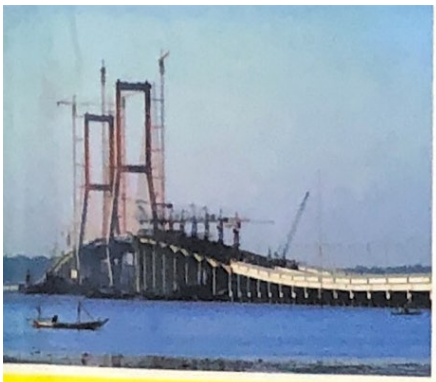

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Scheme and Realization Arrangement System of Lamp Traffic by Condition of Traffic Road

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Abstract
The traffic light management which doesn't work properly is one cause of traffic jam, so that need a better system to reduce the traffic jam. Adaptive traffic light management system is a system that can manage traffic light base on the situation of the traffic jam automatically. This system consists of infrared transmitter module, infrared detector module, microcontroller module, seven segment's module, LED module, and power supply. This system has seven segment's as display for counter time, this can be done on traffic light in every location to manage the traffic on intersection when the light turn into red, yellow or green. This system is equipped by webcam to know the situation and traffic density that can be accessed through the internet. The purpose of this management system is to solve traffic jam that have been caused by the flow of vehicle which is far overshot as compared to queue time. If the traffic jam happens to one part of the intersection, this system will adapt by turn on the green light longer base on the information that received from the sensors.
Keywords: adaptive, counter, jam, time, webcam.

1. Introduction

Since the development of the industry, people kept trying to make breakthroughs in various fields of technology to facilitate life. Among them is the creation of cars and other vehicles such as motor cycles, trains, and others. DKI Jakarta is a metropolitan city with a lot of problems concerning traffic density. Central Bureau of Statistics (BPS) survey results reveal that the number of motor vehicles (2006) has reached 7,773,957 units. Meanwhile, the broad street in Jakarta, according to BPS data, only reached 27,340,000 square meters [1]. Creation of more and more vehicles with a fixed road capacity will cause congestion. Traffic density that occurred in Jakarta would cause traffic congestion if the traffic arrangements were not going well and correctly. This is supported by a survey on street Hasyim Ashari Jakarta Pusat during dense traffic or frequency of vehicles many hours in the office at (at 08.00 am until 10:00 am) and back office (at 16.00 pm to 19.00 pm).

Because some of the above reasons the author tried to create a system of a model that can be set by adjusting the traffic lights on the traffic situation occurs if the traffic situation was solid or smooth. In the long queue of traffic or solid, a system designed to perform adaptive control of the duration of green light or red light, or in other words, this system can manage the traffic lights to adjust to the situation that occurred on the road automatically. System to be designed also to display the time counter for the length of time waiting in line for drivers of motor vehicles and light pedestrian crossings. This system is also equipped with a webcam

connected to the internet so that motorists who will use the intersection can find out the situation and the traffic over the Internet [2]. Settings simulated traffic lights at the traffic lights with a set of four deviate much time at red lights and green. Authors simulate the system on traffic flow on roads deviate four Hasyim Ashari. The purpose of this system design is as follows:

- Designing a regulatory system of traffic lights adaptive, in the sense of time traffic lights according to traffic conditions.
- Help reduce the length of traffic queues at a crossroads.
- Displays the time on the counter, that are useful for drivers to know the length of time the vehicle stopped or running and lights for pedestrian crossings to know when to cross.
- Knowing the situation and the traffic over the Internet.

The design of control systems model of traffic lights automatically have the following specifications:

- Using two-type microcontroller AT89S51 [3]
- Using the infrared sensor as a detector which has a maximum range limit of 8 cm.
- Using LED red, yellow and green as a model of traffic lights.
- Output power supply +5 Volt DC [4].
- Using the lamp seven segments with a two-digit number by 0.5 inch size

2. Block Diagram System

The design is done on the system settings of traffic lights is to use models based on four-way intersection Hasyim Ashari, which consists of the intersection of Harmony, Tanah Abang intersection, cross intersection Sangaji and Roxy. This modeling uses toy cars to simulate traffic. The design of this system begins by detecting the existence of a queue of vehicles on each street at each intersection. The author placed infrared sensors to detect passing vehicles on the road. Sensors are placed in simulated markings guide.

