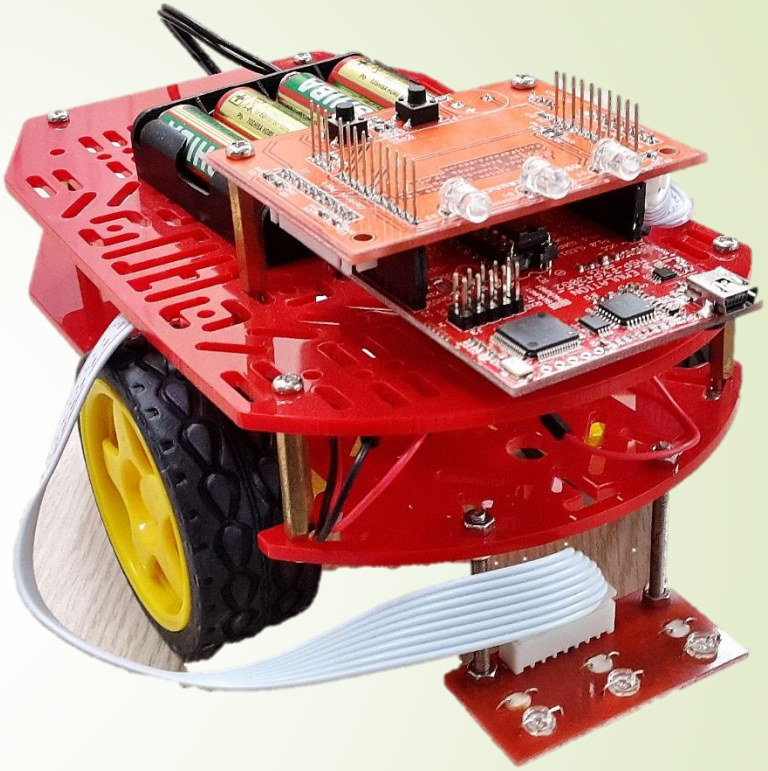
Ho Chi Minh City University of Technology
Faculty of Electrical and Electronics Engineering

