SMART ENGINE COOLING FAN

Table of Contents

1. ABSTRACT

Nowadays the number of vehicles counts are increasing enormously and the use of the vehicles are also increasing a lot. For all the vehicles, engine plays a vital role. The engines temperature gets high within the particular minutes. For that purpose, to reduce the engines temperature cooling fans are used. Electric cooling fans are generally reliable, but sometimes may fail to activate. This may cause the engine to overheat. Diagnosing a failure of this type can sometimes be time consuming, and also require special electronic diagnostic tools. In this proposed mini project, the temperature sensor is used for measuring the engine temperature and the LCD is used to display the obtained temperature. If the temperature displays in the LCD display is above than the fixed value then the cooling fan will be switched ON for reducing the engines heat and then the fan will be switched OFF when the engine becomes to the normal fixed temperature.

2. FEATURES

- Button sensor will check the engine is started or not.
- Displays the temperature value in LCD.
- As per the recommendation the cooling fan will be turned ON.
- It is low cost and cost efficient.

3. SWOT ANALYSIS

3.1. S-STRENGTH

- Low cost
- Measures temperature accurately
- Better performance

3.2. W-WEAKNESS

- Fix the temperature range
- Occupies more space
- Needs additional source of energy

3.3. O-OPPORTUNITIES

- Shall be implement using solar energy
- Shall be implement mobile application for viewing the engine’s temperature

- Shall use different microcontrollers
- Shall use different sensors

3.4. T-THREATS

- If the components get damage it is complicated to replace.

4. 4W's and 1'H

4.1. Who:

This shall be used for all the automotive industry

4.2. What:

This shall reduce the heat of the vehicle’s engines

4.3. When:

This shall be used when the engine gets heated

4.4. Where:

This shall be used in all the vehicles

4.5. How:

This shall be used by reducing the heat of the engine by cooling fan

5. DETAIL REQUIREMENTS

5.1. HIGH LEVEL REQUIREMENTS:

ID	Description	Status
HLR1	Sensors	Implemented
HLR2	Actuators (Display)	Implemented
HLR3	Micro controller	Implemented
HLR4	Software	Implemented

5.2 LOW LEVEL REQUIREMENTS:

ID	Description	Status
HLR1_LLR1	Potentiometer (1k ohm)	Implemented
HLR1_LLR2	Push button	Implemented
HLR2_LLR1	LCD and LED	Implemented
HLR3_LLR1	Atmega328p	Implemented
HLR4_LLR1	Simul IDE	Implemented

6. COMPONENTS:

6.1 ATMEGA328P

The ATMEGA328P is a popular microcontroller due to it being a major component in the Arduino board products. In this proposed project it is used as a major micro controller, it converts analog to digital and maps certain values. It controls potentiometer and LCD displays.

6.1.2 EEPROM

The ATmega32 contains **1024 bytes** of data EEPROM memory. It is organized as a separate data space.

6.2 POTENTIOMETER

In this proposed project the potentiometer is used instead of temperature sensor. It is used to get the user input.

6.3 PUSH BUTTON

Push button is used as a sensor in this proposed project. It is used for sensing whether the engine is started or not.

6.4 LCD

In this proposed project, HD44780-1 LCD display is used to display the temperature of the engines heat.

