

Data
received

Computer

Connect serial TTY.usbserial

set up clock for baud rate

configuration bits
(OSC clock, pre scalar,
interrupt)

global definitions

motor parameters

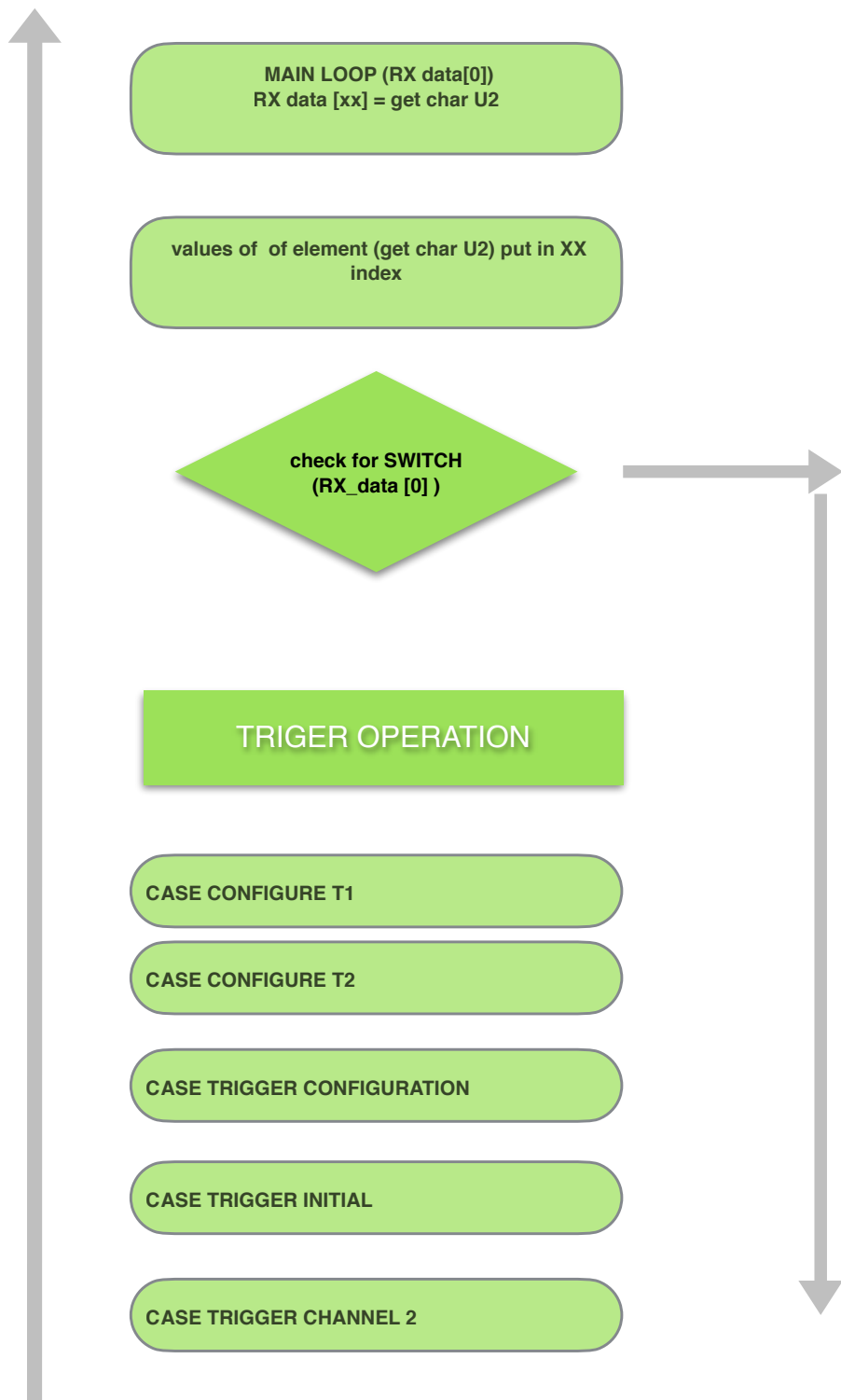
trigger parameter

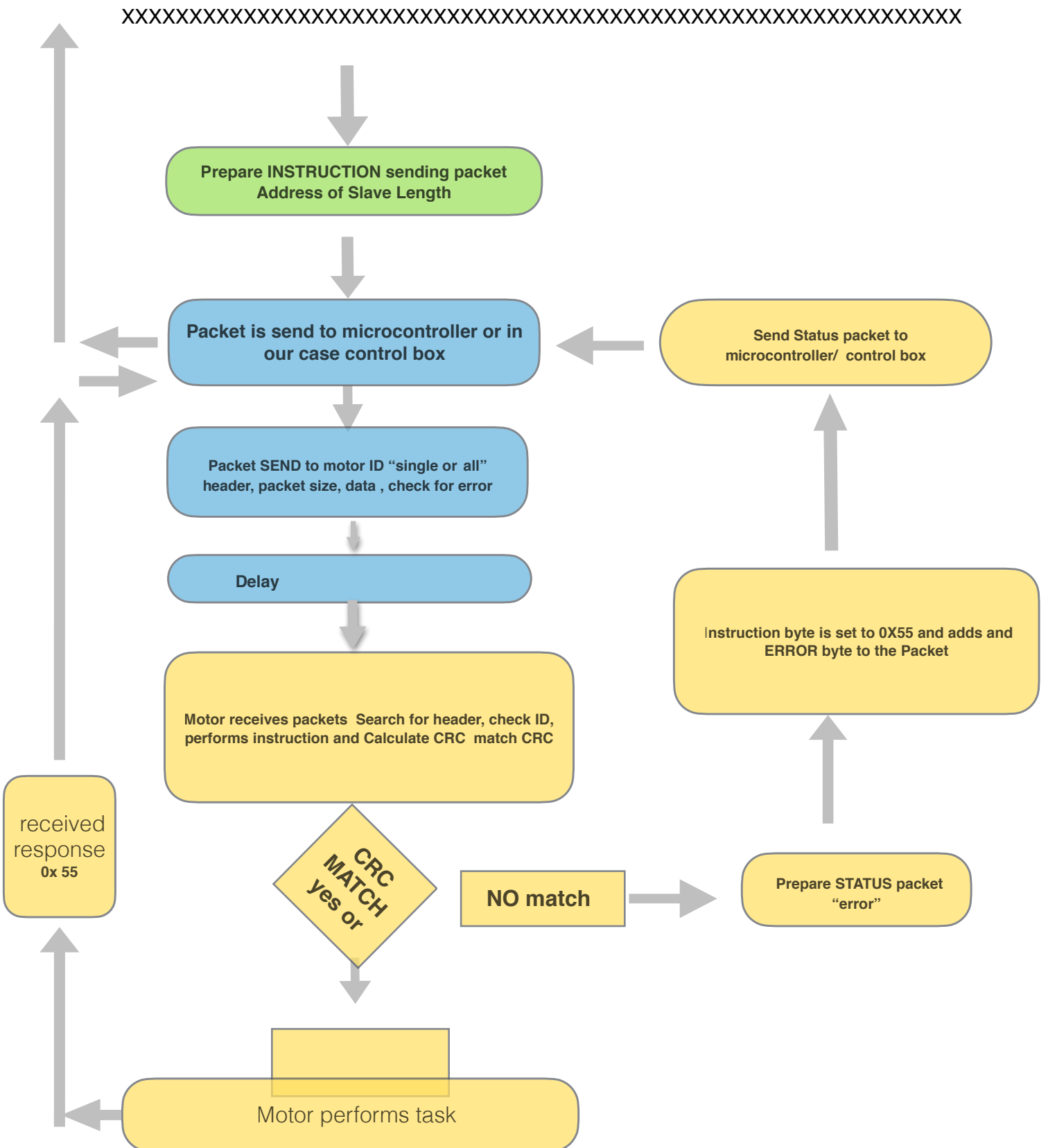
interrups

config motor id

build packet for focus motor

built packet for zoom motor





XX

ISR LOOP is data ready

microcontroller does all these functions with triggers
what's happening on microcontroller and what happening on motor
show with arrow

