DETAMAL (ANTI-THEFT DETECTOR) : THEFT CASE PREVENTION DETECTOR APPLICATION OF MICROCONTROLLER ARDUINO UNO BASED AS HOME SECURITY SYSTEM

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ABSTRACT

The increasing criminal case nowadays makes people worried about losing their properties. In addition, they do not hesitate to act anarchist and often hurt the victim. These criminals frequently come to the victim's house to perform the act of theft. However, theft is often successfully thwarted only by a shout or alarm sound that makes the thief to be panic and afraid then run while cancelling his intention to proceed with his action. Therefore the authors wanted to create an automatic detection system by relying on Arduino UNO, PIR sensor as motion detector and equipped with a camera that will capture images right after the sensor sounds and the sound is expected to thwart the robbery action. The advantages of this application is the camera will rotate automatically where the sensors that detect the presence of the thief detected. And the resulting sound is also derived from the micro SD memory card with MP3 format so that the users can use the sound of shouting, guard dog, or siren that will make the thief panic and run.

Keywords : Arduino Uno, Detector, PIR sensor, Theft

INTRODUCTION

Criminal cases and theft nowadays frequently happen verywhere, either at home, office, school, and even worship places. Although the entry into the house, offices, schools, and worship places have been locked but the thief still has a way to break into those places, whether through the doors, windows, or even the tile or roof.

Some of the prevention methods of theft commonly done by the community are by taking care their house with security guard, guard dogs, and CCTV cameras. However, some of these security have their own advantages and disadvantages. For instance, the security guard has the advantage of patrolling and controlling to take care of a place but today it is possible if the guard is bribed or even do a conspiration to commit robbery. The advantage of having guard dog is a dog is loyal to his master but the disadvantage is not all humans like dogs. Especially in Islam, it is forbidden for muslims to keep dogs. CCTV camera has advantage that can be placed in a strategic place to supervise a suspicious person , but

usually CCTV is not monitored continuously so the theft action is still happening and recorded by CCTV and the theft case can not be stopped.

From the summary above, the authors choose an alternative that can monitor the theft case but it is also expected to thwart the thief to perform the act of theft. The system that will be designed is a combination of alarms whose sounds can be replaced by shouting, guard dog sounds, or siren alarms, CCTV cameras, as well as motion sensors that will activate sounds when a movement of thief is detected when he enters a place that we feel it cannot be entered by everyone.

MATERIAL
Tools and Research Materials

Needs of tools and materials in this study include hardware and software. The hardware used are:
1. Arduino Uno (Starter Kit)
2. standard servomotor
3. PIR Sensor
4. Adaptor Switching 9V 2A adaptor 9 Volt DC arduino
5. Mini Camera
6. A set of CPU (Specs: OS win 8, 4GB DDR3 RAM, 500 Gb Hdd, Core i3, 2Gb VGA)

DESIGN
System Design Draft

From the tools, it is made a thief presence detector tool and it is expected that this system will be able to thwart the act of theft. The working system of this application relies on a PIR sensor to capture the thief presence, then the alarm will sound that will make the thief and the camera will automatically detect the location of the thief. For a clear description, take a look at figure 1 as follows.
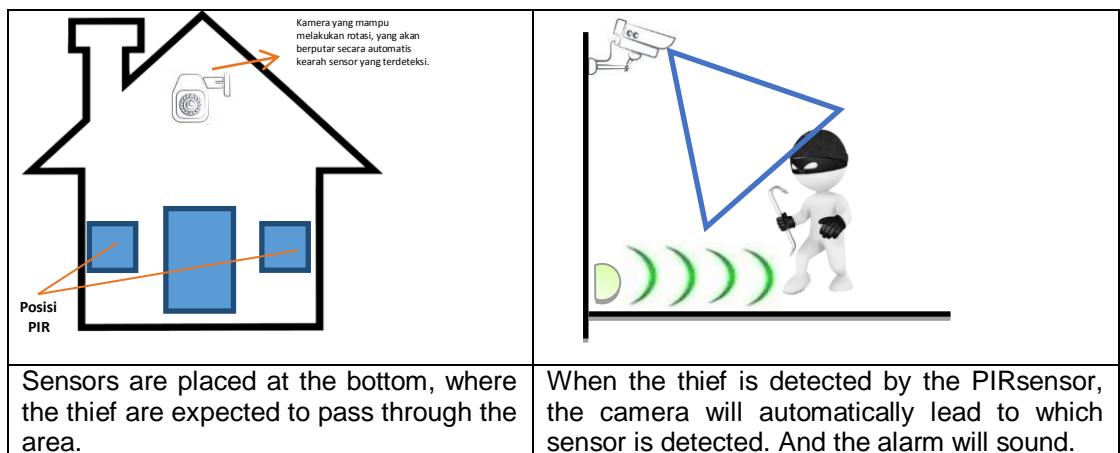