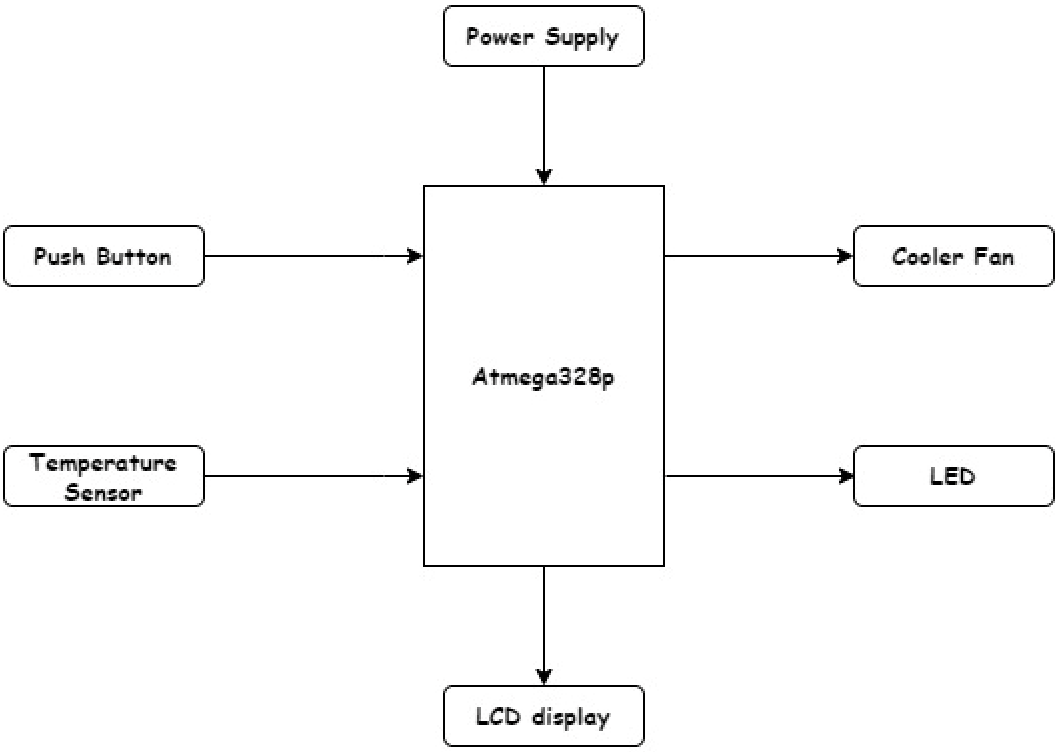
6.5 COOLING FAN

It is used to cool the engine's heat and act as a actuator

7. DESIGN

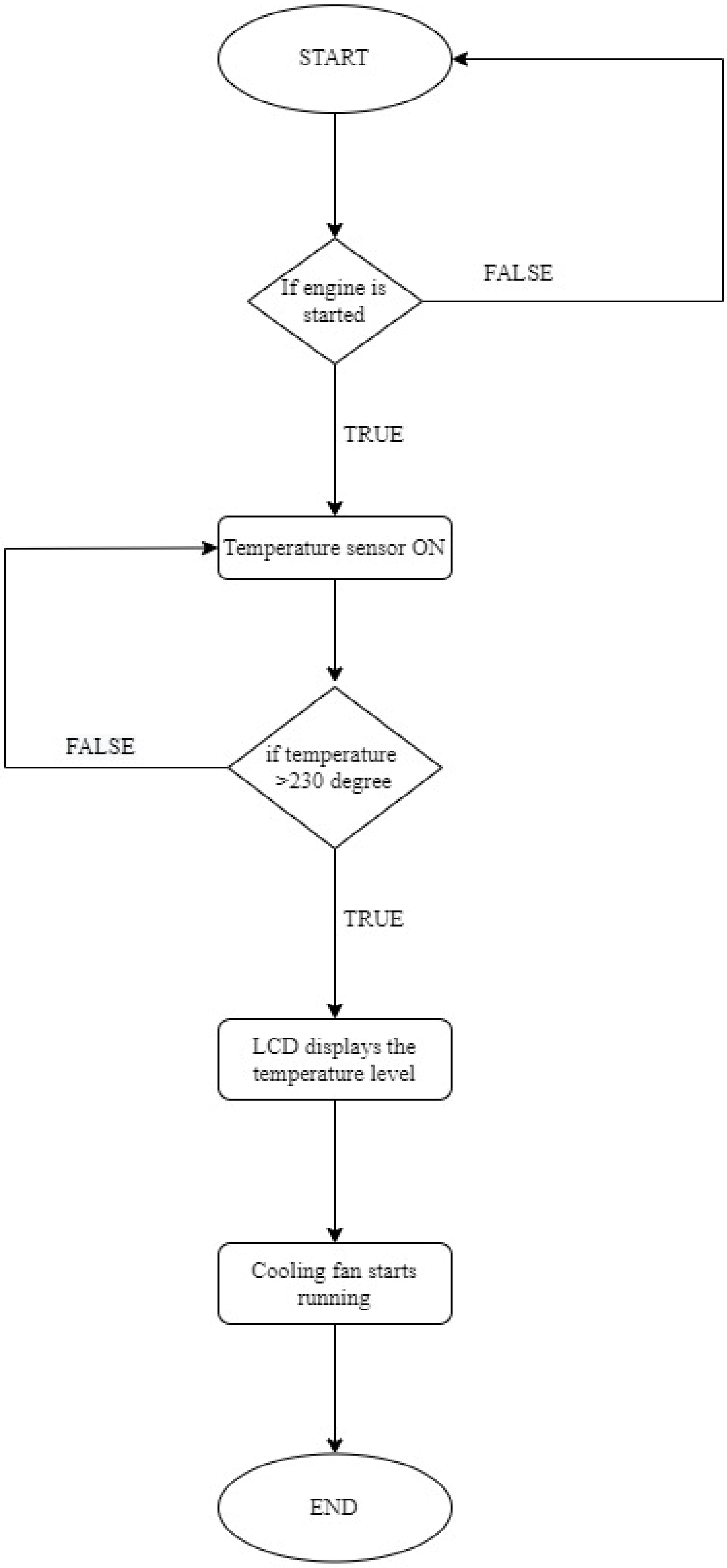
7.1 STRUCTURAL DIAGRAM:

