

Project Plan

Client
Vermeer

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Android Bridge for Off-Highway Vehicles

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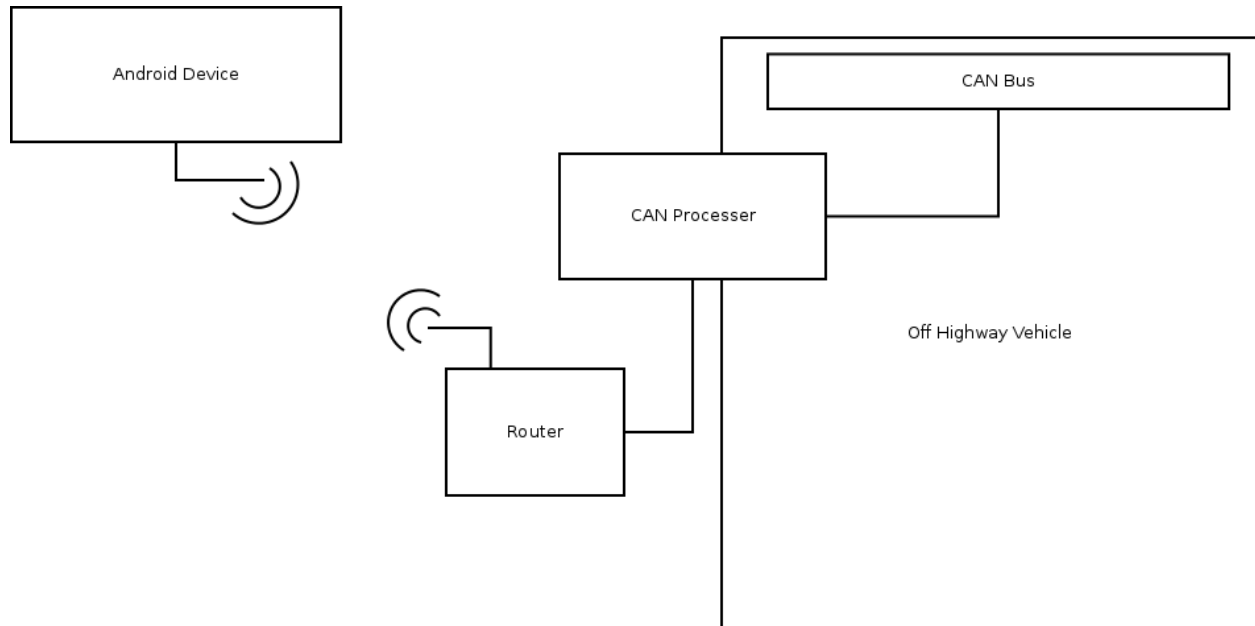
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Problem Statement:

Modern off-highway/agricultural systems use outdoor rated LCD displays to implement user interfaces. These current solutions are either too expensive, or put users at risk being an unsafe distance from the machines. Vermeer wishes to replace these expensive display systems with a more inexpensive solution as well as provide a more flexible development environment. A J1939 CAN system is used on most Vermeer systems, but would like to be expandable to other protocols. Vermeer has expressed their wish of emphasizing research and development with solutions utilizing android systems due to their prior experience with this technology. The solution must be capable of both receiving and sending messages to the CAN bus from a safe distance.

System Block Diagram:



System Description:

The android bridge for off-highway equipment will take into account four major hardware items, and allow them to communicate with each other. The Android Tablet will communicate with a server operating on our CAN Processor, these will connect via the WIFI Router we have in place. After communicating with the Processor, the tablet then sends its information to the processor who relays that information to the CAN Bus, which is mounted on an Off-Highway Vehicle. As you can see our end result is to have the Android tablet give commands to the vehicle. With this

type of system it allows for workers in dangerous environments to operate from remote distances.

Operating Environment:

As we are building a system for off-highway equipment, the system itself should be operable in high temperature and high pressure. The range of temperature that the system should withstand is about -25°C to $+70^{\circ}\text{C}$. As the equipment will be using a lot of power for its functionality, it will produce quite high amount of heat and pressure in addition to surrounding outdoor environment.

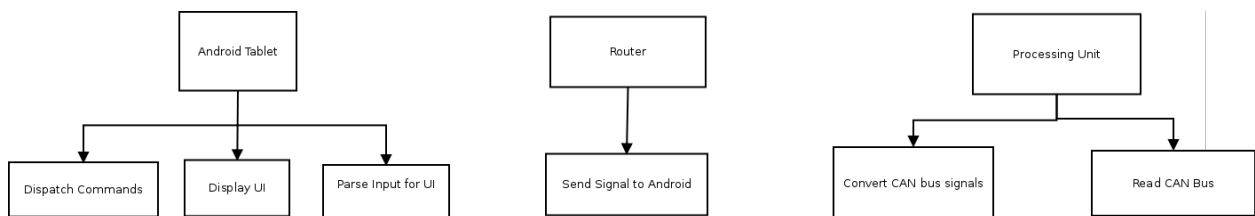
As for the wifi bridge, we need to have a network that is not interfered by other other network as it will be affected the data that are going to be sent to a server outside the place of the system.

