefit of automation includes labor savings, savings in electricity costs, savings in material costs, and improvements to quality, accuracy, and precision.

Fundamentally, there are two types of control loop; **open-loop control**, and **closed-loop feedback** control.

In open-loop control, the control action from the controller is independent of the "process output" (or "controlled process variable"). A good example of this is a central heating boiler controlled only by a timer, so that heat is applied for a constant time, regardless of the temperature of the building. (The control action is switching the boiler off and on. The process output is building temperature).

In closed-loop control, the control action from the controller is dependent on the process output. In the case of the boiler analogy, this would include a temperature sensor to monitor the building temperature, and thereby feed a signal back to the controller to ensure it maintains the building at the temperature set on the thermostat. A closed-loop controller, therefore, has a feedback loop that ensures the controller exerts a control action to give a process output equal to the "Reference input" or "set point". For this reason, closed-loop controllers are also called feedback controllers.

The definition of a closed-loop control system according to the British Standard Institution is 'a control system possessing monitoring feedback, the deviation signal

formed as a result of this feedback being used to control the action of a final control element in such a way as to tend to reduce the deviation to zero.

Likewise, a *Feedback Control System* is a system that tends to maintain a prescribed relationship of one system variable to another by comparing functions of these variables and using the difference as a means of control. The advanced type of automation that revolutionized manufacturing, aircraft, communications, and other industries, is feedback control, which is usually *continuous* and involves taking measurements using a sensor and making calculated adjustments to keep the measured variable within a set range. The theoretical basis of closed-loop automation is control theory.

Section 1.1: Motivation

The corona virus disease is a major problem in the future world. As there is a severe attack in this world, the people are suffering from the corona disease. The corona disease is not a simple virus attack, it makes severe to the human by infecting the respiratory system. The virus disease is heavily spreading in the world, as the nations are trying to monitor and maintain the spread of corona in the nation and other nations. The world is suffering a lot due to this corona virus. There is a strict evaluation everywhere to control the corona disease and spread to the nation. The hospital and the nurse people are suffering to cure the affected people and stop spreading the virus to the neighboring people. The mask and the sanitizer is provided everywhere to protect the people from spreading the virus and to kill the virus from the human hand. The virus is spreading from the human hand and mouth saliva. The mouth spread is controlled with the mask cloth and the human hand is controlled by the hand wash sanitizer. The hand touch while pressing the dispenser usage also spreads from human to human. There should be an automatic hand wash sanitizer dispenser, to control and maintain the spread from human to human. As there is an impact in using the hand wash sanitation by foot or by pressing the sanitizer bottle used to have a spread of the virus disease from one human to another.

The Easy Non-Contact Automatic Hand Sanitizer Dispenser or Automatic Soap Dispenser with Arduino is one of the solution for this problem. It has the Arduino microcontroller to control the sanitizer liquid with the help of a DC water pump. This is used to power up the system by the external power supply of 9V battery or through computer USB cable.

