

# Engineering Clinic Group

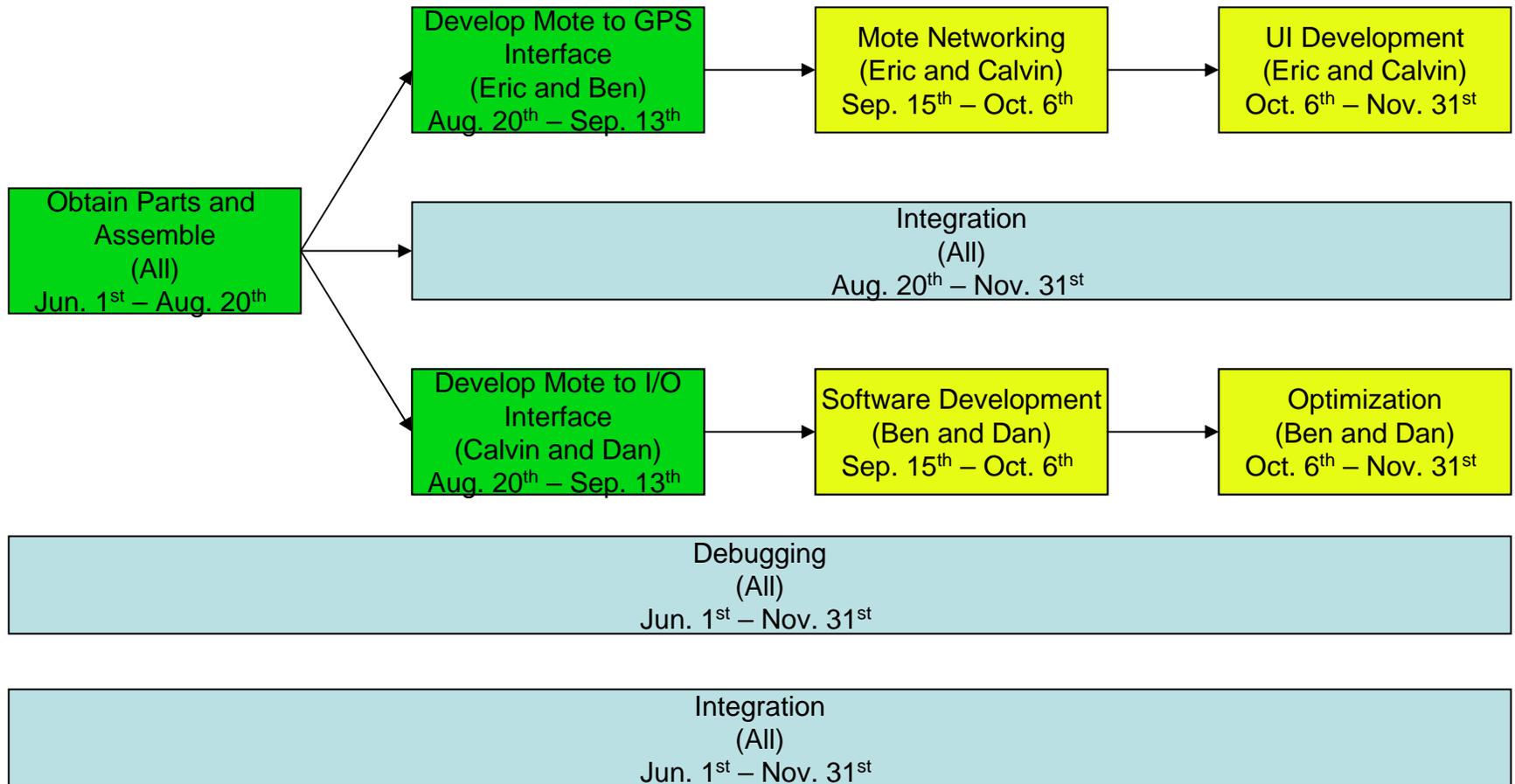
Project:

A Mote and GPS Based System for  
Real-time Driving Directions  
Optimized for Traffic Avoidance

Group Members:

Ben Meakin  
Calvin Yan  
Dan Rolfe  
Eric Hsu

# Revised Schedule of Completion



## Bill of Materials

### Crossbow Imote2 .NET Edition (IPR2410CA)

- Price: \$299
- Source: [www.xbow.com](http://www.xbow.com)
- Contact: [sales@xbow.com](mailto:sales@xbow.com)



### Garmin GPS 15H (010-00240-06)

- Price: \$55
- Source: [www.garmin.com](http://www.garmin.com)
- Contact: 1-800-800-1020



### Cylab Inc. RS-232 to VGA Converter

- Price: \$62
- Source: [www.rs-big-print.com](http://www.rs-big-print.com)
- Contact: [sales@rs-big-print.com](mailto:sales@rs-big-print.com)



## Bill of Materials – Cont.

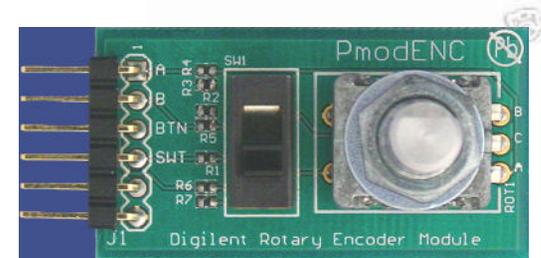
Lilliput 7" EBY701 Touch screen LCD VGA MONITOR

- Price: \$163
- Source: [www.ebay.com](http://www.ebay.com)



Digilent PmodENC Rotary Encoder Module

- Price: \$10
- Source: [www.digilentinc.com](http://www.digilentinc.com)
- Contact: [sales@digilentinc.com](mailto:sales@digilentinc.com)



## The Map Problem

Issue: Need data about city streets and a data structure to represent them

Problems:

- Map files are either encrypted or too large to store locally
- Interface with Google Maps could be too complicated in embedded software development
- Bluetooth interface to handheld GPS device possible, but defeats the purpose of developing our own system

## The Map Solution

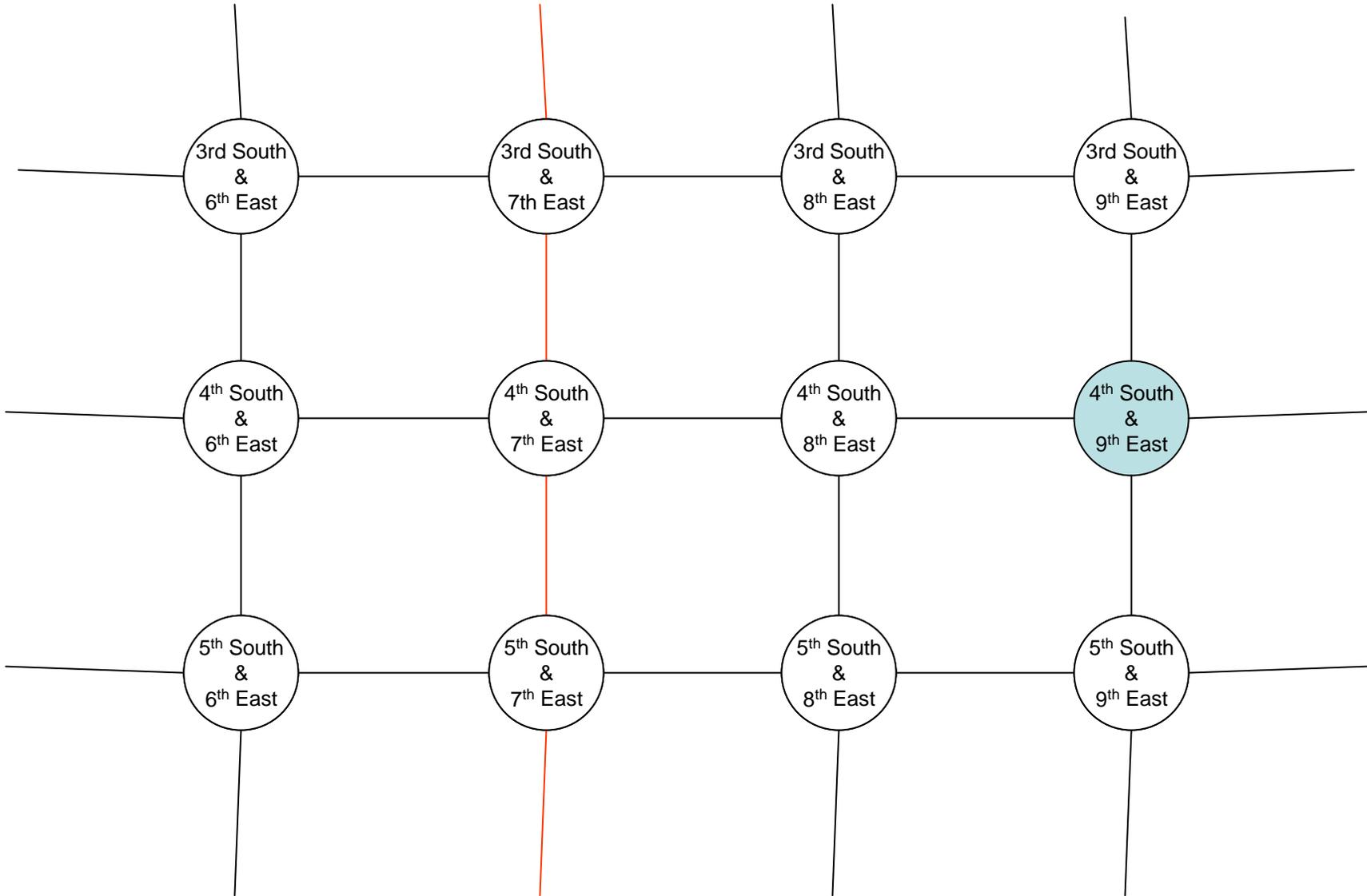
Overview: Install a graph based representation of streets local to each city mote and transmit to car motes upon request