Sensors are placed at the bottom, where the thief are expected to pass through the area.	When the thief is detected by the PIRsensor, the camera will automatically lead to which sensor is detected. And the alarm will sound.

Figure 1. Design Schema of Detamal

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In general, the system detector is strategically placed where it is assumed that the thief will pass through the location, so that if the thief is detected, the alarm will sound and the camera will spin through the location where the sensor detects the thief. The mini camera will be installed on the motor servo so that it can be transmitted from the sensor. By combining 3 (three) important components ; Arduino uno, PIR sensor, and motor servo, so the combination design as in the following section 3.2.
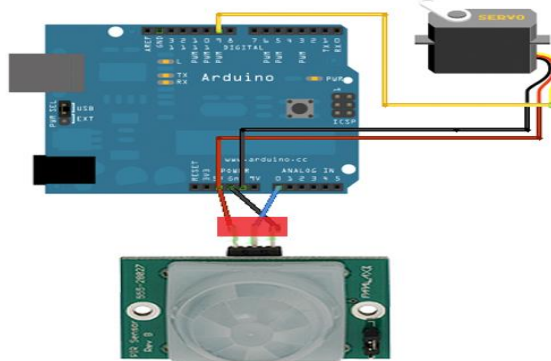
Figure 2. Component schema of Detamal

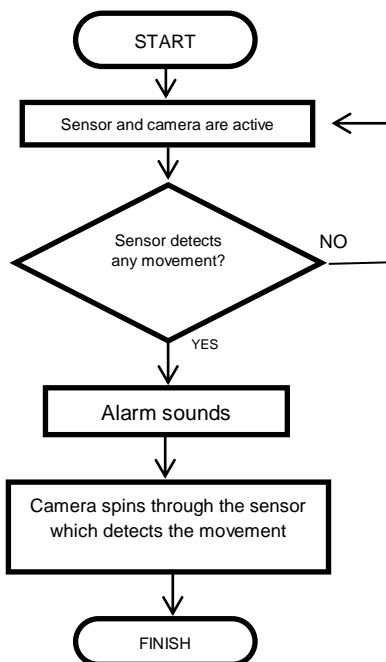The working plot of DETAMAL system is in the following :

Figure 3. Flowchart of Detamal System

RESULTS AND DISCUSSION
System Implementation

Implementation of this system aims to ensure the components of anti-theft detector system (Detamal) has functioned as expected. Testing needs to be done to look for errors that may still occur and a test of the system as a whole. The prototype trial uses Arduino Mega, and also Pir Sensor and other supporting devices.

