



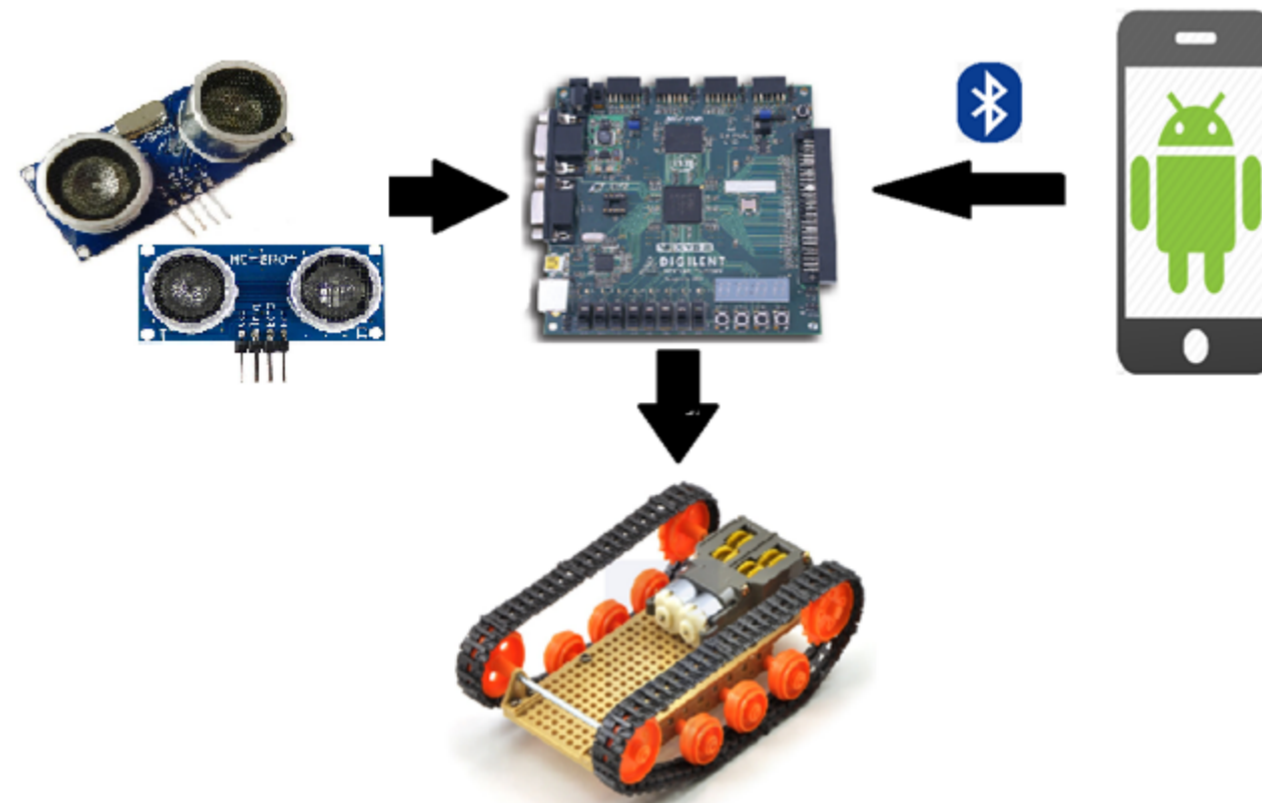
### Introduction

- Our project utilizes FPGA, HC-06 bluetooth module, HB 3 H-Bridge Driver and HC-SR04 sonar sensor.
- ElektroTosba always moves forward until it encounters some obstacles. ElektroTosba moves away from the obstacle when it senses the obstacle.

