Smart System Design For Toyota Kijang Super Electrical Cars Based on Microcontroller

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Abstract. Electrical system body has a role important in a vehicle that is as the main lighting when traveling at night as well as cues to signal to other drivers when turning and braking and honking horns as one element of safety in a vehicle as a whole. Lighting systems (lighting system) divided into 2 of the lighting system inside and outside lighting system. A microcontroller is a microprocessor that is devoted to instrumentation and control. Microprocessor is a digital electronic device that has inputs and outputs as well as control with a program that can be written and erased in a special way. Microcontroller is a chip in the form of IC (Integrated Circuit) that can receive input signals, process them and provide an output signal in accordance with a program that is loaded into it ". Microcontroller input signal coming from the sensor that is information from the environment while the output signal addressed to the actuator to give effect to the environment. arduino is an electronic kit or open source electronic circuit board in which there is a major component, ie a chip AVR microcontroller with the type of company Atmel.Tujuan of this design can be used as a medium of learning in SMK Negeri 1 KETAPANG LAMPUNG SOUTH particular subjects electrical system Toyota kijang car vehicle body super. The design was carried out from April to the month of July 2017 at the Workshop School SMK Negeri 1 KETAPANG, located in the village Berundung, Parit 8, District of Ketapang, SOUTH LAMPUNG district. Keywords: Electrical Bodi vehicles and Arduino AT-Mega328

1. Introduction  
The current technology encourages people to continue to think creatively, not just dig new discoveries, but also to maximize the performance of existing technologies to alleviate human labor in everyday life such as control of electrical lamps her special vehicle Toyota Kijang Super or other electronic devices based microcontroller. Supporting accomplished teaching and learning practices still need to be completed in particular “electrical system of the car” then one of the ways that can be taken is to create a medium of teaching practice in the form of a unit Trainer electrical system of body the car Toyota deer super-based microcontroller as a tool to demonstrate the working principles of electrical systems and as pretest before the vehicle is used as a step nawal standard operating procedures (SOP).

2. Literature  
2.1 The Definition of Microcontroller  
Microcontroller is a chip in the form of IC(Integrated Circuit) that can receive signal, input process it and provide an signal output in accordance with a program loaded into it ".signal Microcontroller input coming from the sensor that is information from the environment while the signal output addressed to the actuator to give effect to the environment.

2.2 A Brief History and Introduction AgainstDevelopment Microcontroller  
Syahwilsaid that the microcontroller first introduced by Texas Instrument with TMS 1000 series in 1974 which is a microcontroller 4 bit first. microcontroller Thisbegan to be made since 1971, which is a microcomputer in a chip fullwith RAM and ROM. Later in 1976, Intel issued a microcontroller which became popular in 8748 which is a name of microcontroller, 8-bit which is a microcontroller of MCS 48. At this time, the microcontroller which many in the market are microcontrollers 8-bitMCS51 family variant (CISC) issued by Atmel with AT89Sxx series and microcontroller AVRis a
microcontroller RISC with ATMEGA8535 series (although variants of the microcontroller AVR very much, with each having different features).

2.3 Overview of Arduino
Arduino is an electronic kit or electronic circuit boards open insource Inside are the main components, namely a chip microcontroller with the type of firm Atmel AVR. In general, Arduino is composed of two parts:

a. Hardware a board input / output (I/O) that is opensource.
b. Arduino software which is also opensource, includes Arduino software an IDE for writing programs and drivers for connection to the computer.

2.4 Power (Power)
Arduino UNO can be supplied via the USB connection or with a power supply externally. Power source is automatically selected. External supply (non-USB) can be obtained from an AC to DC adapter or battery. The adapter can be connected by plugging in a center-positive plug length of 2.1 mm to the power jack on the board. Wires lead from a battery can be inserted in the header head pin Ground (Gnd) and Vin pin of the connector POWER. Arduino UNO board can operate on an external supply of 6 to 20 Volts. If supplied with less than 7 V, presumably pin 5 volt supply may be smaller than 5 Volts and Arduino UNO board could become unstable. If using a large supply of more than 12 volts, the voltage regulator may overheat and harm the board. Arduino UNO The recommended range is 7 to 12 Volt