Infrared sensors are used as many as 4 pieces each of which roads are placed one sensor. Infrared sensor used to have that function as a transmitter and receiver, where the sensor works by emitting infrared light and when light is blocked by the vehicle underneath the light will be reflected and received back by the sensor. Calculation of infrared sensors used to detect the length of time based on the vehicle stopped and counted in seconds, where to find out how much time the sensors detect the vehicle as a writer using the microcontroller control center.

A microcontroller functions as a place of gathering information, processing data, and displays information crossing lights. Microcontroller B serves as a counter output to display the time and traffic lights. Timing information on each counter will vary based on where this data received by the sensor, by knowing the situation that occurred in each of the roads can be made adaptive process. Timing information in each counter is displayed by seven segments and lights to show the traffic lights using LED authors.

This designed system has a three-stage sequence of the road, where the green light that burns is also based on the stage. Three-stage sequence in the intersection of four roads Hasyim Ashari:

- Stage 1 is cross Roxy intersection to Harmony intersection and the Roxy intersection to Harmony intersection.
- Stage 2 is to the Tanah Abang intersection to Roxy intersection and Harmoni intersection.
- Stage 3 of intersection toward the Sangaji intersection to Roxy intersection, Tanah Abang intersection, and Harmoni intersection.

Display traffic lights which lit a lamp that uses LED indicator, where the design model of this instrument there are three color LEDs that represent the condition of each category [5]. Categories for the vehicle to stop using red LED, a category for vehicles get ready to walk using a yellow LED, and the category for vehicles running using a green LED. This designed system also features a webcam to check on traffic and density that can be accessed by via the Internet. The system is designed illustrations can be seen in Figure 2.1, Figure 2.2, Figure 2.3.

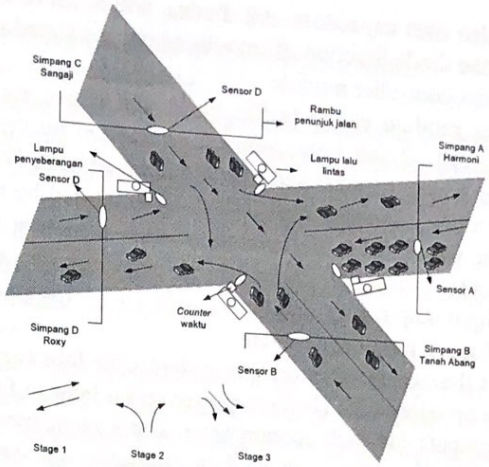

Figure 1 Illustration of the system is designed

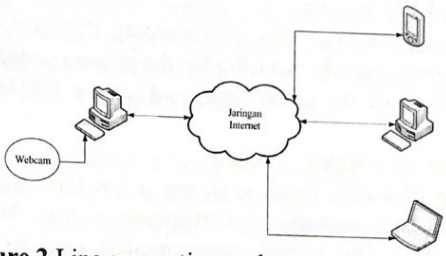

Figure 2 Line connection to the streaming video

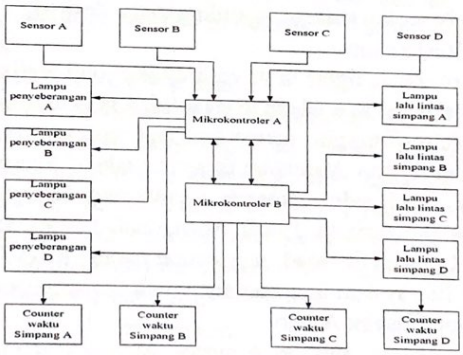

Figure 3 The block diagram design tools

3. Design Realization

Realization of the design tools on this system generally consists of several parts, namely:

- Realization of infrared transceiver module

Infrared transmitter module uses a 555 timer integrated circuit. 555 integrated circuit timer functions to generate a single frequency of 38 kHz. The amount of frequency is affected by two resistors (RA and RB) and a timing capacitor (C). The amount of RA that is used for 1kΩ, RB for 1 kΩ and the amount used for C 0.01 μF.