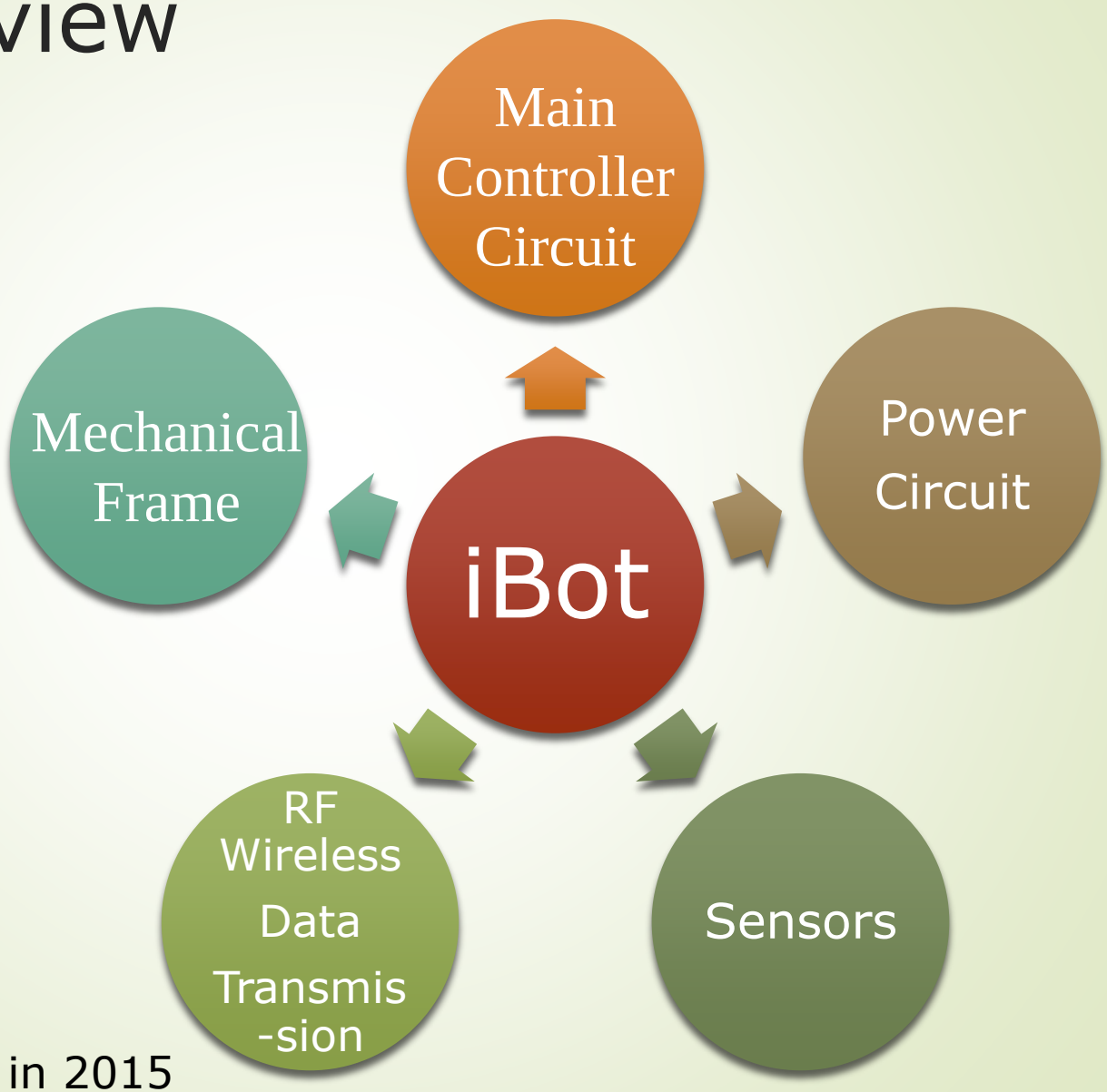


iBot
Hardware Description

Designed by FEEE Student Research Club - PayItForward

payitforward.edu.vn

Overview



(*) developed in 2015

1) Main Controller Circuit

Micro-controller

- MSP430G2553 (16-bit)

LED Display

- 2 status-indicating LEDs (blue – programmable)
- 1 power-on LED (yellow)

Buzzer

- 1 speaker (programm-able)

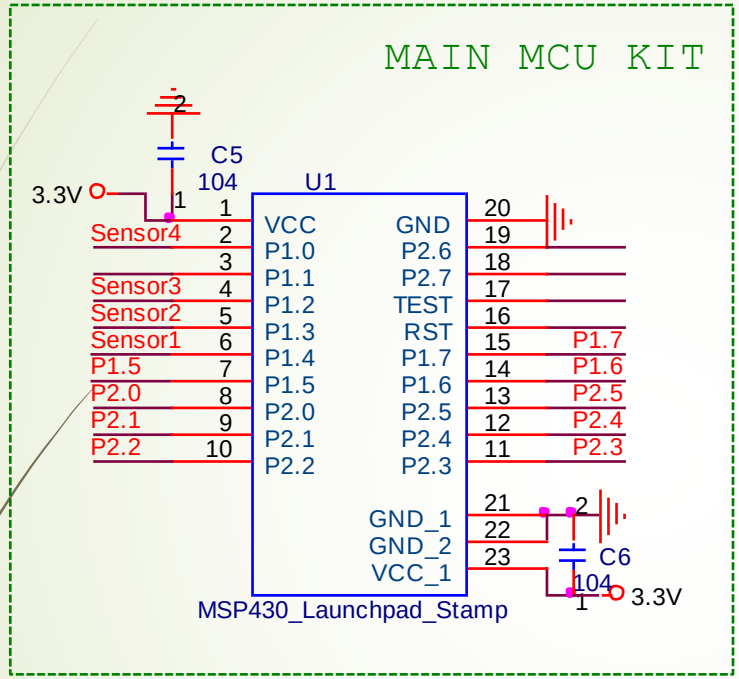
Buttons

- 2 buttons (programm-able)