2.5 Programming
Arduino UNO can be programmed with the Arduino software (download). Select "Arduino Uno from the Tools > Board (including the microcontroller on board). ATmega328 on the Arduino Uno comes with a bootloader that allows us to upload new code to ATmega328 without using programmer. external hardware ATmega328 communicates using the original STK500 protocol (reference, C headerfiles).

```c
#define LED_PIN13

void setup () {
  pinMode (LED_PIN13, OUTPUT); // enable pin 13 for digital output
}

void loop () {
  digitalWrite (LED_PIN13, HIGH); // turn on the LED
  delay (1000); // wait one second (1000 milliseconds).
  digitalWrite (LED_PIN13, LOW); // turn off the LED
  delay (1000); // wait one second
}
```

Figure .2 An example of application programming arduino

2.6 LCD I2C shield
COMPATIBLE 20x4 Support Arduino Uno ATmega328P ATMEGA 16U2 BOARD

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Most common and often used in the project Arduino and types microcontroller otherfor simple in the coding and the price is cheap. 1602/2004 LCD Module 16pin interface has VDD VSS V0 RS R / WE D0 D1 D2 D3 D4 D5 D6 D7 BLA BLK. Here is the Wiring Standard 1602/2004 LCD Module without I2C Backpack using 6pin / 0 and Vcc Gnd (total 8pin).

Figure 3 circuit arduino with LCD I2C shield

Figure 4 Module LCD I2C shield

Digital pins on the Arduino us, to overcome problem this then we memputuhkan i2c LCD that works like Shift Register so that the interface pins can have fewer I2C LCD Backpack Module has 16pin Output can be connected to the LCD pin directly 1602/2004 (permanently soldered) and has a 4pin input (VCC, GND, SDA, SCL).

2.7 Relay
Relay is a switch used to connect or disconnect power flow is controlled by providing a certain voltage and current in the coil. Relay normally only has only one relay coil but may have some contacts. Normal position relay depends on the type of relay used.

Figure 5 Relay 12 volt DC 10 A
Relay consists of a coil and contact coil is a coil of wire that gets electric current,

2.8. circuit Lamp Electric Body Car
For other types of lights that are on the outside and inside a vehicle are as follows:
- Lights head
- Brake Lights
- turn signal lamp (turn signal light)
- lamp hazard (hazard warning light)

3. Research Methodology
3.1 Research Tools and Tools Materials
ingredients:
- Tang cut
- Solder
- tin Straws
- Screwdriver plus minus
- Multitester
- tespen lamp
- Laptop
- Stand electricity
- Electrical Cables body
- Controlling Electrical
- head lights, turn signal, lights, brake reverse, lights, fog horn, windscreen wipers.
- Atmega Arduino Uno USB328 and LCD shield 20 x 4
- Fuse (Fuses) Tube 30 A
- Relay Hella 12 volt feet 4 and Relay DC to DC 12 volt feet 5
- Board Board and jumper cables
- Power Bank 6600 mah

3.2. Diagram flow

4 Results and Discussion
4.1 Diagram design

Design diagram above electrical sensor will provide a signal output from the relay 4 feet 12 volt 30 amperes to relay 1012 volt foot 5 amperes and received by arduino in portis that already in the program and translated into I2C LCD Shield.
4.2 Figure Trainer Electrical

Figure 6. Circuit Overall Trainer Electrical

Pictured above is the entire circuit appears in front of all the series are the head lights (Head Lamp), turn signal lamps (Lamp Sein), brake lights (stop lamp), lamp retreat, Kalakson (Horn).