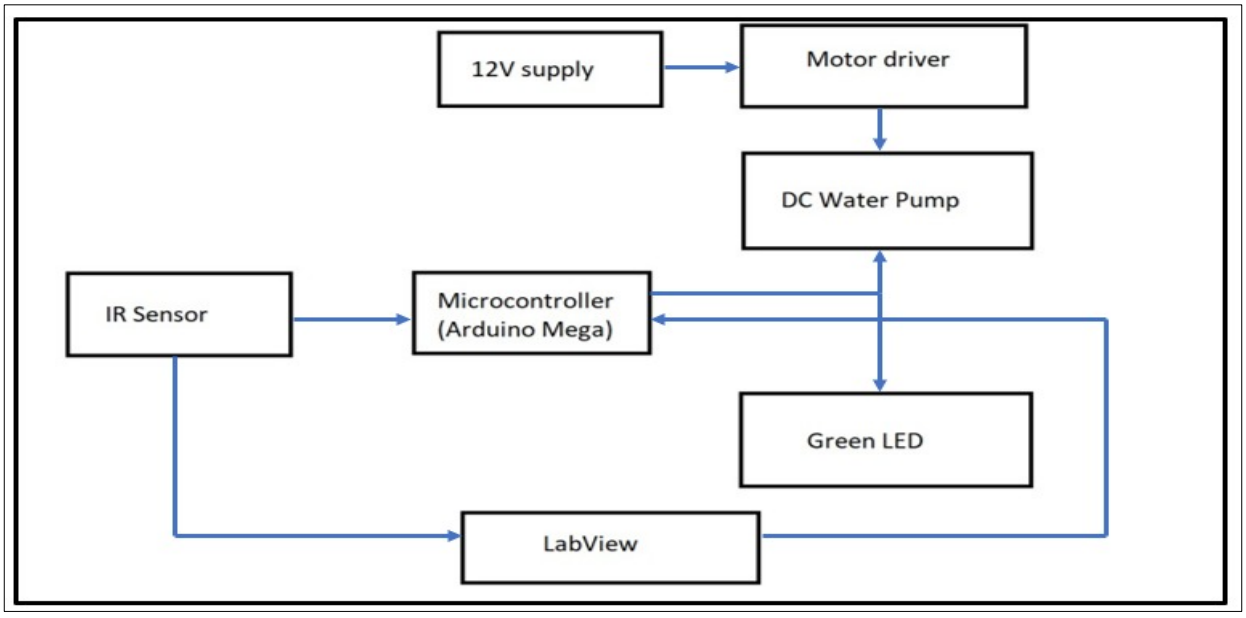
Section 1.2: Problem Statement

Over the last months the COVID-19 pandemic has been spreading chaos all around the world. There have been countless infections and unfortunately many casualties. One of the most important measures suggested by the World Health Organization is frequent hand washing with either soap or hand sanitizers. But one of the most significant problems is the way we do it and that is by physically touching the dispenser which

eliminates the whole purpose of the action and even creates a great risk of infection. So we decided to create something using an Arduino Mega board that could combat this problem, but we also wanted it to be cheap and to be able to be attached to many different dispensers easily, quickly and effectively! And this is exactly what we made, an accessory that can be attached to most hand sanitizer/soap dispensers and turn them Completely Hands-Free and Automatic!

Section 1.3: Block Diagram

A block diagram is a graphical representation of a system – it provides a functional view of a system. Block diagrams give us a better understanding of a system's functions and help create interconnections within it. Block diagrams derive their name from the rectangular elements found in this type of diagram. They are used to describe hardware and software systems as well as to represent processes. Block diagrams are described and defined according to their function and structure as well as their relationship with other blocks.



Chapter 2:

HARDWARE AND SOFTWARE REQUIREMENTS

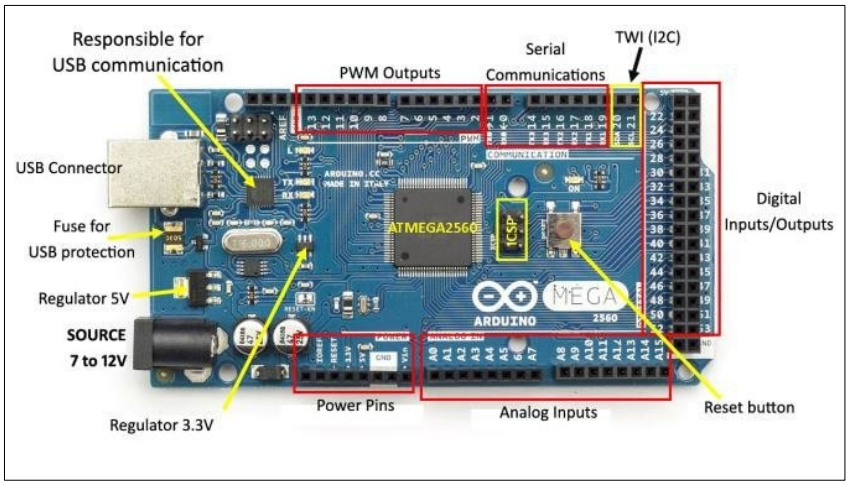
Section 2.1: Hardware components

1. Arduino Mega microcontroller
2. IR Sensor
3. DC Water pump
4. LED
5. 12volt lead acid-battery
6. L293D Motor driver

2.1.1 Arduino Mega:

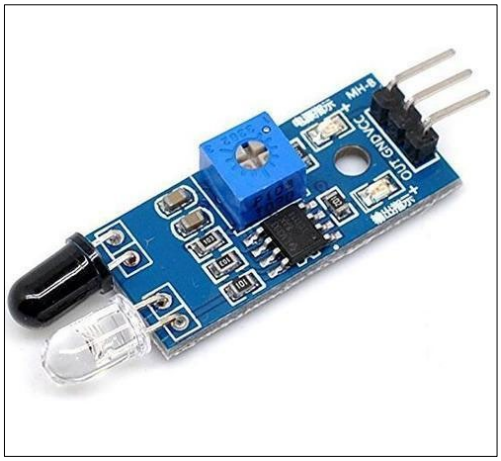
The **Arduino Mega 2560** is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller

Flash - 256k bytes (of which 8k is used for the bootloader)
SRAM - 8k bytes
EEPROM - 4k byte

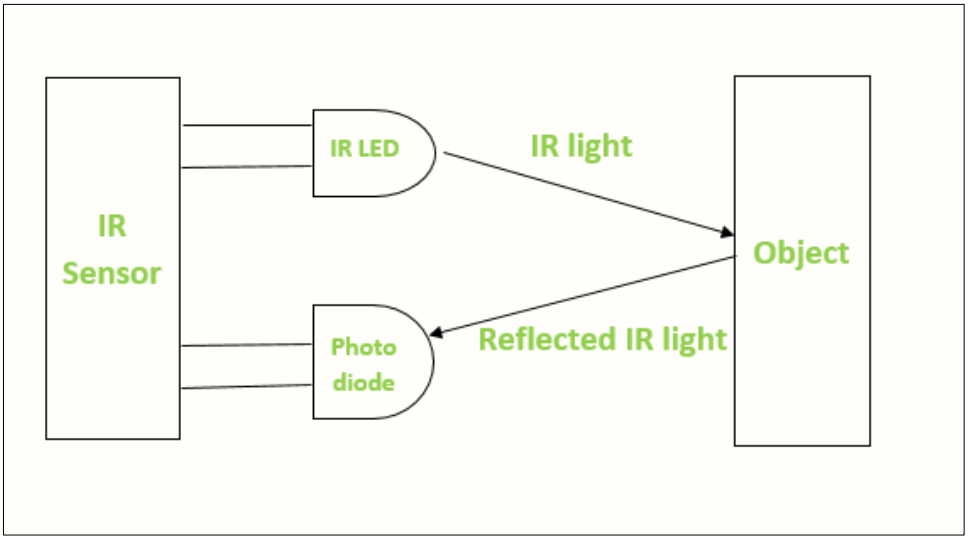


2.1.2 IR sensor:

IR sensor is an electronic device, that emits the light in order to sense some object of the surroundings. An **IR sensor** can measure the heat of an object as well as detects the motion. Usually, in the **infrared spectrum**, all the objects radiate some form of thermal radiation. These types of radiations are invisible to our eyes, but infrared sensor can detect these radiations.



The emitter is simply an IR LED **(Light Emitting Diode**) and the detector is simply an IR photodiode. Photodiode is sensitive to IR light of the same wavelength which is emitted by the IR LED. When IR light falls on the photodiode, the resistances and the output voltages will change in proportion to the magnitude of the IR light received.



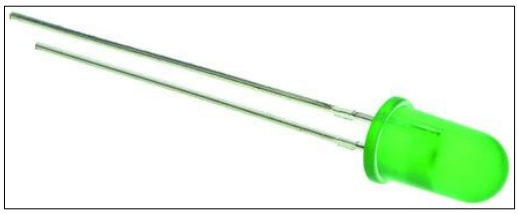
2.1.3 DC Water Pump:

The water pump can be defined as a pump which uses the principles like mechanical as well as hydraulic throughout a piping system and to make sufficient force for its future use. They have been approximately in one structure otherwise another because of early civilization. At present these pumps are utilized within a wide range of housing, farming, municipal, and manufacturing applications.

The working principle of a water pump mainly depends upon the positive displacement principle as well as kinetic energy to push the water. These pumps use DC power for energizing the motor. The water pump is a portable device and can be applied in several household applications. These pumps are used for pumping the huge amount of water from one place to another. The main purpose of a water pump is versatile. A quality pump which can be selected carefully may be perfect for draining water from a low flooded region, refilling the swimming pool, and bathtub, circulating pesticides otherwise fertilizers.