User Interface Description:

Currently the interface will be hosted on an Android tablet. We have decided to go native instead of using a route such as html. This will allow for more native operations such as GPS, Motion Detection, and the Camera, not to mention speed. Because of this the interface will also have to be not only user friendly but also safe. The reason being is that our users will be in tough environments and if anything were to go wrong then we could potential be at risk for causing harm to users. The interface will consist of buttons, toggles, switches, and gauges for measuring.

Appendix to be completed (for prototype sketches & final design).

Modular Design to be completed.



Functional Requirements:

- Must be able to run outdoors
- Must be able to run in a high-vibration environment
- Must be able to communicate over a (large/safe) distance
- Must be able to run non-stop

(Use Cases soon to follow)

Non-Functional Requirements:

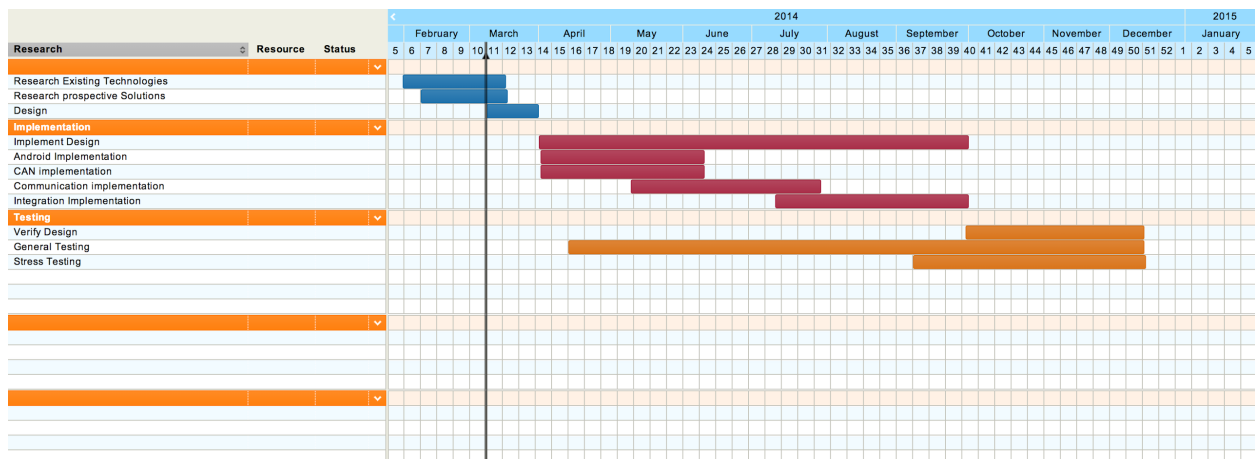
- Must be cheaper than current solution
- User friendly for the android user
- Extensible to other CAN protocols

Deliverables:

Deliverable	Date
Achieve equipment for tasks needed	15 February 2014
List of existing known industry options	20 February 2014
Project Plan v1	22 February 2014
A working CAN bus wifi bridge through android, that can observe and control Vermeer's off-highway equipment.	TBA

Work plan:

Work Breakdown Structure:



Project Schedule:

Waterfall

Why Waterfall? A very clear goal that is set for us. Due to the time, the way the course is set up, and the wishes of Vermeer, Waterfall makes the most sense. Our MVP on the product is very close to the final product, making an iterative approach less intuitive. We will use some agile methodologies in the sense that we will be periodically checking with Vermeer that we are on the right track, making adjustments as necessary.

Requirements - Given by Vermeer

Design - Includes needed research, To be completed by 04/01/2014

Implementation - To be completed by 10/15/2014

Verification - To be completed by 12/15/2014 based on the requirements given by Vermeer

Maintenance - Projected to be minimal as this is more of a prototype

Risks:

The following risks are associated with our current project. Note that the probability is a percentage, criticality is out of 100, and risk factor is probability multiplied by the criticality.

Risk	Probability of occurrence	Criticality	Risk Factor	Mitigation Strategy
Application has critical bugs.	.25	75	18.75	Test as frequently as we can, integration tests included.
Hardware Compatibility with Code Base.	.50	80	40	Test early the software and hardware communication.
People on the team leave.	.10	25	2.5	Make sure documentation is updated and have multiple people on the same tasks.
Leadership is forsaken, and tasks not assigned	.20	70	14	Communicate early with leaders, and assign tasks for the future to have a future plan assigned