- Realization of the infrared detector module

Infrared detector module uses a component that can receive infrared transceiver modules, namely infrared detector. Infrared detector functions to capture the infrared signal emitted by infrared transmitter. This detector will work well if there is frequency 38kHz. Infrared

detector module also uses capacitors and diodes, which serve to keep the capacitor current and voltage while the diode function of smoothing out the signal to the microcontroller A.

- Realization microcontroller module

Microcontroller module at the traffic light model uses two AT89S51 microcontroller which consists of each 32 feet input output pins, named by the authors in this design as a microcontroller for the first micro and micro microcontroller B for both. A microcontroller takes the input from the infrared sensor data to be processed by the micro-A, after the data is processed it will be forwarded to the microcontroller B. Writter will use a microcontroller to set the sensor detects a long time based on input received by sensors, processing data and issued a crossing light output.

- Realization of seven modules segment

Realization of the design tools on this system uses four time counters each intersection consists of 1 piece counter time. The author uses seven lamps of 8 fruit segment consisting of 2 lamps seven segments for each counter time. The system used to light the seven segment scanning mode. Scanning mode is a data transmission system to multiple addresses simultaneously. Seven segment modules that use mode scanning system used to send data to the 8 fruit set seven segments with the data transmission time delay, it will have an effect as if the seven active segment at the same time.

- Realization of the LED module

Realization of design tools on this system board Printed Circuit Board (PCB) mounted three types of LED colors, namely red LED for the present conditions of red light, green LED for the present condition of the green light, and yellow LED for the present condition of yellow light.

- Realization of the power supply module

Model simulation of traffic lights is to use a voltage of 5 volts Direct Current (DC), whereas the problem, the voltage of Perusahaan Listrik Negara (PLN) for 220 Volt Alternating Current (AC). This power supply module aims to lower the voltage from 220 volts to 5 Volt and change the current from AC to DC. AC voltage source through the input of PLN changed into a DC voltage through rectifier AC voltage, then the filter into a DC voltage, and ultimately set the voltage according to the desired.

- Overall System Realization

System settings of traffic lights in its entirety is a joint realization of all the modules that are designed or not designed as a whole to establish a system to work according to the desired destination. Miniature traffic light intersection that represent intersection made four on the road Hasyim Ashari in Jakarta. Miniature cross is made of four wooden boards made of 70 x 70 cm square. Each - each side represents a crossroad. Intersection called Harmony ramp intersection A, cross the road to Tanah Abang-called cross B, cross the road called the intersection Sangaji C, cross the road intersection named Roxy D. Traffic lights sequence at every intersection in this system in accordance with the sequence that occurred in stage four on the road intersection Hasyim Ashari.

Sensors that are used as many as 4 pieces, each sensor mounted at each intersection. Microcontroller is used as much as two pieces, Microcontroller A for the collection of information, processing data, and displays information crossing lights. Microcontroller B serves as a counter output to display the time and traffic lights. Counter time used in this design as much as 8 pieces, with the details of each intersection consists of 2 pieces of time counter. LEDs are used in this design as many as 20 pieces, with the details for the 12 pieces LED traffic lights and also 8 pieces for the crossing lights. System traffic light settings is also equipped with a webcam. Webcam on this system serves to show the video, in which every person can know the situation and the traffic that occurs at the intersection.

4. Test Result

Tests performed on this design consists of several parts, namely:

- Infrared transmitter and detector module

This test aims to determine whether the data transmission can be done either based on the distance between the transmitter and the infrared detector. Testing in this module begins by providing a miniature vehicle barrier against infrared rays, which in this test carried out various experiments.

Experiments done by giving a certain distance between the miniature vehicle with the transmitter module and infrared detection. Testing of the distance between the transmitter and the infrared detector are arranged from a distance 3 cm to 10 cm.

- Module microcontroller

Microcontroller module testing is done by testing ports available on the microcontroller. This test aims to determine whether this module works very well. Testing is done in two ways, ie without using the program and by using simple programs that are downloaded into the microcontroller.The first test is, without using the program, this test aims to determine if each leg of the microcontroller is working
properly or not.