Limitations: Bandwidth and Memory

- For long trips it may be impossible to download street information covering the whole path. If it can download the whole path, it may not fit in memory.

Workaround: Only Download What you NEED

- Graph Pruning Algorithms
- Provide data limited optimized routes
  - If not possible then just tell user where known traffic is.



**Information Display  
And  
Destination Input**

## Information Display

Parts 1:

Rs232 to vga converter

- Display 12 large characters in a line and 6 lines in total or
- Display 20 small characters in a line and 8 lines in total
- Characters supported : 0-9, A-Z, a space, plus & negative signs and a period.

```

RS-BIG-PRINT
RS232 TO VGA
  CONVERTER
DISPLAYS
TEXT BOTH
BIG + SMALL
  
```

```

RS-BIG-PRINT
SIZE BIG-SML ESC B-S
CLEAR SCREEN ESC 2
CLEAR LINE   ESC 4
MOVTO LINE   ESC N L
MOVTO COLUMN ESC N C
SCROLL UP-DN ESC U-D
ESC M FOR MORE
  
```



## Information Display

Parts 2:

Lilliput 7" EBY701 CAR PC Touch screen LCD VGA MONITOR

- VGA input
- Touch Screen Function with USB interface
- W 7 3/4" X H 4 1/2" X D 1 3/8"
- 30Ms Responsive Time



## Destination Input

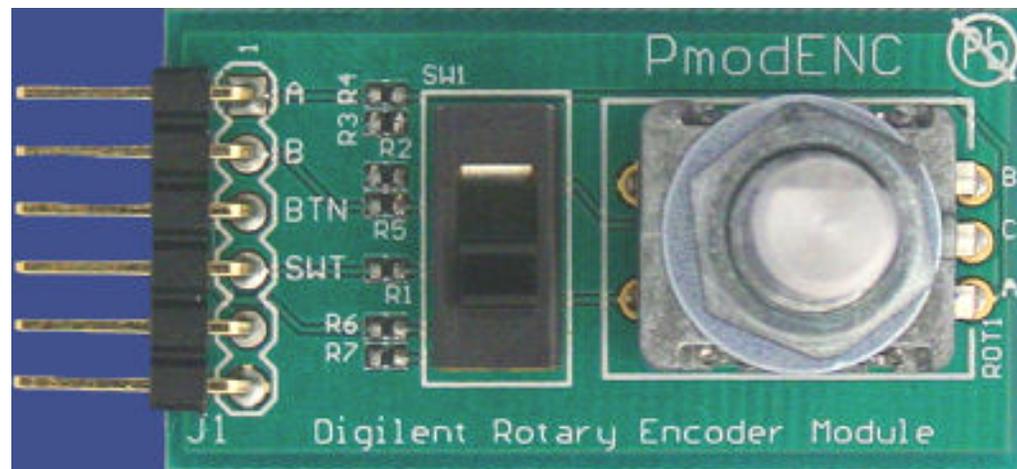
Parts 1:

PmodENC Rotary Encoder Peripheral Module

- Rotary push-button shaft encoder
- Slide switch

Parts 2:

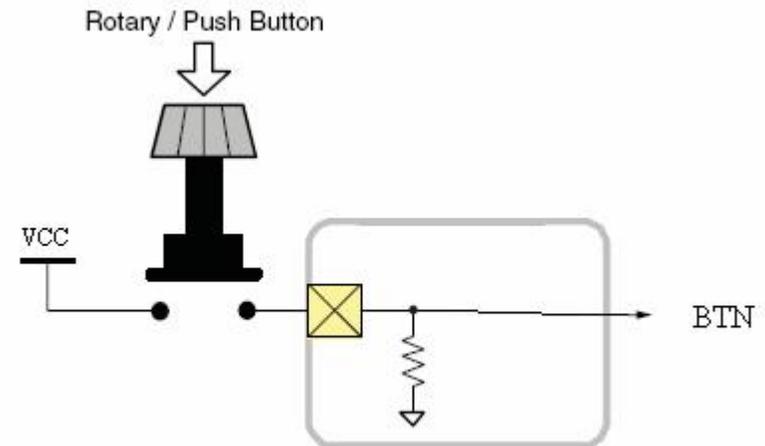
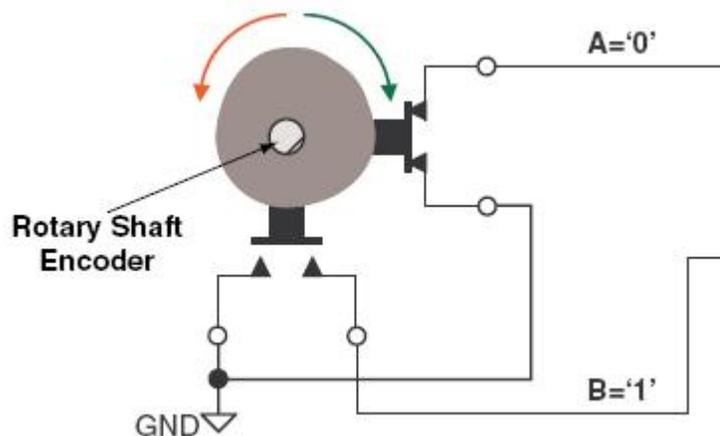
Lilliput 7" EBY701 CAR PC Touch screen LCD VGA MONITOR



## Destination Input

PmodENC Rotary Encoder Peripheral Module

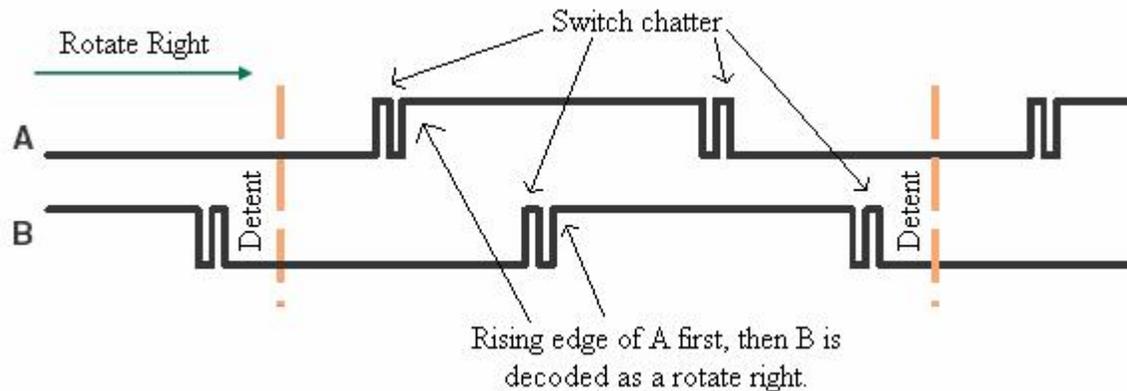
- Slide Switch: On/Off Output at pin SWT
- Press Button: High on pin BTN when being pressed
- Rotate: Receive rising edge of pin A and B in different sequence