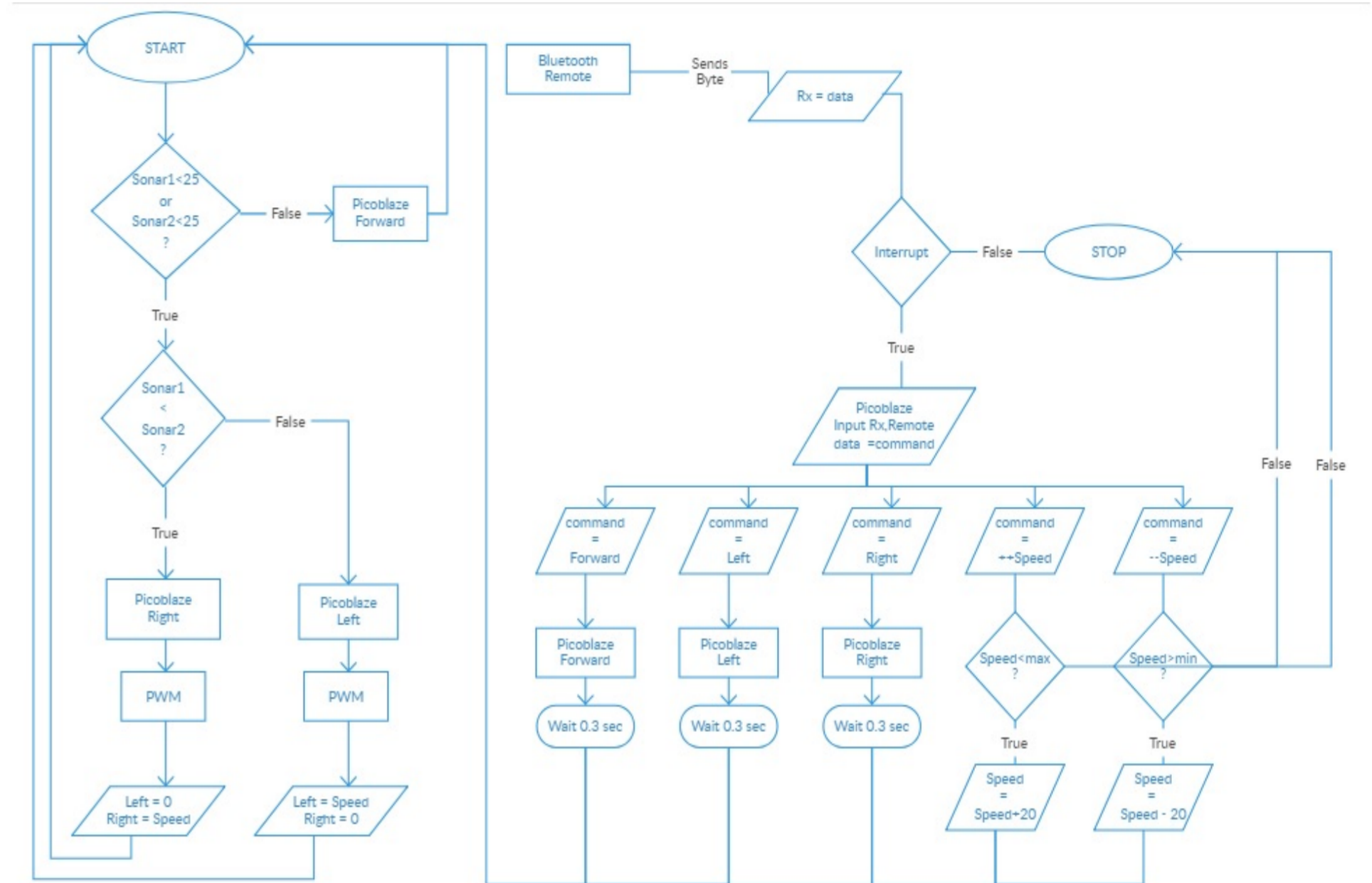
### Methodology

- PWM signals are generated with a verilog module which generates PWM with desired duty cycle by picoblaze and motors are driven by H-bridge.
- Picoblaze steers the ElektroTosba to left or right according to the value from sonar sensors.
- Bluetooth interrupts with 'interrupt' command and it takes ElektroTosba's control to manual.

### System Overview



### Block Diagram



### Challenges

#### Bluetooth module:

- While implementing bluetooth module in our Project, we observed an incompatibility between bluetooth baud rate and system. We had to arrange baud rate.
- System required stable pwm outputs for motors, so the pwm generators are designed in order to be controlled only in the beginning of period, that prevented discrepancy between microcontroller and pwm generators.
- Creating a dual sonar was hard and it did not work so 2 sonar modules have been used and on verilog their outcomes are processed.
- The result measurement of sonar was not correct but there was a pattern and a graph drawn and noticed that there is a linear relationship between result and read distance.

### Future Work

ElektroTosba is an Autonomous ground vehicle which can avoid obstacles. By adding Imu on it, mapping can be made easily. Thanks to Imu vehicle will know where it has gone and by sonar it will know limits of area and by all together a map can be created.

By adding cleaner equipment on it, ElektroTosba will be ready for cleaning autonomously. Additional map ability will help the system to clean most optimal way.

Without any extra cleaning equipment ElektroTosba is a great racing system. By adding FPV races can be made from distance with bluetooth.