The design uses arduino mega as its microcontroller and some supporting devices such as design in the following picture:
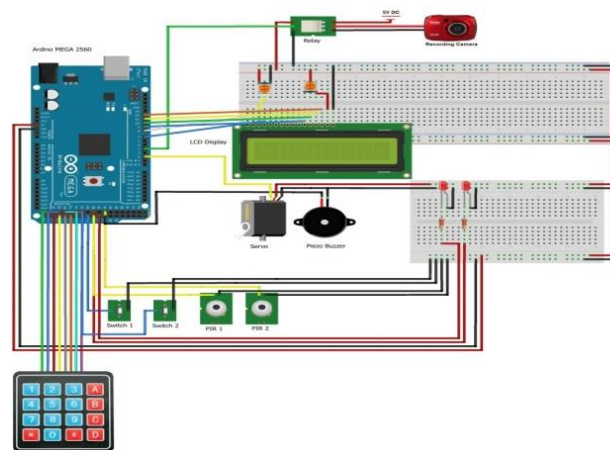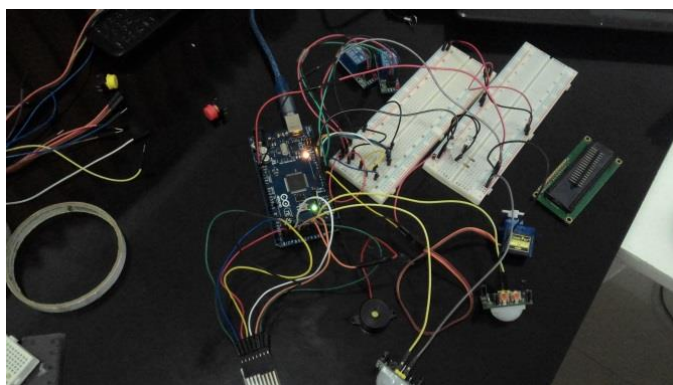

Figure 4. The design of system result

From the sketches above, it is observed that the system uses two pir sensors, this is shown so that the system can detect the location based on the pir sensor that sounds. The design process of the system is initialized by connneting arduino uno with pir sensor using a linking board such as in the following :

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In order for the system to be compatible with the servo motor so that the camera directs to the detected sensor location, it will require a program as follows:

```
//Servo
Servo myservo;          // create servo object to control a
servo
int pos = 90;           // variable to store the servo position
int passwd_pos = 15;    // the postition of the password input
```

In order for the alarm not to sound countinously, so when the sensor detects a movement, the keypad is required to mute the alarm. So it is used program as follows:

```
//Password
Password password = Password( "1234" );

const byte ROWS = 4; // Four rows
const byte COLS = 4; // Four columns

char keys[ROWS][COLS] = { // Define the Keymap
  {
    '1','2','3','A'        }
  ,
  {
    '4','5','6','B'        }
  ,
  {
    '7','8','9','C'        }
  ,
  {
    '*','0','#','D'        }
};

byte rowPins[ROWS] = {
  46, 47, 48, 49};      //connect to the row pinouts of the
keypad
byte colPins[COLS] = {
  50, 51, 52, 53};      //connect to the column pinouts of the
keypad

// Create the Keypad
Keypad keypad = Keypad( makeKeymap(keys), rowPins, colPins,
ROWS, COLS );

// initialize the library with the numbers of the interface
pins
LiquidCrystal lcd(7, 8, 9, 10, 11, 12); // Assignign arduino
pins to LCD display module
```
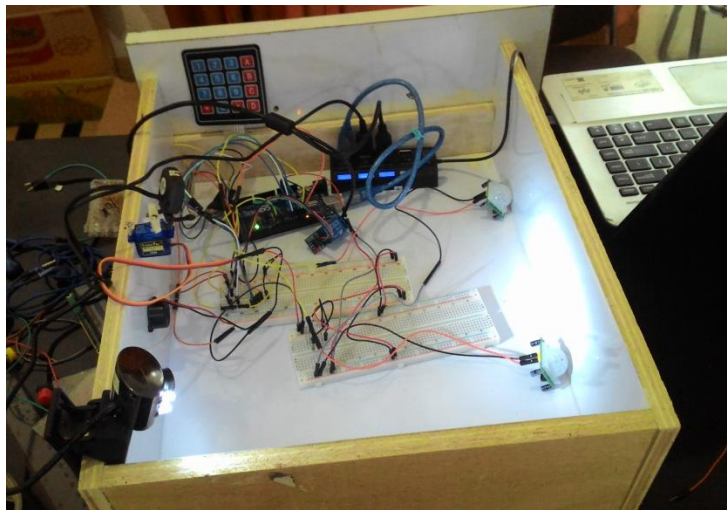
Figure 4.3 System design of anti-theft detector