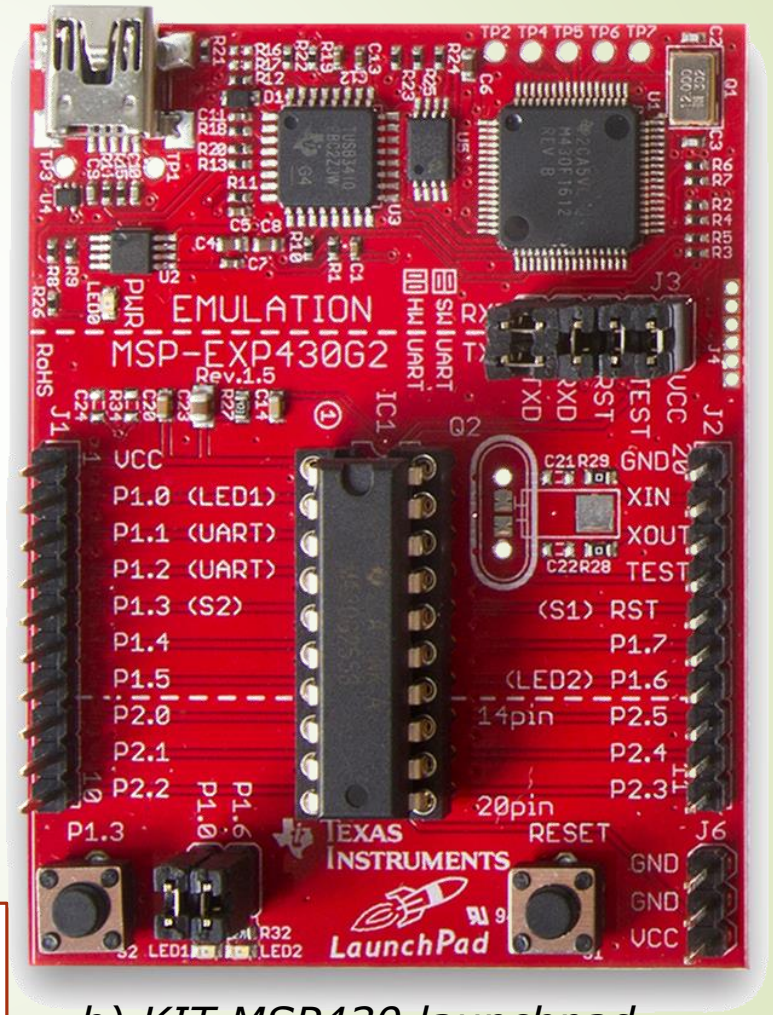
Signal Bus

- Connecting between power circuit and sensors circuit.

1) Main Controller Circuit



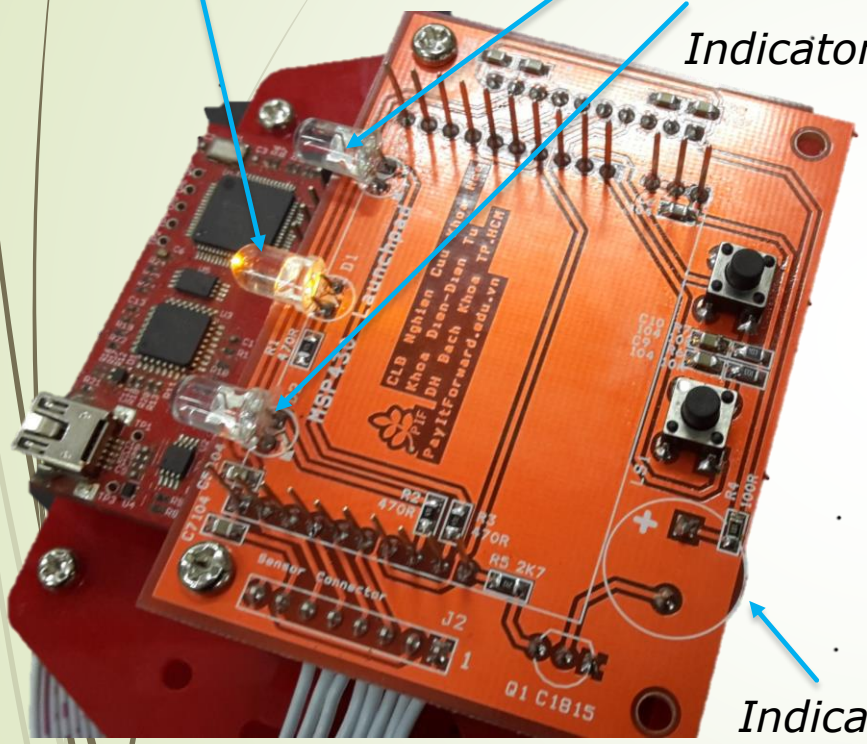
a) Connection diagram between signal pins from Launchpad Kit to other system modules.

