ENEL 400 Sub System Design – Motion Control

System Function Definition:

Clarify subsystem objectives

- Develop the motion controls for operating the vehicle.
- The objective of this subsystem is to read the change in motion of the accelerometer and its configuration.
- These values will then will be read by the STM32 on the user controller and sent to the vehicles microcontroller.

Gestures

Motion

Turn left	Forward	Turn right
Pivot Left	Stop	Pivot right
Turn left	Backwards	Turn right

Forward/left	Forward	Forward/right
Left	Flat	right
Backwards/left	Backwards	Backwards/right

- Then these gestures will be measured by the STM32 and will be transmitted to the car.

Establish metrics for subsystem objectives

- We will be using an accelerometer which will be connected to the microcontroller using a serial interface. The microcontroller will convert the input into the orientation of the accelerometer.
- The orientation will be defined by angles of rotation about the accelerometers central axis.
- The STM32 will calculate these values and transmit them to the microcontroller on the vehicle.

- These values then will be received by the receiver on the car and the car will move accordingly.

Identify subsystem constraints

- The movement of hand will be restricted. It can move in certain directions and with certain speed.
- Reading and transmitting the data wirelessly.
- The car will not be fully gesture controlled due to limited amount of gestures.
- The car cannot travel beyond the range of the communication system.

Revise system function requirements.

- We will be using analog accelerometer(ADXL-362). It will be configured to read gestures from the user.

Conceptual Subsystem Design:

1. Establish Subsystems functions
   - The car will move in the direction in which hand is moved.
   - The subsystem will be able to detect 9 different gestures.

2. Establish Subsystems requirements (function specs)
   - Required components are an accelerometer an STM and transmitter.

3. Establish means for subsystem functions
   - An accelerometer will capture user gestures.
   - A microcontroller will read the accelerometers measurements as an input an transmit the resulting gesture out to a second STM.
   - We will use the radio link components for transmitting and receiving data.

- The second STM32 will be used to receive the data and move the car accordingly.

4. Generate subsystem function design alternatives.
    - We might change what motion the car performs due to the users input.

5. Refine and apply subsystem metrics to subsystem function design alternatives.
    - Even if we change how the car reacts to the user input, we will keep the 9 input gestures the same.

6. Choose a subsystem design.
    - We will use the ADL355 accelerometer
    - We will use 2x STM 32 microcontroller
    - Radio link (transmitter and receiver)