Explanation of the figure :
1.   Recording camera, functioning for the user to record continously
2 and 3. PIR Sensors, functioning as sensor which detects movement
4. Motor servo camera, camera which is located above motor servo where the movement follows pir sensor
5. Keypad, functioning as a password that will be filled to stop the alarm
6. Buzzer, functioning as an alarm

After the design process has finished, so it is done a trial toward the camera used, the results can be seen in figure 4.4 and figure 4.5 follows :
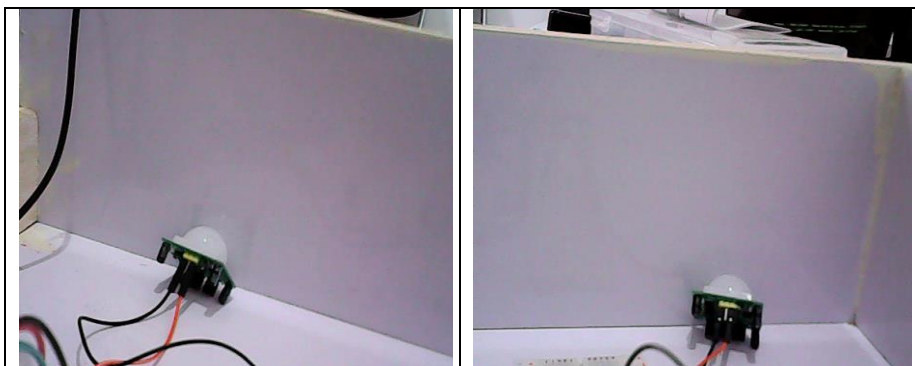

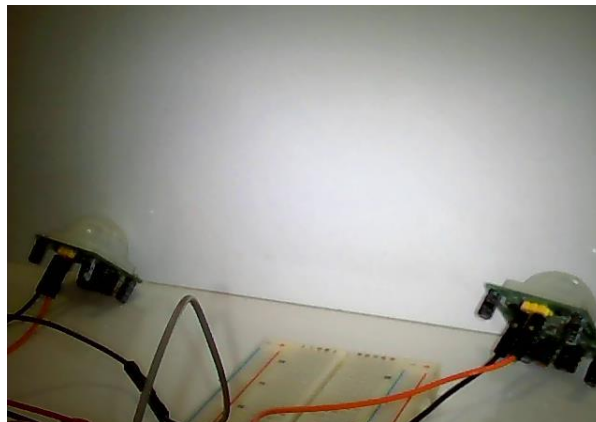**Figure 4.4** The result of motor servo camera

Figure 4.5 The result of recording camera

When the sensor testing process is located in no obstacle condition, see
Figure 4.6 below:

Figure 4.6 PIR position when sensor testing process

The experimental process is performed 10 (ten) times towards the sensor,
and the results are shown in Table 4.1 below:

Table 4.1 The result of Pir Sensor testing

PIR Sensor 1	TOTAL OF MOVEMENT TRIAL									
	1	2	3	4	5	6	7	8	9	10
	B	B	B	G	B	G	G	B	B	B
PIR Sensor 2	TOTAL OF MOVEMENT TRIAL									
	1	2	3	4	5	6	7	8	9	10
	B	G	G	B	B	G	B	B	B	B

From the table above, it can be seen that the failure rate is approximately
30%, this can occur if the Pir sensor is error after it is previously used.

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