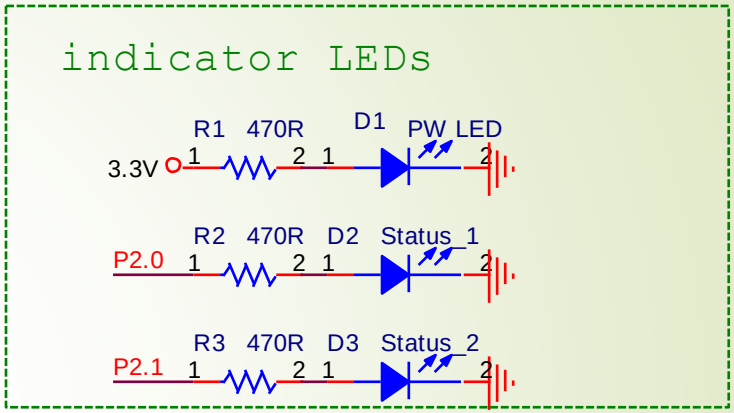


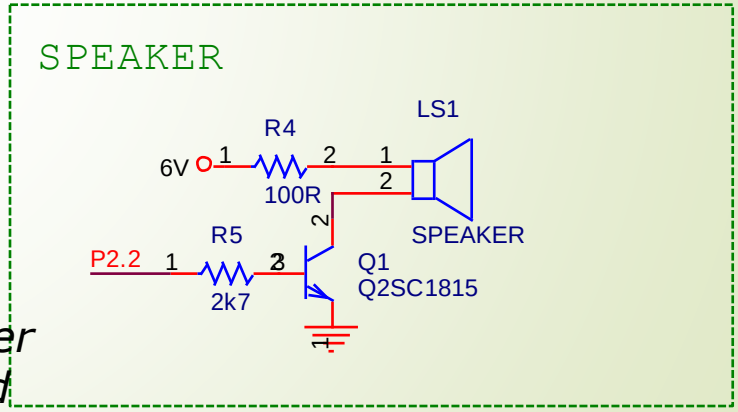
b) KIT MSP430 launchpad

- iBot uses MSP430 Launchpad Kit from Texas Instruments (TI), with 16-bit microcontroller (MCU) MSP430G2553

1) Main Controller Circuit



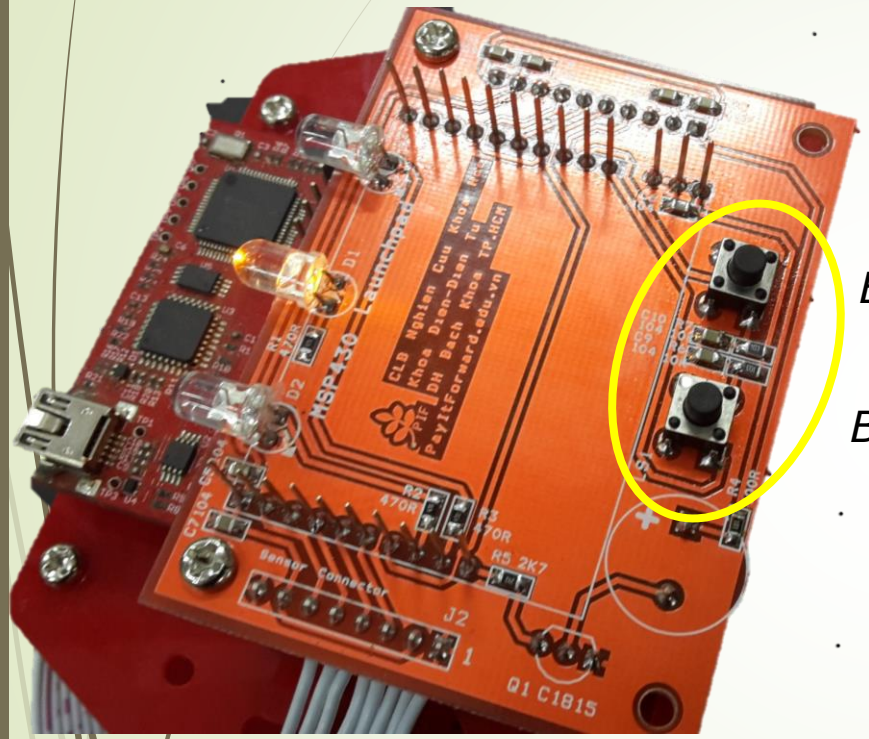


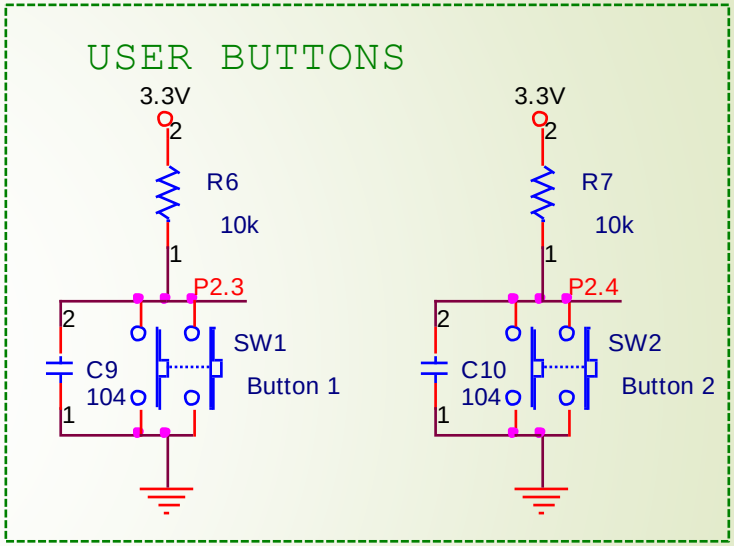


a) LED and Buzzer digram

- Student can program to control Indicator LED and Buzzer.

