Project Proposal

This document highlights a project that could be considered by the group for the autonomous self-driving vehicle.

Path Finder: for indoor green house

Path finder is an autonomous guided vehicle that navigates through a drawn path on the floor, following a path(s) to get to the end place. The application for the path finder would be in hospitals or industrial work floor, transporting medical or machining equipment respectively.

For the group project the path finder could be programmed to work in a large indoor greenhouse farm where temperature is a huge factor in successful growth of a crop. It could be used to navigate around the greenhouse recording temperature at each area and comparing the temperature with a reference temperature. If a temperature measured in particular area is too cold or too warm it could flag the area. The flag is a record of the temperature and area where it is too cold or too warm.

The path finder must be equipped with navigation and mapping stack to simultaneous record it's location in software. It must be able to detect the path drawn on the floor, readjusting itself to keep within the path. If it deviate from the path, must be able to back track and find the path again. It needs to record temperature at time interval and compare with reference temperature. The components that could be utilised to achieve this design is highlighted in the components sections.

Components:

mbed LPC1768 board: https://os.mbed.com/platforms/mbed-LPC1768/

> The pathfinder will be based on the mbed LPC1768 with is an ARM microcontroller board designed for rapid prototyping. The board had a built in Powerlink interface enabling data transfer and programming.

Light Sensor: https://os.mbed.com/cookbook/m3pi-LineFollowing

> To detect the path on the floor the program could utilise a inferred light sensor. The sensor will be able to detect lines or nearby objects. The light senor works by detecting refractive light coming out of the Red infrared LED. It is able to distinguish light reflected from light or dark object in front of it. This suggests that the path drawn on the floor could be in a black line on a white floor. Making the drawn line on the floor thick would allow the path finder to easily detect the line on a white surface and stay on the line rather that mistake an another object for a line.

Mounting the light sensor to the front of the cars chassis would allow the path finder to scan to check for the line and move forward; therefore moving the car inch forward each time a line is detected.

Navigation stack: https://os.mbed.com/users/4180_1/notebook/relays1/

A possible suggestion of a navigation stack would be a H-Bridge driver integrated circuit. The H-Bridge is used to control a rotation speed and direction of a DC motor. The speed of the individual motors could be controlled to make the car turn left and right.

Temperature sensor: https://os.mbed.com/cookbook/TMP102-Temperature-Sensor

The possible suggestion for a temperature sensor is a digital temperature sensor. Digital temperature sensors are easier to implement compared to analogue counter parts.

Reset Button: https://os.mbed.com/users/4180_1/notebook/pushbuttons/

The purpose of the reset bottom is to stop the path finder for diagnostics and maintenance. This is useful while programming the car, stopping the car/motors from moving while programming. It could be used to initialise the code, where pressing the button executes the code to move the car and pressing the button again stops the car in case there is an issue where the car goes off route.

Component cost:

The price is listed in USD as the store source is American. The components listed are supported by mbed and are available in the mbed library. The prices exclude shipping charges.

Component:	Link	Quantity	Cost
Mbed LPC1768	https://www.sparkfun.com/products/9564	1	$54.95
Line follower (Light sensor)	https://www.sparkfun.com/products/11769	3	$2.95 each
H-Bridge (Navigation stack)	https://www.sparkfun.com/products/14451	2	$4.95 each
Temperature sensor	https://www.sparkfun.com/products/13314	1	$4.95
Reset Button	https://www.sparkfun.com/products/10442	1	$2.10
Car body (optional)	https://www.sparkfun.com/products/15835	1	$114.95

Total cost:	Without car: $80.75	With car body: $195.70