Report:
THROTTLE SYSTEM

LTTS
GLOBAL
ENGINEERING
ACADEMY

L&T Technology Services

Version Number:
Team Members :
Team No:
Module: Model Based System Engineering

DECLARATION

I hereby declare that the attached documents are correct and valid to the best of my knowledge.

SNEHA S R

PROBLEM STATEMENT:

• Now-a-days, the world is being automated in almost every industry. In the vehicle industry, there is an initial stage of study of automation.

• In manual mode, a human driver should always be present inside the vehicle. This consumes a lot of human power.

• On an average, people spend about an hour each day and travel 31.5 miles, a five percent increase from 2014.

• In the busy world, it is a huge time-consuming process. There are some other issues such as drunk and drive etc., which causes accidents leading to death of human life.

ABSTRACT:

The automatic control of a vehicle's throttle is now one of the most important challenges in the Intelligent Transportation Systems field. A throttle control system for the path tracking of autonomous vehicles is described. The throttle control system consists of a potentiometer and primitive driver. The path tracker generates the desired throttle position by using the lateral offset. The throttle controller controls the steering actuator to follow the desired steering angle. A DC servo motor is installed to control the throttle and these messages are transported using CAN protocol.

COMPONENTS:

STM32f103RB MICROCONTROLLER:

STM32 is a family of 32-bit microcontroller integrated circuits by STMicroelectronics Internally, each microcontroller consists of the processor core, static RAM, flash memory, debugging interface, and various peripherals. STM32 is a family of 32-bit microcontroller integrated circuits by STMicroelectronics. The STM32 chips are grouped into related series that are based around the same 32-bit ARM processor core, such as the Cortex-M33F, Cortex-M7F, Cortex-M4F, Cortex-M3, Cortex-M0+, or Cortex-M0. Internally, each microcontroller consists of the processor core, static RAM, flash memory, debugging interface, and various peripherals. The STMicroelectronics STM32F103RB is an ARM 32-bit Cortex-M3 Microcontroller, 72MHz, 128kB Flash, 20kB SRAM, PLL, Embedded Internal RC 8MHz and 32kHz, Real-Time Clock, Nested Interrupt Controller, Power Saving Modes, JTAG and SWD, 3 Synch. 16-bit Timers with Input Capture, Output Compare and PWM, 16-bit 6-ch Advanced Timer, 2 16-bit Watchdog Timers, SysTick Timer, 2 SPI, 2 I2C, 3 USART, USB 2.0 Full Speed Interface, CAN 2.0B Active, 2 12-bit 16-ch A/D Converter, Fast I/O Ports.

SERVO DC MOTOR:

Servo motors are highly controllable. They were built with precision and accuracy in mind, and provide users with essentially infinite resolution on what the output angle can be. DC motors, while far less complex than servo motors are also easy to control; reverse the

leads to change directions, and change the voltage to change the speed. The Speed is 8000 RPM,Torque is 1.3 nm to 27 nm,Body Material is made of Iron,Motor Type is DC,Commutation is Brush and the Motor Voltage is 20 to 85 VDC.

CYTRON MOTOR DRIVER:

It supports both sign-magnitude PWM signal and locked-anti phase. It is compatible with full solid-state components resulting in higher response time and eliminates the wear and tear of the mechanical relay. DC brushed motors are the most commonly used and widely available motors in the market. The Cytron 10 Amp 5 V - 30 V DC Motor Driver will help you add functionality to your DC motor.

CAN- CONTROLLER AREA NETWORK:

The Controller Area Network (CAN) is a serial communication bus designed for robust and flexible performance in harsh environments, and particularly for industrial and automotive applications A Controller Area Network (CAN bus) is a robust vehicle bus standard designed to allow microcontrollers and devices to communicate with each other's applications without a host computer. It is a message-based protocol, designed originally for multiplex electrical wiring within automobiles to save on copper, but can also be used in many other contexts. 11 For each device the data in a frame is transmitted sequentially but in such a way that if more than one device transmits at the same time the highest priority device is able to continue while the others back off. Frames are received by all devices, including by the transmitting device.

LEVEL SHIFTER:

A level shifter in digital electronics, also called logic-level shifter or voltage level translation, is a circuit used to translate signals from one logic level or voltage domain to another, allowing compatibility between ICs with different voltage requirements, such as TTL and CMOS. This level converter- 4 channel features four high speed bi-directional 4 channels, allowing for safe and easy communication between devices operating at different logic levels. The logic level converter circuit convert signals as low as 1.8 V to as high as 5 V and vice versa, and its four channels are enough to support most common bidirectional and unidirectional digital interfaces, including IC, SPI, and asynchronous TTL serial.

Technologies/Tools Learnt:

1. STM32 Microcontrollers.
2. Electric Circuits.
3. Motors, Actuators and Encoders.
4. Control systems and Battery management.
5. STMCubeMX.
6. Eclipse for embedded C.

IMPLEMENTATION:

This system is an open loop control system. The DC servo motor drives the potentiometer according to the input given in the tele-mode. The resistance is directly proportional to the vehicle speed. These messages are transported through CAN Protocol.

RESULT:

Hence, the implementation of CAN Protocol using STM Microcontrollers is successfully established and the solution of Autonomous electric vehicle is arrived.