1) Main Controller Circuit

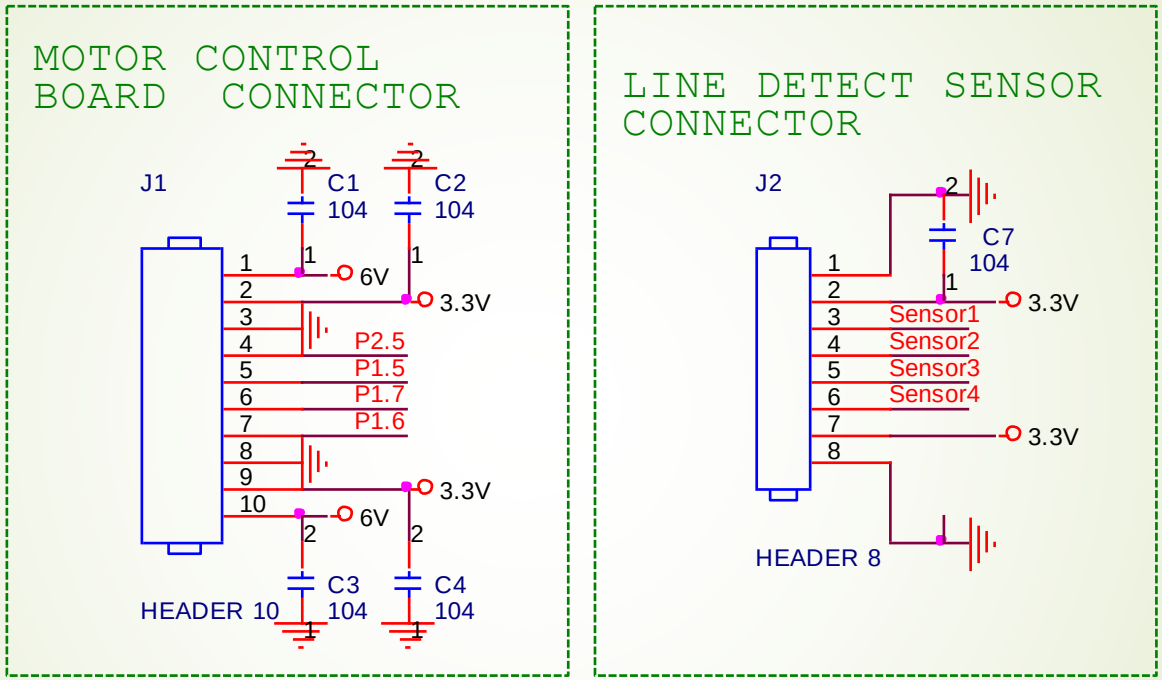




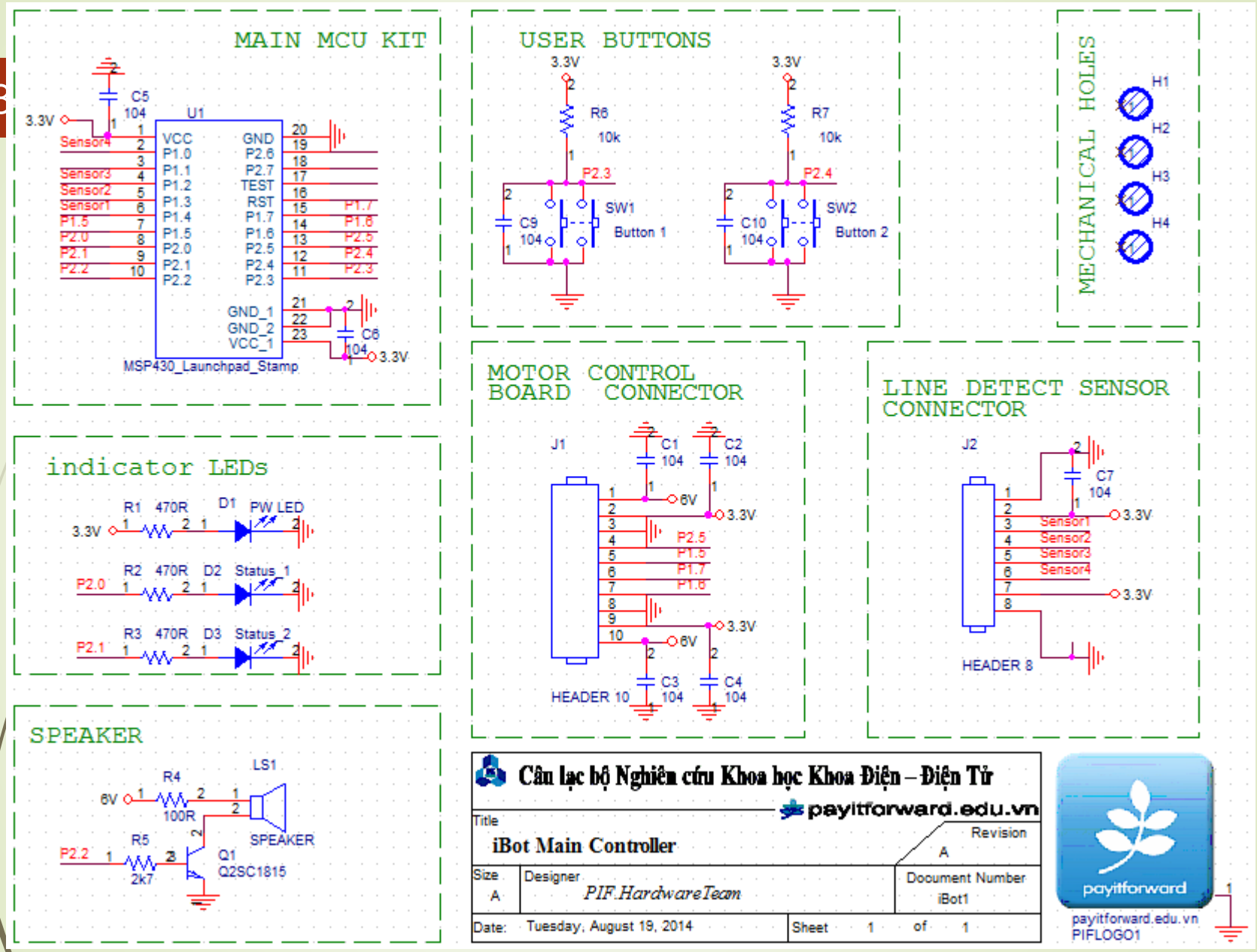
Buttons circuit diagram

- Student can use button 1 & 2 to finish tasks.
- Example: Press button 1 to run the robot, button 2 to stop