## Destination Input

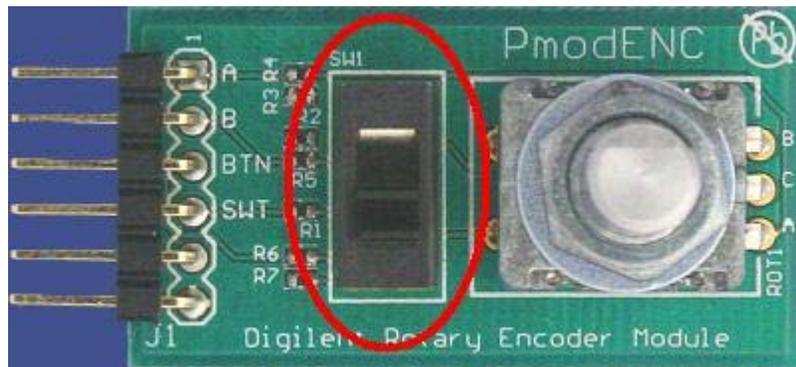
PmodENC Rotary Encoder Peripheral Module

- Rotate Right: Receive rising edge of pin A before pin B
- Rotate Right: Receive rising edge of pin B before pin A
- The last two pins are GND and VCC



GOOD DAY  
SWITCH ON  
TO INPUT THE  
DESTINATION

Switch On

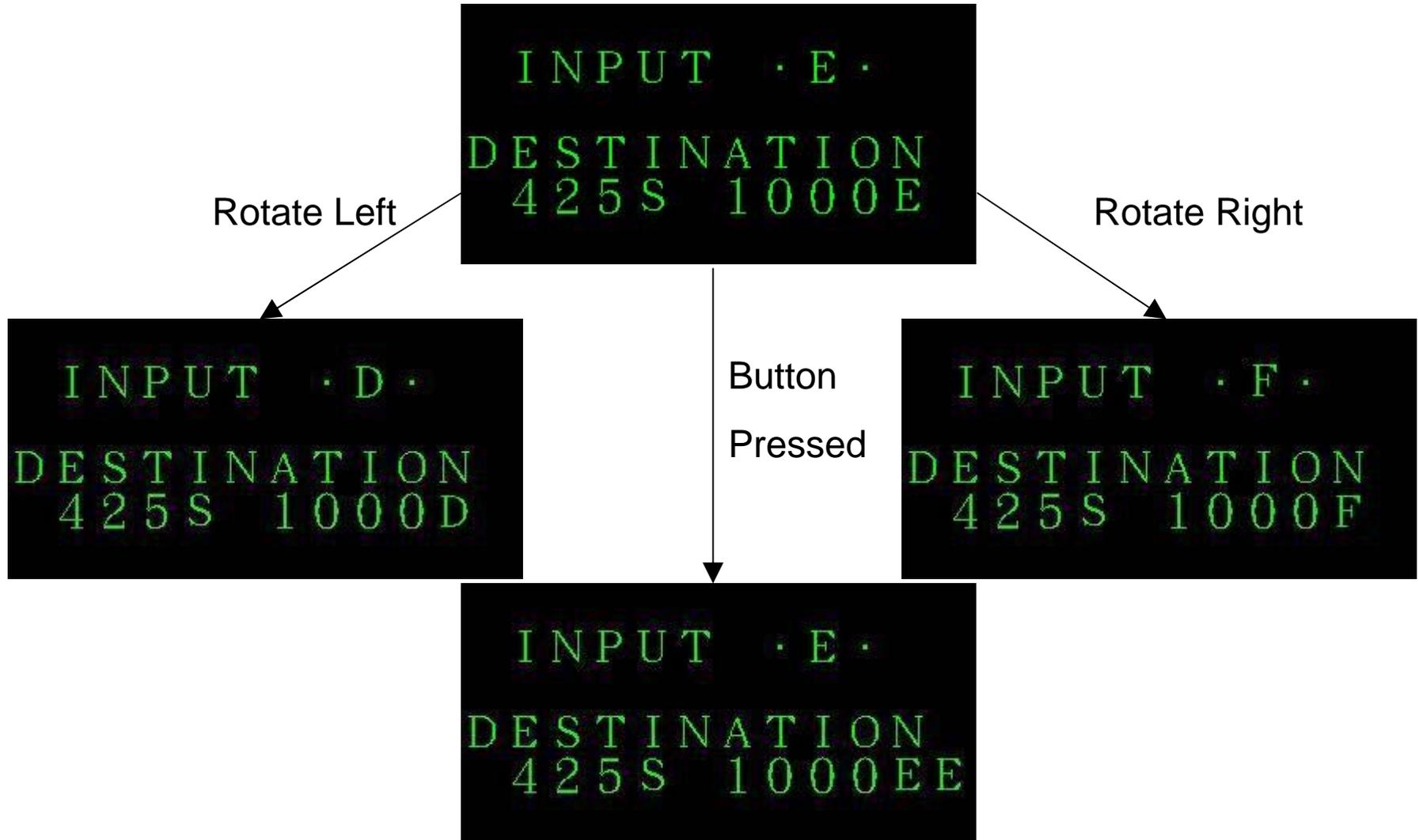


Data  
Input  
Sequence

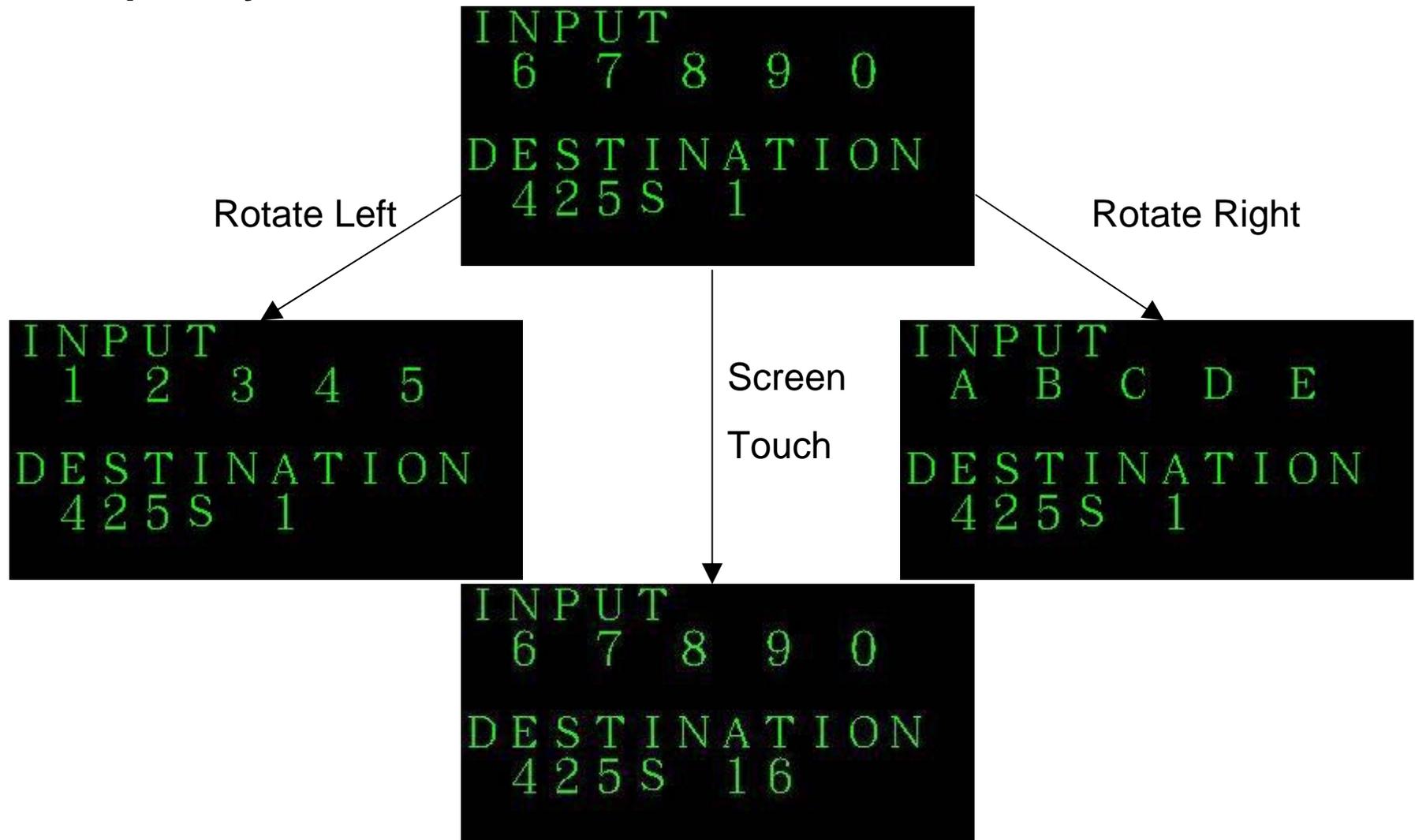
DIRECTING  
TURN RIGHT  
IN THE NEXT  
INTERSECTION

