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Automatic Headlight Control System of Vehicle

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Abstract: Our project is developed in such a way that it detects light intensity and automatically switches to low beam or high beam accordingly using a LDR and another thing is automatic wiper as servo motors which works automatically on detecting rain drops and alert system to alert people during accident by sending SMS to saved phone numbers and rechargeable batteries are used to power the whole system making our project energy efficient.

Keywords: *LDR, Automatic Headlight, Rechargeable Battery, Automatic Wiper, Alert System.*

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I. INTRODUCTION

There are lot of accidents going on these days, due to the rise of vehicle and traffic so our project focuses on that and is designed in a such a way that it has LDR to automatically switch the headlights reducing the manual effort of the driver and another thing we have is automatic wiper to have clear view during rain or fog and we also have GSM module which activates on happening accident and sends help message or SMS to saved phone numbers.

II. LITERATURE REVIEW

According to some research some drivers don't have consciousness of manually switching headlights by sometimes forgetting to switch the headlights that's why automatic headlights have become important in today's generation and it is also said that its better if the driver keeps their headlight on automatic but even though our headlights work only in night time but however sometimes the headlights may get activated in day time also when it detects some kind of oncoming light, this is we can say one disadvantage of our project. But for the safety, driver can heavily depend on the automatic headlights during night time. If we talk about turning off the automatic headlights system than that is not possible because of the use of LDR connected to the headlights through relay so the system is fixed. Another research says that sometimes vehicle might go through accident in remote areas or unidentified areas and nobody can reach the driver during accident so there is a use of alert system in our project, which automatically send SMS alert to the driver's saved phone numbers.

III. METHODOLOGY

In our Automatic headlight control system of vehicle project, Arduino is the main controller because it does all the processing stuff to send signals and all. First there is LDR which detects the light intensity along with a relay which switches headlights to low beam or hight beam depending on the light intensity and sends signals to Arduino which processes the signal. Then there comes servo motor as automatic wiper which is also connected to Arduino along with raindrop sensor connected to Arduino, when It detects rain then the servo motor gets the signal through Arduino and starts rotating in 180 degrees similar to the wiper and then there is GSM module and magnetic reed switch which are connected to the Arduino for alert system. What happens is during accident the magnetic reed switch separates and it sends the signal to Arduino and the gsm module gets activated and sends accident alert send help SMS to the saved phone numbers of the driver and after that the buzzer and led indicator also gets activated this way our system can also be usable during accidents.

A. Material Selection

For the dependability and effectiveness of the systems the components are selected for by looking at the cost, so there are total of main 11 components starting with Arduino uno which is the main controller of the system and is also very cheap then second there is LDR sensor which is also cheap as it only detects light intensity and sends signal to Arduino to relay and rain sensor module also is cheap and is used to detect rainfall and then there is 12v rechargeable batteries so that during emergency the batteries can be easily recharged and then there is 7805 voltage regulator which is also very affordable as it converts 12v to 5v for the use of Arduino, LDR senor and other components, and then there is headlights which works by using 12v battery and turns on during night

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time and either switches to low beam or high beam and is not cheap in price but is affordable and then there is magnetic reed switch which is also cheap and work on separation of switch and sends signal to Arduino and then there is buzzer which works on separation of magnetic reed switch is very cheap and then there is LCD which is cheap and is used to show accident alert and rain detected message and then there is GSM module to send help message or SMS to saved phone numbers showing alert system.