1) Main Controller Circuit

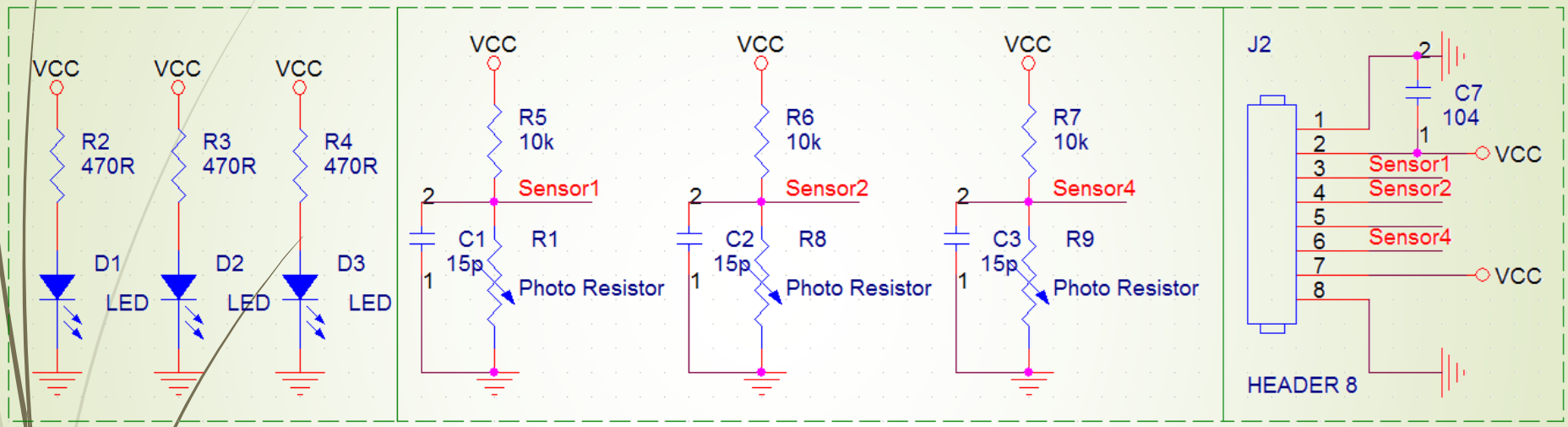


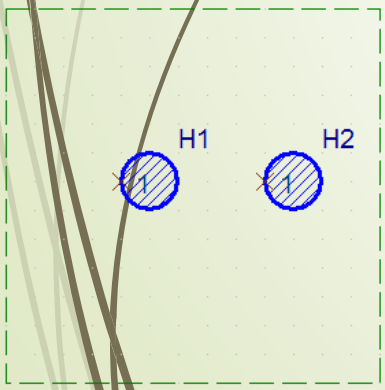
Connector circuit diagram between power circuit (left, 10-wire bus) and line detection sensor (right – 8-wire bus)/