Switch Off

## Input Style 1

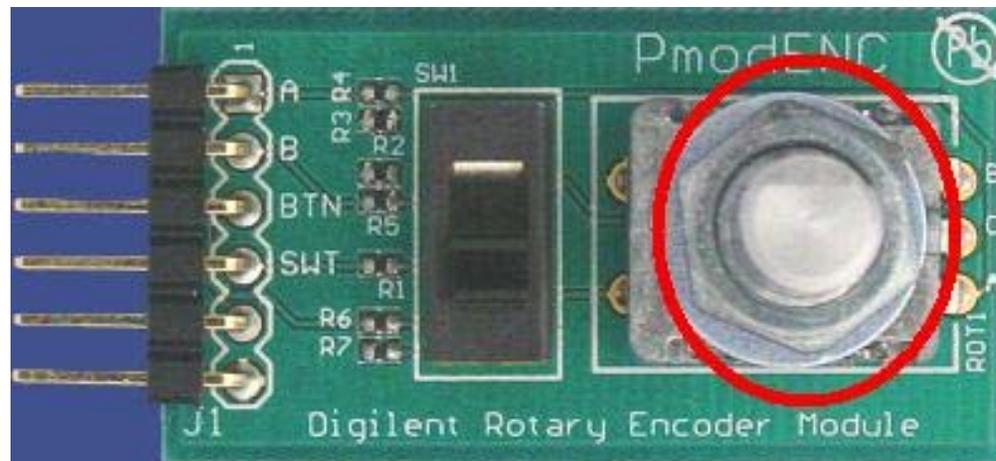


### Input Style 2



## Input Style

- Two kinds of input style
- Determine by the following
  1. Sensitive of the touch screen
  2. Graphic quality
  3. The ease of rotating the button



# Wireless

- 802.15.4
- Since we are working with the other team
  - What they expect from us.
  - What we expect from them.
  - How we plan on doing it.

# Talking

- Things we will be sending them
  - Current position, and velocity of each vehicle.
- City motes send us
  - Map data.
- We can request from them
  - gas station locations.