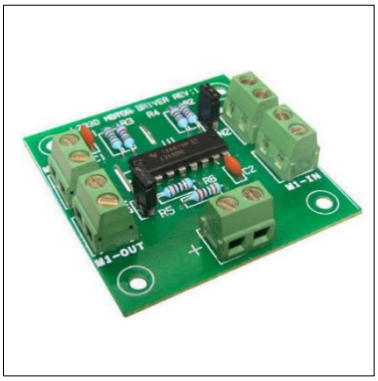
2.1.4 LED:

A light releasing diode is an electric component that emits light when the electric current flows through it. It is a light source based on semiconductors. When current passes through the LED, the electrons recombine with holes emitting light in the process. It is a specific type of diode having similar characteristics as the p-n junction diode. This means that an LED allows the flow of current in its forward direction while it blocks the flow in the reverse direction. Light-emitting diodes are built using a weak layer of heavily doped semiconductor material. Based on the semiconductor material used and the amount of doping, an LED will emit a colored light at a particular spectral wavelength when forward biased.



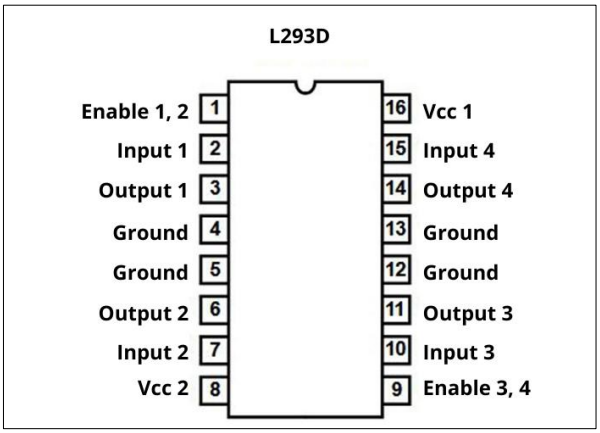
2.1.5 L293D Motor driver:

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D IC. In a single L293D chip there are two h-Bridge circuit inside the IC which can rotate two dc motor independently .H-bridge is a circuit which allows the voltage to be flown in either direction .H-bridge IC are ideal for driving a DC motor. Due its size it is very much used in robotic application for controlling DC motors.



There are 4 input pins for l293d, pin 2,7 on the left and pin 15 ,10 on the right as shown on the pin diagram. Left input pins will regulate the rotation of motor connected across left side and right input for motor on the right-hand side. The motors are rotated on the basis of the inputs provided across the input pins as LOGIC 0 or LOGIC 1. For rotating the motor in clockwise direction, the input pins have to be provided with Logic 1 and Logic 0. Enable pins 1 and 9 (corresponding to the two motors) must be high for motors to start operating. When an enable input is high, the associated driver gets enabled. As a result, the outputs become active and work in phase with their inputs. Similarly, when the enable input is low, that driver is disabled, and their outputs are off and in the high-impedance state.

L293D pinout:



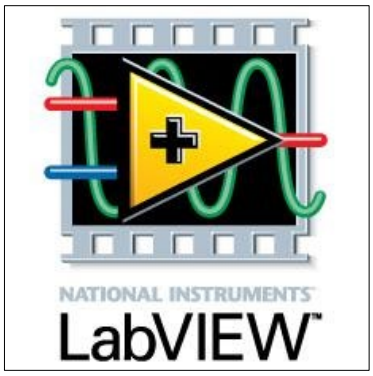
Pin Number	Pin Name	Description
1	Enable 1,2	This pin enables the input pin Input 1(2) and Input 2(7)
2	Input 1	Directly controls the Output 1 pin. Controlled by digital circuits
3	Output 1	Connected to one end of Motor 1
4	Ground	Ground pins are connected to ground of circuit (0V)
5	Ground	Ground pins are connected to ground of circuit (0V)
6	Output 2	Connected to another end of Motor 1
7	Input 2	Directly controls the Output 2 pin. Controlled by digital circuits
8	Vcc2 (Vs)	Connected to Voltage pin for running motors (4.5V to 36V)
9	Enable 3,4	This pin enables the input pin Input 3(10) and Input 4(15)
10	Input 3	Directly controls the Output 3 pin. Controlled by digital circuits
11	Output 3	Connected to one end of Motor 2
12	Ground	Ground pins are connected to ground of circuit (0V)
13	Ground	Ground pins are connected to ground of circuit (0V)
14	Output 4	Connected to another end of Motor 2