Complete Main Controller Circuit

2) Line Detection Sensor Circuit



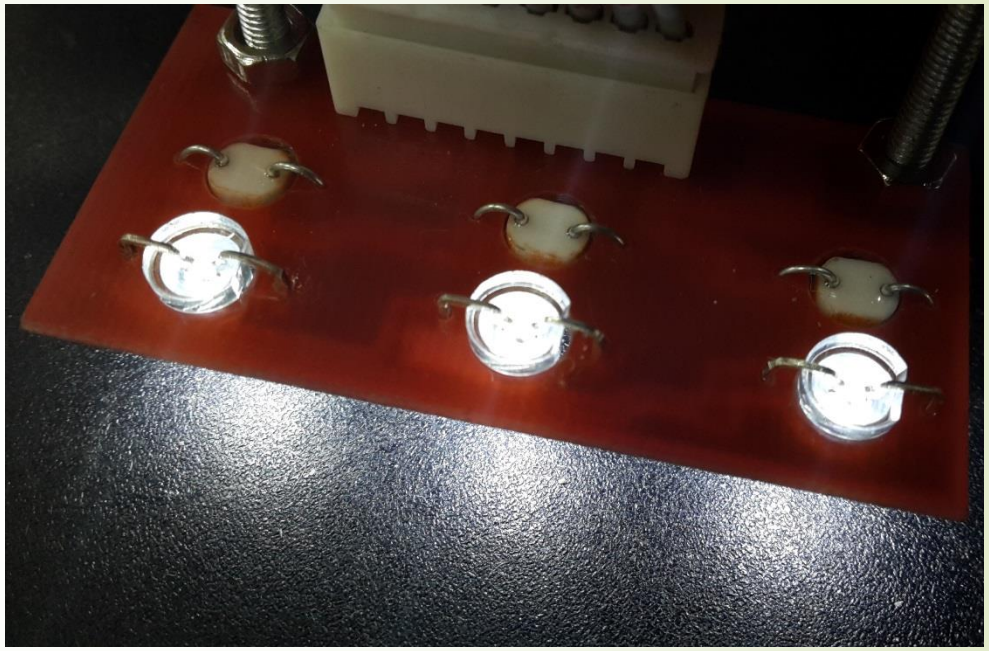


Câu lạc bộ Nghiên cứu Khoa học Khoa Điện – Điện Tử		payitforward.edu.vn
Title: iBot Line Sensor		Revision: A
Size: A	Designer: PIF.HardwareTeam	Document Number: iBot2
Date: Thursday, August 21, 2014	Sheet 1 of 1	

2) Line Detection Sensor Circuit

Line detection circuit (line follower) consists of 3 pairs of LED – photoresistor (LDR)

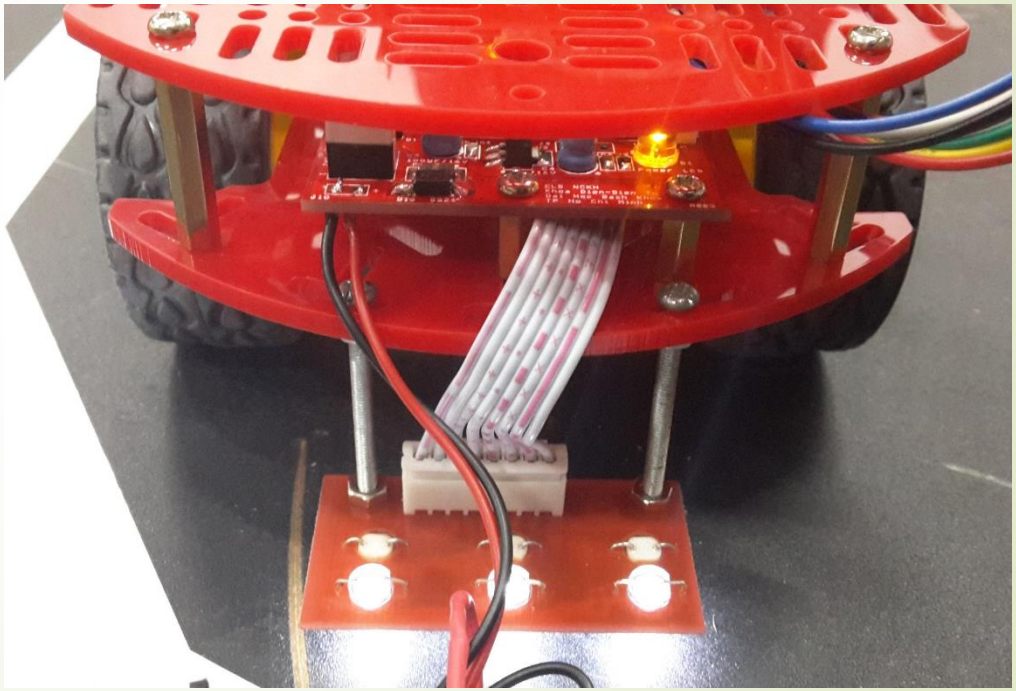
Working principle
(updating)



