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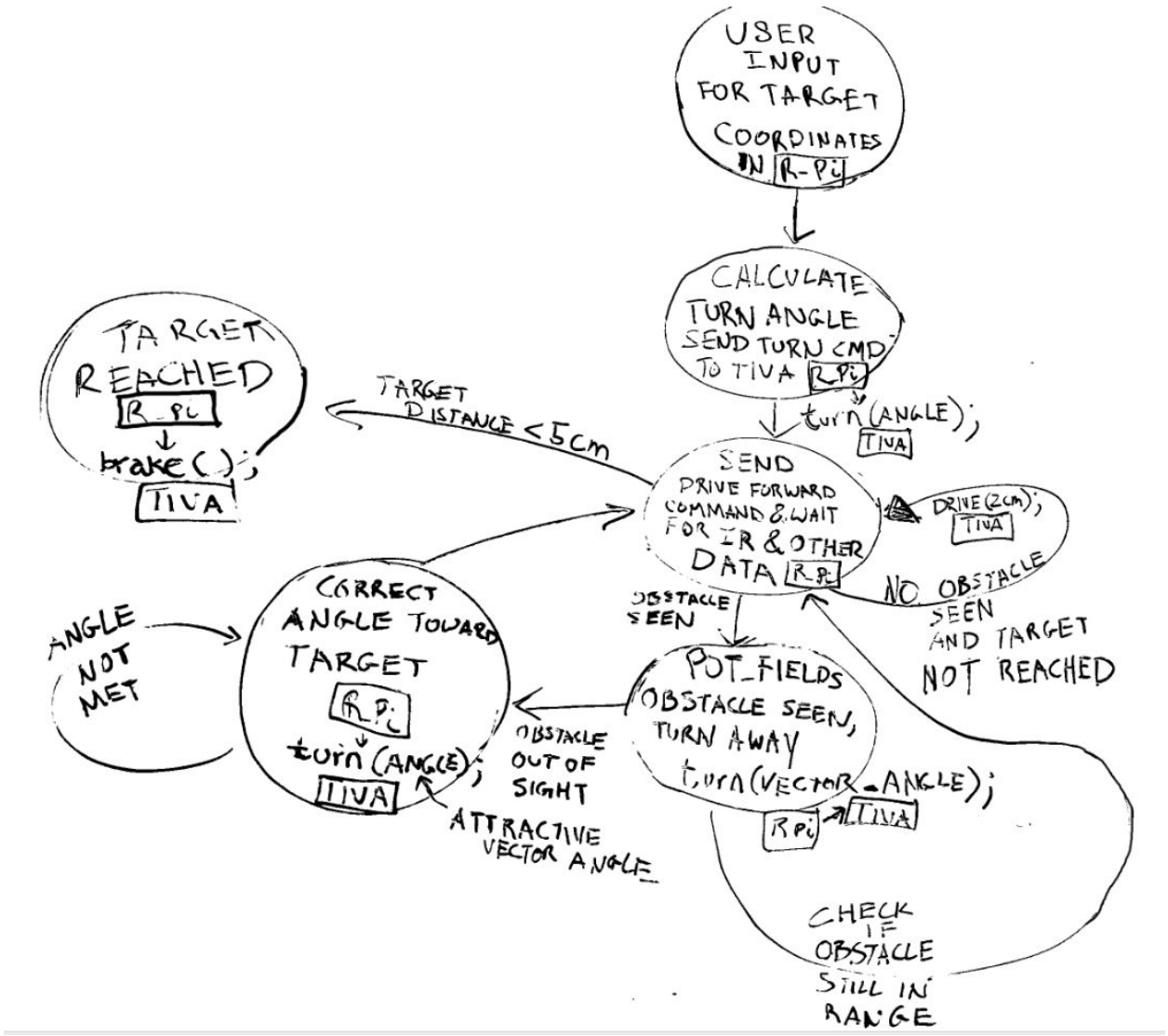
LAB 7

Design an approach to high-level, obstacle avoidance. This should take a destination as input and drive to that destination while avoiding any obstacles in its path. Document your design through words and/or pictures. Your documentation should be complete such that I could take it and implement your design without asking you any questions.