15	Input 4	Directly controls the Output 4 pin. Controlled by digital circuits
16	Vcc2 (Vss)	Connected to +5V to enable IC function

2.1.6 12volt lead acid-battery:

Section 2.2: Software requirements

2.2.1: LabView:



LabVIEW uses a graphic interface that enables different elements to be joined together to provide the required flow. LabVIEW was developed by National Instruments as a workbench for controlling test instrumentation. However, its applications have spread well beyond just test instrumentation to the whole field of system design and operation. LabVIEW was first launched 1986 as a tool for scientists and engineers to facilitate automated measurements - the aim was that it would be a tool that would be as productive for scientists and engineers as spreadsheets were for financial analysts. LabVIEW is essentially an environment that enables programming in G – this is a graphical programming language. LabVIEW is essentially the user interface for G. However as the software has developed, the term LabVIEW is now synonymous with the G language. LabVIEW also provides a host of other facilities including debugging, automated multithreading, application user interface, hardware management and interface for system design. In this way, LabVIEW acts as a portal for a variety of facilities, bring them together under a single element that is easy to manage.

Within LabVIEW there are several elements and concepts that are key to the format and operation of the environment. These include:

- ***LabVIEW environment:*** The LabVIEW environment consists of LabVIEW VI manager (project explorer), the programming tools, debugging features, templates and ready built sample examples, and an easy interface to the hardware drivers.
- ***LabVIEW VIs:*** The LabVIEW VI is a “Virtual Instrument” that enables a user interface to be built and it contains the programming code.

- ***LabVIEW G programming:*** This is the graphical programming language where the functional algorithms are built using “drag and drop” techniques. *Read more about*
- ***LabVIEW dataflow:*** This is the core concept that determines the running order for the program.

Chapter 3:

DESIGN & IMPLEMENTATION

Section 3.1: Design:

The following points explain the hardware designing of our project:

- We have used Arduino Mega 2560 microcontroller as the heart of our project. We have connected. Arduino is powered by 5volt supply by laptop through USB cable and it also communicates with LabVIEW via USB cable.

- As we know, IR sensor has 3 pins namely: VCC, gnd and out. The IR sensor requires 3.3 volt to operate and it is taken from 3.3volt output supply form Arduino. Ground(gnd) is connected to the ground pin or Arduino. The output pin(out) is connected to digital pin 10 of Arduino mega to read the signals of the sensor and hence to function accordingly.

- Motor driver is externally powered by a 12volt lead acid battery via mechanical switch to drive the motor as voltage supplied by the Arduino is not sufficient to drive the motor.

- The 2 terminals of the DC water pump is connected to the input sockets of the motor driver. The positive and negative pins from the motor driver is connected to the digital pins 7 and 8 of Arduino mega. These pins are used to drive the H-bridge in motor driver to control the direction of rotation of the motor.

- The enable pin of the motor driver is connected to the PWM pin 9 of Arduino so as to control the RPM of the motor.

- The positive terminal of the green LED is connected to pin 11 of Arduino mega to indicate that the sensor has sensed the object in front of it.

Section 3.2: Implementation:

The entire arrangement is set up such that whenever hand is placed in front of the dispenser, the IR sensor senses the hand in front of it and sends the signal to Arduino mega to drive the motor and LED for desired amount of time and once the hand is removed, no object is sensed by the IR sensor and no commands will be executed by Arduino.

The while loop within the LabVIEW keeps running for infinite number of times until the user manually decides to stop it by pressing stop button in the front panel. During the execution of the loop once, if object is sensed by the IR sensor, LabVIEW front panel also indicates the same through a LED and a ‘Thank you’ message.

Chapter 4:

RESULTS & DISCUSSIONS

Chapter 5:

CONCLUSION

Implementing of Contactless Automatic Hand Wash Dispenser for Sanitation is efficient and the cost price is minimized. It works like the normal contactless automatic machine. The human gets the limited sanitizer liquid for sanitation in hand, to wash the hands and to protect themselves from the corona disease. This system can be utilized in malls, high populated areas. The economic cost of the project, it will be better quality when considering the life of the system and the project.