The Local

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System Structure

- GPS
- Compass
- Position/Orientation Decoder
- Identifier
- UI/Video Module
- Video Monitor
Device Functions

- **Locator**
  - Indicates current position on a local map.

- **Identifier**
  - Provides information about desired building.

- **Tour guide**
  - Takes users on a “tour” by providing information about surroundings.
GPS and Compass

GPS

Compass

Synchronizer

RS232 Decoder

Message Decoder

Coordinate Transform
RS232 Interface

- Single ended serial communication standard
- 10 Bits
  - Start bit
  - 8 data bits
  - Stop bit
- Asynchronous
- To Decode
  - Listen for start bit
  - Time form local clock
  - Store data bit at data rate

Diagram:

- Idle
- Start Bit
  - Count = 0
- Sampling
  - If clock & odd, store
  - Count <= count + 1
- Done
  - Data ready = 1
  - Count = 7
- Data
  - *
Message Decoder

- GPS uses NMEA Protocol
  - Identifying header
  - Comma separated fields

- To Decode
  - Listen for $GPGGA header
  - Parse message
  - Store Coordinates
Coordinate Transformer

- Our map is flat, but the world is not.
  - The globe isn’t a sphere, either

- WGS Protocol
  - Accurate way to convert Latitude/Longitude to flat local space

- Output position in locally flat space
Identifier Portion
Functional Block Diagram For Identifier

Synchronizer

Identifier

ROM

(x,y,θ) → 15 to Identifier

info
reset
clock

t_mode

(x₀,y₀,b_num) → 15 from Identifier

ROM

ROM

ROM

ROM

(x₀,y₀,b_num) → 15 from Identifier

(8, 12, 15, 12) from Synchronizer

(x₀,y₀,b_num) → 15 from Identifier

(8, 12, 15, 12) from Synchronizer

(8, 12, 15, 12) from Synchronizer

(8, 12, 15, 12) from Synchronizer
Functionality of Identifier

- Controls the query of points (reading from object memory for each object)
- Determines line of sight coordinates
- Passes building number of interest (if in tour mode or if info button pressed) as well as device position to video module
Reading ROMs

1. Initialize
2. Wait
3. Load Address
4. Read Contents/Check Point
5. Send Response

- reset
- !start
- start
- !point
- point
Video Portion
- **Inputs:**

  - x-coordinate 6
  - y-coordinate 6
  - building # 3
    - or null(0)

  - FPGA
Inside the FPGA:
Block Diagram

Output:

- Pixel Clock
- Position Reg
- Building Reg
- ADV7125 Video DAC
- FPGA
- ROM

- x-coordinate
- y-coordinate
- building #

- 40.000 MHz (800x600, 60Hz)
- building info
- map info
Scalability

- Scrolling Maps
- Rotating Maps
- Zooming
- Giving of Directions
- Audio Playback of Building Information
- More Interactive User Interface
- Live Updating
- Many more....
Timeline

- Interface with GPS, completion of FSM coding, load map onto ROM – April 29th
- GPS/Identifier modules combined, memory initialization complete, map drawing – May 4th
- Work in map mode – May 6th
- Work with info button press, “tour guide” mode – May 8th
- Additional features – May 8th thru May 10th