7.1.1 HIGH LEVEL STRUCTURAL DIAGRAM



BLOCK DIAGRAM OF SMART ENGINE COOLING FAN

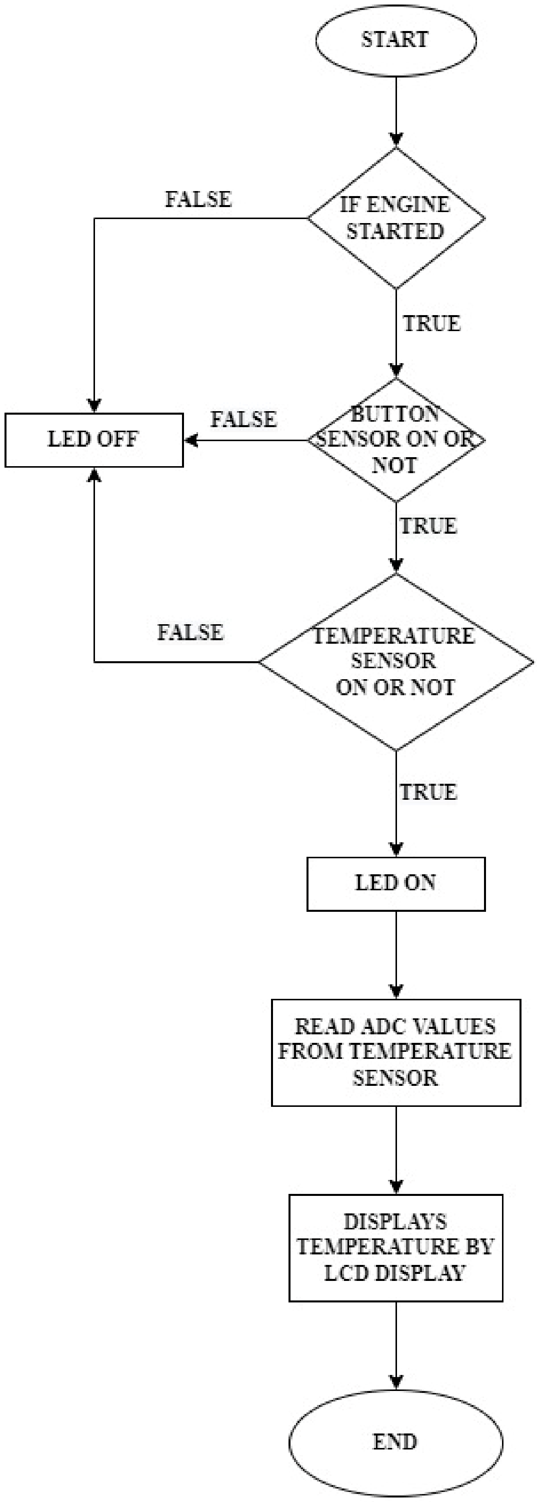
7.1.2 LOW LEVEL STRUCTURAL DIAGRAM



FLOW DIAGRAM OF SMART ENGINE COOLING SYSTEM

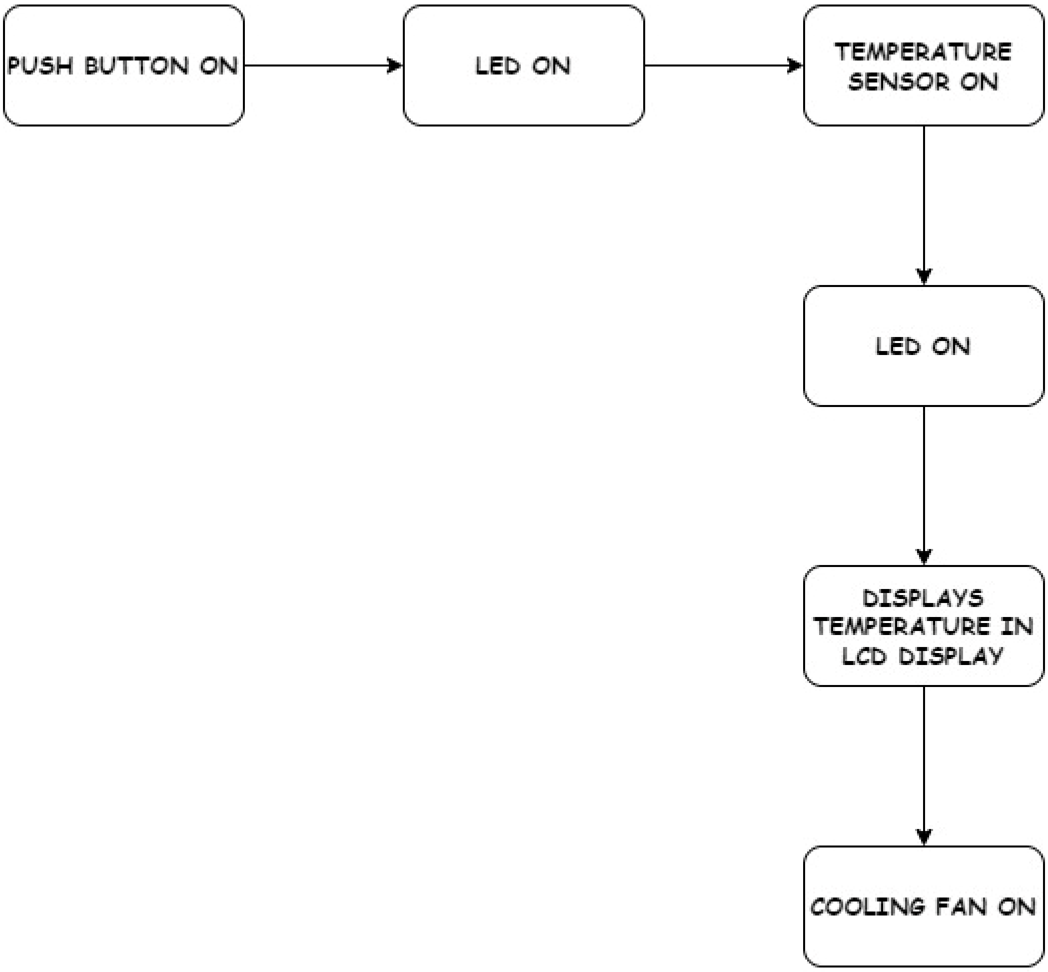
7.2 BEHAVORIAL DIAGRAM

7.2.1 HIGH LEVEL BEHAVORIAL DIAGRAM



HIGH LEVEL BEHAVORIAL DIAGRAM

7.2.2 LOW LEVEL BEHAVORIAL DIAGRAM



LOW LEVEL BEHAVIORAL DIAGRAM

8. TEST PLANS AND OUTPUT

Test ID	Description	Input	Output	Status
TID_01	If Engine Started	Push button=1	Push button=1	PASS
TID_02	If Engine Not Started	Push button=0	Push button=0	PASS
TID_03	Temperature Request	Temp=0 degree Celsius	Cooler Fan=OFF	PASS
TID_04	Temperature Request	Temp=100 degree Celsius	Cooler Fan=OFF	PASS
TID_05	Temperature Request	Temp=200 degree Celsius	Cooler Fan=OFF	PASS
TID_06	Temperature Request	Temp=230 degree Celsius	Cooler Fan=ON	PASS
TID_07	LED ON	Push Button=1 && Cooler Fan=1	LED=1	PASS
TID_08	LED OFF	Push Button=0 && Cooler Fan=0	LED=0	PASS
TID_09	LCD Display	Temperature= 230 degree Celsius	Temperature: 230 degree Celsius	FAIL