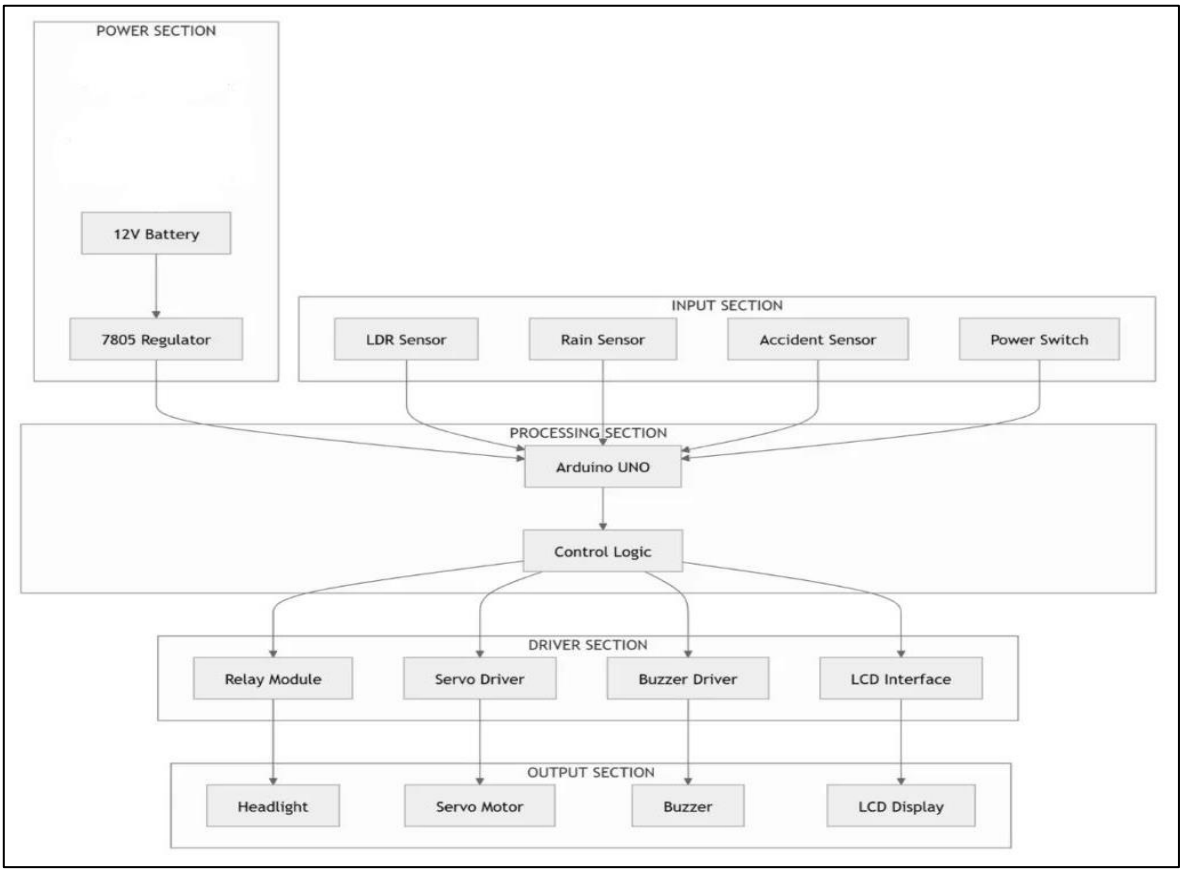

Fig 1 Block Diagram

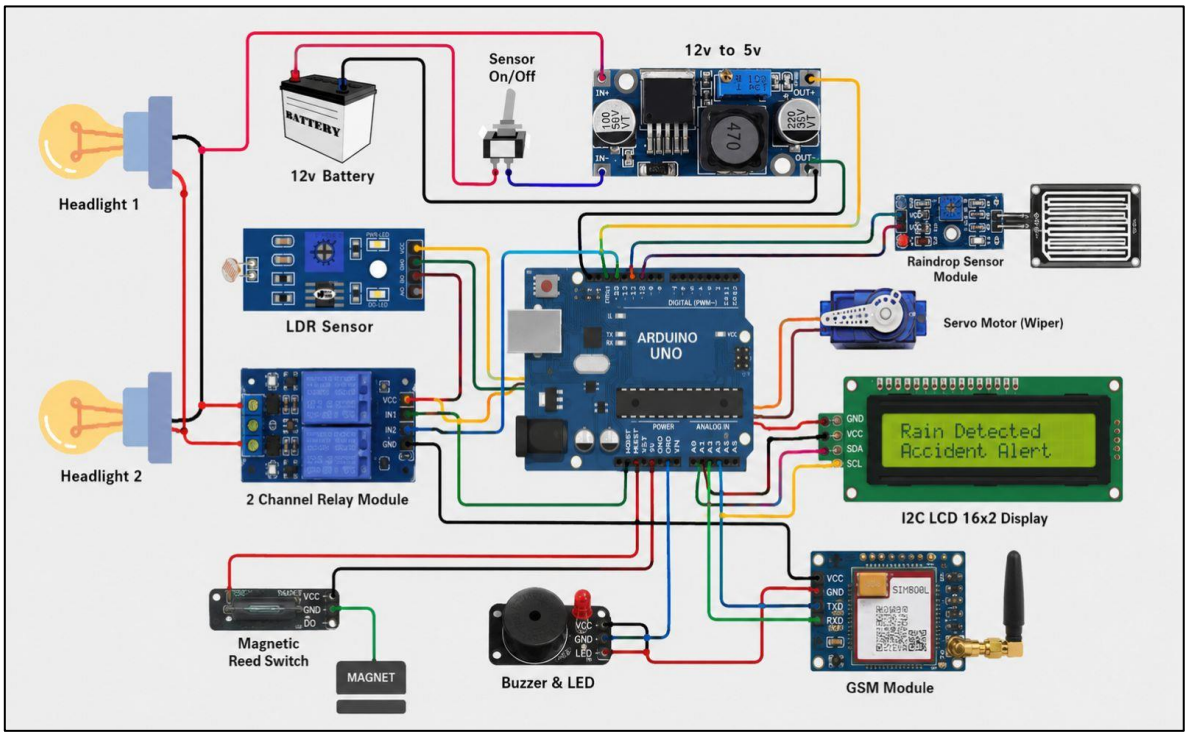

Fig 2 Circuit Diagram

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➢ *Arduino Uno*

The main controller of the system is an Arduino uno, it takes all the inputs from components like LDR, rain sensor and servo motor and processes them. Arduino is the brain of Automatic headlight control system of vehicle.