We are going to use potential fields as our means of obstacle avoidance. The state diagram below shows the design of the system

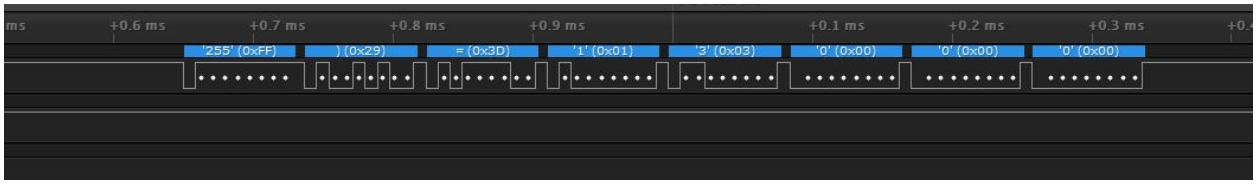


Determine which parts of your design will run on the Raspberry Pi and which will run on the Tiva. Determine which (if any) new parts you need to add to your Lab 6 system to implement your design

The Pi is doing the calculations for the Potential Fields algorithm and tracking the movements via the FKM and monitoring the IR and Bumper values. The Tiva is performing the movements given by the Pi and sending a byte back when the motion is complete along with the values of the sensors (seen Below in CCS code) and Logic analyzer.

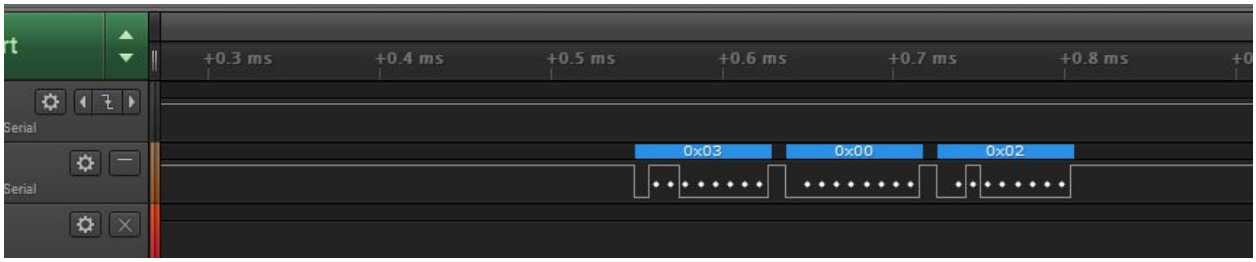
Implement the new design modules for both devices. Verify the communication is correct between devices using the logic analyzer. Take screenshots showing functionality.

Logic analyzer data sent from the Tiva board with following info




```
219 void Send_Packet(void){
220
221     if(UARTSpaceAvail(UART5_BASE)){
222         UARTCharPut(UART5_BASE,0xFF);    // start byte
223         UARTCharPut(UART5_BASE,ADC_F);   // F IR
224         UARTCharPut(UART5_BASE,ADC_L);   // L IR
225         UARTCharPut(UART5_BASE,ADC_R);   // R IR
226         UARTCharPut(UART5_BASE,FWD_COMP);  // MC command complete
227         UARTCharPut(UART5_BASE,TURN_COMP);  // MC command complete
228         UARTCharPut(UART5_BASE,left_bump);  // left bumper value
229         UARTCharPut(UART5_BASE,right_bump);  // right bumper
230
231
```

Capture of the Pi data sent to the Tiva for a forward movement command




```
inch = 2
movement = struct.pack('!BH', fwd_cmd, inch)
port.write(movement)
print'Inching FWD'
```

Zoomed out to see both packets sent (Tiva on Left)