- Seven segment Module

These tests use a digital multimeter, starting with a digital multimeter set to 200 Ohm or to image the diode. Positive leg on a digital multimeter (red cable) is connected to a common anode of the seven segments, whereas the negative leg of a digital multimeter (black cable) connected to the foot of a, b, c, d, e, f, and g in turn.

- LED Module

These tests use a digital multimeter, starting with a digital multimeter set to the 200 Ohm or to image the diode. Positive leg on a digital multimeter (red cable) is connected to the common anode of the LED, while the negative leg of a digital multimeter (black cable) is connected to the common cathode of the LED.

- Power supply module

Testing the power supply module are two ways with no load and load the entire series. Tests on the power supply circuit is intended to determine whether this circuit can produce a stable output voltage or not.

- Test Results and Analysis Software Webcam

Software testing is done on a webcam aimed to determine whether the webcam running as expected and can be used to access streaming video via the Internet. Testing is done by checking the IP address that is used to take streaming video. After the IP address is known, it must be done examination write back with the IP address of your web browser's address with port 86. In the web browser's address there are two download options that can be accessed by Internet users is the option to download the video or JPG. Streaming video can be accessed via the Internet, it can be concluded that the test went well.

- Test Results and Analysis of Overall System

Overall system test objectives were to determine whether the system is designed to run as expected. Testing is done by combining all the modules have been designed. Testing is done through 2 stages. The first test carried out by observing the order of the stage lights, green lights on this system.

The default condition of the green lights on this system was started from stage 1 and stage 2 and the last stage 3, where the system is the sequence of green lights is repeated continuously. Stage sequence
of test results of green lights can be seen in Table 1

Table 1 The results of the test sequence of green lights stage

Ordering stage	Green Light flame	Condition
1	Harmoni dan Roxy intersection	√
2	Tanah Abang intersection	√
3	Sangaji intersection	√

√ = walk according to the default condition

The second test is done by testing every intersection whether the infrared sensor can display the time counter display is in conformity with the default condition of the range when the sensor detects the presence of miniature vehicles. Starting with a set of miniature infrared sensor under the vehicle, if the indicator light sensor is said to the infrared sensors detect vehicles. After a vehicle is detected then the test is continued by testing how long the sensor detects whether the vehicle is in accordance with the duration of green lights that have been programmed. Systems work well if the range when the sensor detects the vehicle is in accordance with the duration of green lights are displayed on seven segment light. The default condition of the range when the sensor and display the time counter can be seen in Table 4.2. The results of the test range when the sensor detects the vehicle and display the time counter displayed on seven segment light can be seen in Table 4.3.

Table 2 The default condition when the sensor range and the time counter display

Condition	Time range sensor (secon)	Green light duration (secon)
Vehicles detected	t <= 6	10
Vehicles detected	6 < t <= 14	15
Vehicles detected	14 < t <= 25	25
Vehicles detected	t > 25	30

t=time

Table 3 The results of the test range sensors and display time counter time

Experiments to	Condition	Time range sensor (secon)	Green light duration (secon)
1	Vehicles detected	4	10
2	Vehicles detected	7	15
3	Vehicles detected	16	25
4	Vehicles detected	19	25
5	Vehicles detected	27	30

5. Conclusion

The author obtained the conclusion of the design and realization of system traffic light settings are adaptive to the road traffic conditions are:

- This system has a feature that allows Internet users to access traffic conditions that occur in cross Hasyim Ashari. On this basis it can be concluded that the system is running in accordance with what is desired.
- Change the time range of green lights every crossroad done after one round of green stage lights, it can be concluded that the system is running in accordance with what is desired.
- The weakness of this system is the system cannot distinguish a vehicle that had stalled in the queue of vehicles waiting at a red light.

Advice can be given from the author for the development of this system design are:

- Traffic light system can be developed into integrated systems to the Internet network so that controls can be done through a remote PC by the designer.
- This traffic light system can be developed into a system for calculating the number of vehicles passing on a street or intersection area. It aims to determine how much or banner advertising.

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