

Safety First

1 Safety Measures on MOPED

Feature	Value
Braking distance	20 cm
Safety distance	20 cm
If MOPED loses connection with server it stops.	Instant
If App is in manual steering and user presses disconnect, sends 0 as velocity before it actually disconnects.	Instant

2 Tests

JUnit

Component	Test procedure	Result
Ip validation	Send both valid and invalid ip:s into the method.	Returns expected true/false values.
Steering Commands	Create a JSON Object with set steering values. Send the data to the data holder that the Steering Command class gets said data from. Check if the original steering values matches the values in the data holder and Steering Command class.	Return values are as expected.
JSON Objects	Create a JSON Object with set data in the data holder class. Check if data holder saves set values.	Return values are as expected.
App Connection & Server Protocol	Create a dummy client. Try to get a successful connection between server and client. Send messages from client to server.	Connection successful. Echo message received.

Integration testing

Component	Test procedure	Result
MOPED-server connection	The test was initialized by running the run.py script and allowing a server to connect to the MOPED. If the connection was successful, we initiate a protocol that sends data and receives commands.	We get an out print with the message "Client connected".
App-server connection	Only enable app thread in server code (very simple). Start app and try to connect.	Server prints whether or not connection was successful.
App functionality	Only enable app thread in server code (very simple). Start app and do use case testing.	Server prints results of each action making it very easy to see if app is performing correctly.
Manual steering	Start the MOPED and run the run.py script allowing server connection. The server then allows connection for the app. The app sends commands to the server and the server interprets the commands and sends them to the MOPED.	The MOPED receives the values and passes them through to the VCU which allows the motor and gyro to handle the input and act accordingly.
Adaptive Cruise Control (ACC)	When connection is established, we activate ACC from the app and the server runs the ACC logic. Holding an object in front of the ultrasound sensors and moving it gradually forward and backwards.	The MOPED receives values from the server and accelerates and de-accelerates according to the distance of the object in front of the ultrasound sensor.
Platooning	When connection is established, we activate Platooning from the app and the server runs the ACC logic and the image	Moving the picture across the cameras vision range and in the scope of the ultrasound sensor caused the moped to follow the

	recognition logic in parallel. Holding a picture with a specific symbol in front of the MOPED.	object/picture.
Platooning with another MOPED	Having the MOPED facing another MOPED with a specific symbol on its back. When the Platooning is activated via the App	The wheels start shifting to make the MOPED face the symbol. Whenever the front MOPED changes direction, the MOPED follows suit.