Overview

My project is to create a modular ECU \* BCU tom improve affordability for entery level compeditors in motorsport while being scaliable for more advanced teams. This would be used for performance tuning applications, the device would support having multipule inpounts both analug and ditital and be able to output lowvoltage switched outputs that could be connected to relays or driveres depending on voltage to remove manufactura limitations and allow for custom mosotrport required options such as, anti lag, throttle blipping, launch control, drive by wire and wireless sterrinwhell controlswhile being modular so the end user would only need to purchase the functions that they require.

Motovation

I believe there is demand for a prouduct that can both act as a ECU and body control modual that can be used in motosport and tunning applications. There are several companies that like Motec, Haltec, Link, AEm & several others that already make engine management systems. There are also several companies such as Cartek and Summit Racing that make BCU;s and Wireless Steeri8ng wheel control systems but (with the exception of Motec) there are no out of the box single supplier options that are affordable at a grass roots level.. Motec do currently make all in one a bus system for there ECU’s but it is not affordable for most grass roots teams with the base unit retailing at $6841 USD without screens, and additional fetau7es like shist controllers and additional senros pacages. For a Motec M142 GPR Pro with Logging. <https://www.motorsportselectronics.com/products/motec-m142?variant=12346090564>

Description

The product would intergrate fetaues of a normal ECU and a Normal Car body mamgment system into several smaller units. It is important that it has the ability to perform all the standard motorsport requirements as this would be the target market, phase 1 would only support petrol & E85 only with a max of 8 cylinders running Direct injections. It would also require: Drvie by wire, unit squencual and non squensual spark, Variable cam control, know detection Anti lag, throttle blipping, launch control, traction control, auto throttle blip (for full throttle shifting) speed limiting, paddle shift support. Some of these would be in the base unit while others like drive by wire would be a optional add on that maes use of the in care thertnet network to feed information back. Addtionaly it would require digital & analoug inputs as well as digital and anlog outputs to drive relays and bar body features.

I forsee the unit consisting of multipull small units that can be networked together to create a whole system, so that a end user could by the components that they need rather than the current all or nothing approach taken by many ecu manufcturers. This would also allow for us to phase features in and out based on demand without re engineering the entire product, helping with live cycle and compatibility issues.

The product would be able to be installed with off the shelf ethernet cables running at 1gig but would come with the recommendation to use ruggerdised cables in envromentaly exposed areas. By using established communication proticoles without relaying on propitry ones thus allowins for more modularity and on the fly off the shelf repairs when parts fail. It would also mean they entery point would be a lot easier as a customer could purchase the engine managmdet system and then add body control, cameras, knock system etc as required which would be a uneek approach currently not available. The body management system would control everything from headlights, indicaters, wipers, electronic diff’s and any non engine system on the car including the provision for solid state engine and fule kill switcxhes and fire management systems all from the wireless streering wheel control, doing away with cabling issues and wire failure due to constand movement which would again address a common cause of failuyre in current technology. This would most likely be handled over either Bluetooth or 8011.bgn. current rally cars already utilize wifi to assist with tracking so building a system that could intgrate the wifi would also require less duplication and save weight. The system would run a onboard device that had a primary output be to a android or apple tablet connected via usb this would allow the user to both view and change settings easily without the need to get out a dedicated pc just to tune the car. This could also be expanded to include a second out put for the navigator that could show the current gps location and other navagor specific told for use in rallying. This would further improve cost viability because rather than using specilised custom mad lcd sceens the end user could use off the shelf products and just download the app, then the devices could be mounted in the vecvhial using RAM mounts (which are already FIA approved) for that exqact application meaning less cusom engineering.

Tools and Tech

The project would require two main applications, the first application would be the QUI that the end user would use, this would be in the form of an android/apple app so that it could work on a tablet. This would allow for customized inputs and isplay screens to monitor the engie data and display dash information.

Ther second piece of software would be a program that would actually go on the device and control would respond to the vairus inputs and control the out puts of the various systems as per all modern ecu’s this would aslo include networking systems so that it can link with the additional moduals

Lastly there would be a number of different units that can all connect via ruggdised ethernet cables:

Main ECU and Engine Mamgnet Box

Body Control Box (Lights indicators, paddle shifts, whipers etc)

Drive by wire actuator and potentiometer

Skills

I would require someone with extensive programing knowledge to both make the APP and signigcant experience in C to write the software for the individual units.

There are already many networking options available on the market that the end user could self source

The main hardware would need to be made using a microprocessor board with a expansion board that could handle the required inputs and outs, on average this generally sits around 40 of each. This would need to be sourced or made and would be mopst significant expence for the project as relliablity of the MCU will be very important.

Outcome

Should the project be successful you would end up with a produc that is saclaible, realliable and available to a large portion of the market than current options. People would be able to start with an initial small investment and as they develop there cars purchase the add on options they need and install them with little technical input using off the shelf parts that are easily sorced. This would hopefully garner market sshare and also make it a lot easier for people to break into a sport that is increasingly becoming to expensive to copete in, and make it more affordable for grase roots levels of the sport.