NEED 3 ENTITIES
COMPUTER (PROCESS) MICROCONTROLLER (PROCESS)(BLOCK DIAGRAM HOW
CONTROLLER WORKS) MOTOR (PROCESS)
FOR EVERY CASE AND CONFIGURATION

SEND RECEIVE DATA BETWEEN PC AND MICRO ON FIRMWARE
CTRL X SRC

Dynamixel motors are controlled by receiving packets of data and also by sending data packet as
return

HEAD of packet 0xFF 0xFF tells microcontroller is the beginning of packet

ID where is going or motor name /address usually defaults to 1

LENGTH this is the length of the packet in this case is the number of (parameters + N) plus
(instruction) and (plus check sum)

This will make the microcontroller aware of how many bytes of data to expect

example let's say

parameter = 1

(additional parameter) N = 0

instruction = 1

CRC cycle redundancy check - error detect = 2 CRC_L and CRC_H

Then LENGTH = 4 bytes of data

INSTRUCTION this is what is being asked to do

2. 5. Instruction

The field that defines the type of commands.

Value	Instructions	Description
0x01	Ping	Instruction that checks whether the Packet has arrived to a device with the same ID as Packet ID
0x02	Read	Instruction to read data from the Device
0x03	Write	Instruction to write data on the Device
0x04	Reg Write	Instruction that registers the Instruction Packet to a standby status; Packet is later executed through the Action command
0x05	Action	Instruction that executes the Packet that was registered beforehand using Reg Write
0x06	Factory Reset	Instruction that resets the Control Table to its initial factory default settings
0x08	Reboot	Instruction to reboot the Device
0x10	Clear	Instruction to reset certain information
0x55	Status(Return)	Return Instruction for the Instruction Packet
0x82	Sync Read	For multiple devices, Instruction to read data from the same Address with the same length at once
0x83	Sync Write	For multiple devices, Instruction to write data on the same Address with the same length at once
0x92	Bulk Read	For multiple devices, Instruction to read data from different Addresses with different lengths at once
0x93	Bulk Write	For multiple devices, Instruction to write data on different Addresses with different lengths at once

PARAMETER example if we wanted to write to motor we first parameter send data about what is going to be modified (position, speed, torque) then second parameter send (position= 45, speed= 2, torque = 5)

CRC cycle redundancy check - error detect

Checks for error in transmission by adding the bytes of data in packet - not including header Form ID onwards.

These are too many bytes so it takes the sum then the value with lowest byte is taken and then it takes the opposite value or NOT ~ (inverts zeros and ones)

This happens when SENDING and RECEIVING then both values are compared

The CRC is computed before sending packet and one again when received

The return or STATUS packet is similar to INSTRUCTION packet with the in this case it will add an ERROR byte as the INSTRUCTION BYTE is set to 0X55 status

NOTE this will change the LENGTH + 1

optic chararaterizaion depth of filed how does the system as a hole work together
microcontroller how things to talk to each other
what have done first year here what have done today
include a futre component

3. 2. Error

The field that indicates the processing result of Instruction Packet

Bit 7	Bit 6 ~ Bit 0
Alert	Error Number

- Alert : When there has been a problem in the Device, this field is set as 1. Checking the Hardware error status value of the Control Table can indicate the cause of the problem.
- Error Number : When there has been an Error in the processing of the Instruction Packet.

Value	Error	Description
0x01	Result Fail	Failed to process the sent Instruction Packet
0x02	Instruction Error	Undefined Instruction has been used Action has been used without Reg Write
0x03	CRC Error	CRC of the sent Packet does not match
0x04	Data Range Error	Data to be written in the corresponding Address is outside the range of the minimum/maximum value
0x05	Data Length Error	Attempt to write Data that is shorter than the data length of the corresponding Address (ex: when you attempt to only use 2 bytes of a item that has been defined as 4 bytes)
0x06	Data Limit Error	Data to be written in the corresponding Address is outside of the Limit value
0x07	Access Error	Attempt to write a value in an Address that is Read Only or has not been defined Attempt to read a value in an Address that is Write Only or has not been defined Attempt to write a value in the ROM domain while in a state of Torque Enable(ROM Lock)

Ikiki