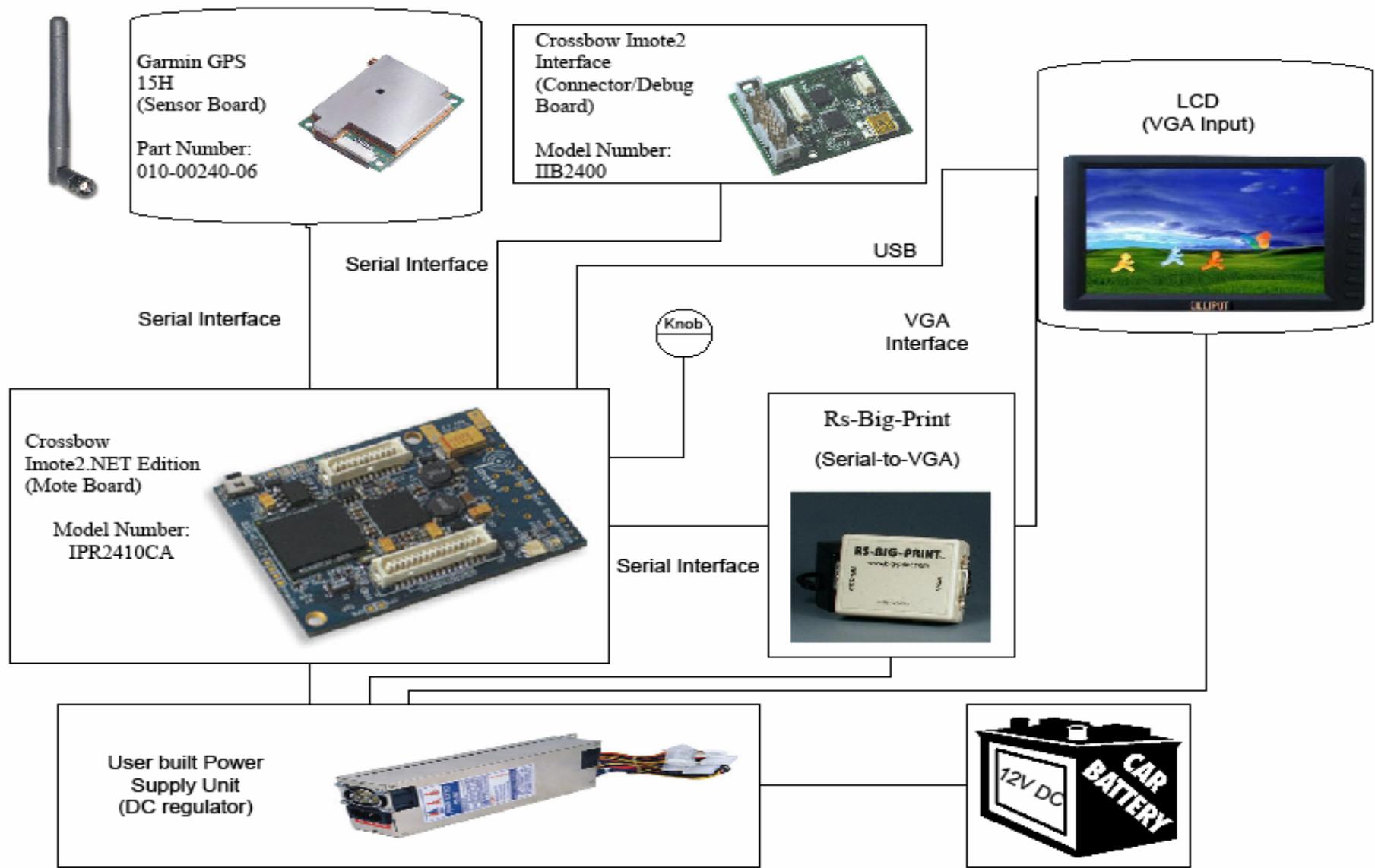
# The Idea

- Some information will be sent on regular intervals.
- Other information will be available upon request.
- Between the two groups we will come up with an expected message format.

# Mote Power

- To power the mote we will interface with the car battery
  - The interface will supply the proper amount of power for the mote.

# THE BIG PICTURE



## Updated RISKS

- GPS module from Garmin - Interface via serial instead of Bluetooth (eliminating wireless problem)
- No complicated GUI - Display text directions and information.
- No proprietary map scheme – Acquire map data from STATIONARY motes.

## Conclusion

- FINAL Original HARDWARE components.
- FINAL Original SOFTWARE design.
- Same timeline for the schedules.

## Q&A

- Questions?
- Comments...