4.3 Wiring Diagrams Networks Head Lamp (Lamp Lamp Far and near)

Above the working principle of the circuit when is the switch controlling the lamp head (head lamp) electrical (switches) activated the electric current will flow towards the relay DC feet 4 12 30 volt amperes leg in code relay DC 86 and relay outputs code 87 to turn on the bulb (head lamp) and the electric current flows to the relay 5 feet 12 volt 10 ampere-coded leg 86 and relay outputs 87 code forwarded to arduino in port that already determined at the time of programming (port 3). Signal relay output DC 5 feet 12 volt 10 amperes is read by the arduino and translated into the display to writing the LCD I2C that the (head lamp) are alive (I) and ready to use. If the relay does not send the output signal to automatically arduino arduino will read (O), which means that the lamp head (head lamp) die translated into writing display to the LCD I2C.

4.4 Wiring Diagram Lights turn Signs (Sein)

Figure 8. Wiring Diagram Lights turn Signs (Sein)

The working principle of the circuit above is when the switch turn signal lamp controller (sein lamp) electrical (switches) activated the electric current will flow towards the relay DC feet 4 12 volt 30 amperes on foot code relay DC 86 and the output relay code 87 for the turn signal lights turn (turn signal lamp) and the electric current flows to the relay 5 feet 12 volt 10 ampere-coded leg 86 and a relay output code 87 is forwarded to arduino in port has been determined at the time of programming (port 3). Signal relay output DC 5 feet 12 volt 10 amperes is read by the arduino and translated into the display to writing the LCD I2C that as signal turn lamp Thelife (I) and ready to use. If the relay does not send the output signal to arduino automatically arduino be read (O), which means that the signal turnlamp die translated into writing display to the LCD I2C.

4.5 Wiring Diagram Brake lights

Above the working principle of the circuit when is the switch controlling the electrical brake lights (switches) activated the electric current will flow towards the relay fourth leg DC 12 volt 30 ampere at the foot of code relay and DC 86 output code relay 87 to turn the brake light bulb and electric current flows to the relay 5 feet 12 volt 10 amperes to 86 feet and code output relay code 87 is forwarded to arduino in port have been determined at the time of programming (port 3). Signal relay output DC 5
feet 12 volt 10 amperes is read by the arduino and translated into the display toward the LCD I2C that the brake lamp life (I) and ready to use. If the relay does not send the output signal to automatically arduino arduino will read (O), which means the lights go translated into writing in the show to LCD I2C.

4.6 Wiring Diagram Horn (Horn)

The working principle of the circuit when the above is switch controller Horn(horn) electricity (switch) on the switch electric current will flow towards the relay fourth leg DC 12 volt 30 amperes at the foot of code relay DC 86 and relay outputs code 87 to turn the Horn(horn) and the electric current flows to the relay 5 feet 12 volt 10 amperes with code 86 feet and relay outputs 87 code forwarded to arduino in portis that already determined at the time of programming (port 3). Signal relay output DC 5 feet 12 volt 10 amperes is read by the arduino and translated into writing display to the LCD I2C that Horn(horn) are alive (I) and ready to use. If the relay does not send the output signal to automatically arduino arduino will read (O), which means Horn(horn) die translated into writing display to the LCD I2C.

4.7 Wiring diagram reversing lights

Above the working principle of the circuit when the switch reverse lights electrical controllers (switches) activated the electric current will flow towards the relay fourth leg DC 12 volt 30 amperes at the foot of code relay and DC 86 output code relay 87 to turn on a light bulb and electric current flows backward toward the relay 12 volt 5 feet 10 amperes to feet code 86 and relay outputs code 87 forward to arduino in portis that already determined at the time of programming (port 3). Signal relay output DC 5 feet 12 volt 10 amperes is read by the arduino and translated into the display toward the LCD I2C that the lights are on (I) and ready to use. If the relay does not send the output signal to automatically arduino arduino will read (O), which means the lights go translated into writing display to the LCD I2C.