Table 1 Specifications

Operating Voltage	5V
Input Voltage	7-12V
Micro Controller	ATMega328P
Digital I/O Pins	14
Analog Pins	6
Clock Speed	16 MHZ

➢ *Rain Sensor Module*

Rain sensor is used to detect the water droplets on the surface. If rain is detected, the signal is sent to the Arduino, and the servo motor functions as an automatic wiper.

Table 2 Specifications

Operating Voltage	5V
Output	Analog and Digital

➢ *12V-Rechargable Battery*

12V Rechargeable Battery is used as the main power source to supply energy to the entire system and ensure proper continuous operation.

➢ *7805 Voltage Regulator*

7805 Voltage Regulator is used to convert 12V supply into stable 5V which is required for Arduino and other electronic components.

➢ *LDR Sensor*

LDR Sensor is used to detect ambient light and automatically control the high beam and low beam of headlights.

➢ *Headlights*

Headlights are used as output devices to provide visibility during night driving by providing light.

➢ *Servo Motor*

Servo Motor is used as an automatic wiper when rain is detected in raindrop sensor.

Table 3 Specifications

Operating voltage	3V-7.2V
Recommended voltage	5V
Rotation	0°-180°
Stall torque	1.2-1.8 kg/cm

➢ *Magnetic Reed Switch*

Magnetic Reed Switch is used to detect accident and activates buzzer by detecting separation of magnet.

➢ *Buzzer*

Buzzer is used as an alert system to alert people and indicate accident occurrence.

➢ *16x2 LCD*

16×2 LCD is used to display system messages such as “Rain detected” and “Accident alert”.

Table 4 Specifications

Display type	16x2 Character LCD
Operating voltage	5V

➢ *GSM Module (SIM900A)*

GSM Module (SIM900A) is used to send SMS alerts to saved contacts.

Table 5 Specifications

Network	GSM 900/1800 MHz
Operating voltage	3.2V-4.8V (typically 4V)
Communication	UART serial (TX/RX)
SMS support	Text mode and AT commands
Current Consumption	250mA (2A peak)

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SIM support	1.8V/3V SIM card
Application	SMS alert and communication

➢ *Hardware Testing*

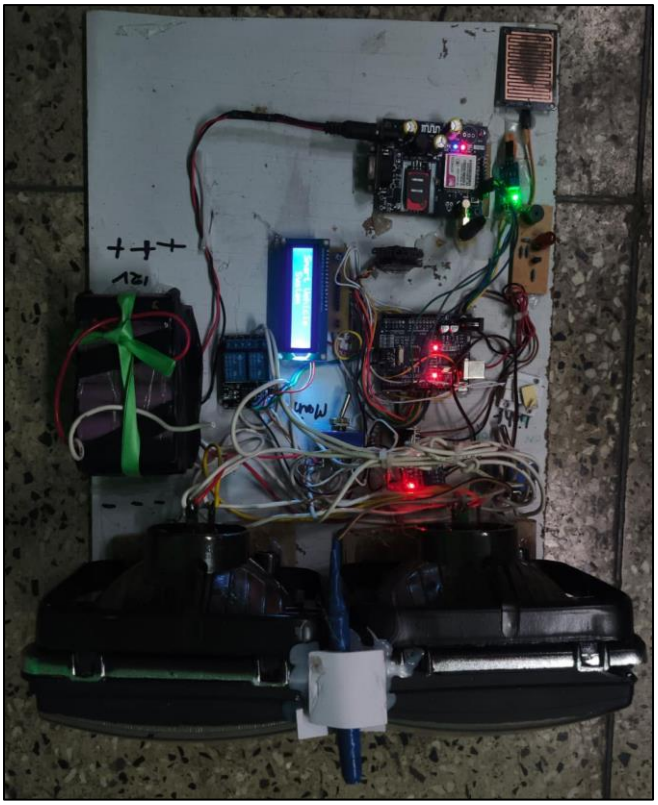

Fig 3 Hardware Testing

IV. RESULTS AND DISCUSSION

All components are working fine as per the simulation and hardware and the relay module was tested using LDR successfully the headlights are also working perfectly by switching headlights to low beam or hight beam and Arduino was also working fine and all the programs uploaded was working fine and then there is servo motor along with servo motor which works as automatic wiper was also working fine and then there is GSM module which is also connected to magnetic reed switch to Arduino was working as per the program and then sends the “send help” message or SMS to saved phone numbers and after that the buzzer and led was also working fine and then lcd successfully showed the message on screen.

V. CONCLUSION

In conclusion, our project Automatic headlight control system of vehicle was successfully designed with Arduino and all the components and our project becomes cost effective as all the components like LDR sensor, raindrop sensor is cheap and affordable and worked fine. Although some components like headlights are little costly and needs some research depending on which headlight to be bought and how much watt of headlight is needed and then there is 12v rechargeable battery which is also little costly as the battery is rechargeable and then there is GSM module which is also costly as it is used to send SMS to saved phone numbers during accident in our project.

FUTURE SCOPE

- Camera can be added to headlights for more accurate detection of oncoming vehicle.
- IOT and mobile app can also be added to monitor the status of vehicle in real time.
- Solar panel can be added for solar charging of the system for more efficient use of battery.
- Besides sending SMS only, automatic emergency calling systems can be added for faster rescue response.

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