4.8 Measurement Results in the microcontroller (Relay leg 5)

<table>
<thead>
<tr>
<th>NO</th>
<th>Bagian Yang di Uji</th>
<th>Hasil Pengukuran Sebelum Switch Di Aktivasi (Volt)</th>
<th>Hasil Pengukuran Setelah Switch Di Aktivasi (Volt)</th>
<th>Kesimpulan</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lampu Kejala (Jadi kejala)</td>
<td>0 Volt</td>
<td>4,5 Volt</td>
<td>Baik</td>
</tr>
<tr>
<td>2</td>
<td>Lampu Kedua (Kedua)</td>
<td>0 Volt</td>
<td>4,5 Volt</td>
<td>Baik</td>
</tr>
<tr>
<td>3</td>
<td>Lampu Ketiga (Ketiga)</td>
<td>0 Volt</td>
<td>4,5 Volt</td>
<td>Baik</td>
</tr>
<tr>
<td>4</td>
<td>Lampu Keempat (Keempat)</td>
<td>0 Volt</td>
<td>4,5 Volt</td>
<td>Baik</td>
</tr>
<tr>
<td>5</td>
<td>Klakson (Horn)</td>
<td>0 Volt</td>
<td>4,5 Volt</td>
<td>Baik</td>
</tr>
</tbody>
</table>

From table above that affect the measurement results is the Source of battery requires charge and expenses of each of the different light and it resulted in a different output in each lamp in the electrical circuit.
4.9 Results Measurement in Electrical Networks (Relay leg 4)

Table 2 Results Measurement in Rangkapian Electrical (Relay feet 4)

<table>
<thead>
<tr>
<th>NO</th>
<th>Bagian Yang di Utk</th>
<th>Hasil Pengukuran Sebelum Switch Di Akrifkan (Vol)</th>
<th>Hasil Pengukuran Sendah Switch Di Akrifkan (Vol)</th>
<th>Kesimpulan</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lampu Kepala (Jarak dekat)</td>
<td>0 Volt</td>
<td>10,55 Volt</td>
<td>Baik</td>
</tr>
<tr>
<td>2</td>
<td>Lampu Kepala (Jarak jauh)</td>
<td>0 Volt</td>
<td>10,55 Volt</td>
<td>Baik</td>
</tr>
<tr>
<td>3</td>
<td>Lampu Kepala (Dieng)</td>
<td>0 Volt</td>
<td>10,55 Volt</td>
<td>Baik</td>
</tr>
<tr>
<td>4</td>
<td>Lampu Sen (Kanan)</td>
<td>0 Volt</td>
<td>11,25 Volt</td>
<td>Baik</td>
</tr>
<tr>
<td>5</td>
<td>Lampu Sen (Kiri)</td>
<td>0 Volt</td>
<td>11,25 Volt</td>
<td>Baik</td>
</tr>
<tr>
<td>6</td>
<td>Lampu Sen (Hazard)</td>
<td>0 Volt</td>
<td>11,25 Volt</td>
<td>Baik</td>
</tr>
<tr>
<td>7</td>
<td>Lampu Rem</td>
<td>0 Volt</td>
<td>12,00 Volt</td>
<td>Baik</td>
</tr>
<tr>
<td>8</td>
<td>Lampu Mendar</td>
<td>0 Volt</td>
<td>12,80 Volt</td>
<td>Baik</td>
</tr>
<tr>
<td>9</td>
<td>Klikson (Horn)</td>
<td>0 Volt</td>
<td>11,05 Volt</td>
<td>Baik</td>
</tr>
</tbody>
</table>

From the table above that affect the measurement results are from the source of the battery is not good should be in charge because at its basis in the vehicle no charging system (alternator) as charging the vehicles while in design this was not made a charging system (alternator) as charging the battery. Therefore, the battery used to decrease the power voltage which is quite significant and could affect voltage the output that is less than the max

5 Conclusion

1. In each respective series of electricity requires a component that relays DC 12volt 30 amperes feet 4 as an output signal to be forwarded to the relay DC 12volt 10 amperes foot 5 as a signal receiver that will be forwarded to the tools microcontroller and translated into LCD shield 20 x4.

2. If the electrical control switches in the switch will automatically turn on the electrical circuit and will always be controlled by arduino aT-Mega 328 and translated into the C language or programming language.

3. Electrical circuits are controlled by arduino Mega AT-328 will allow users to monitor the vehicle from the LCD of each respective vehicle lamps.

4. This design is used as a pretest before the vehicle is used as if in an electrical circuit is not functioning properly / off automatically arduino would read such damage.
References