Line Detection (line follower) Circuit

2) Line Detection Sensor Circuit

Line detection circuit (path tracking) consists of 3 pairs of LED – photoresistor (LDR)



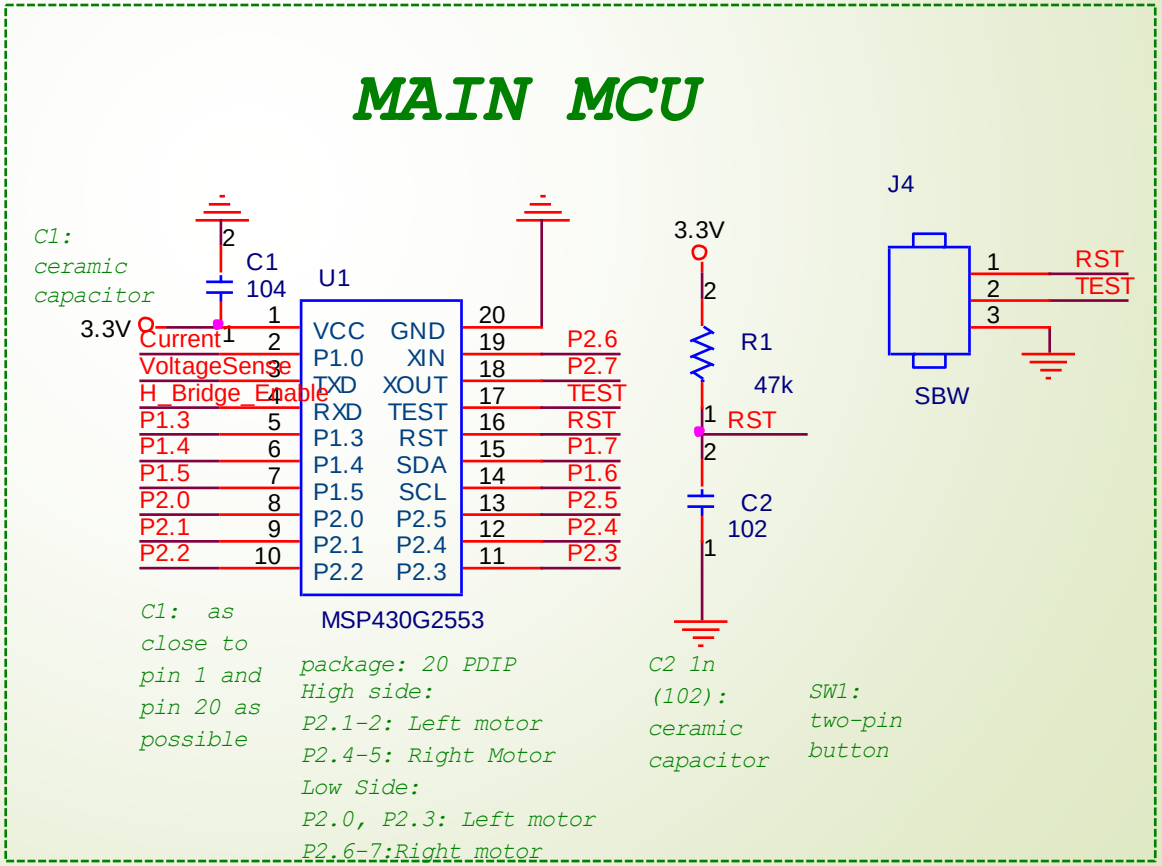
Line follower circuit connects with main control circuit by one 8-wire bus.

3) Power Circuit: controlling DC motors

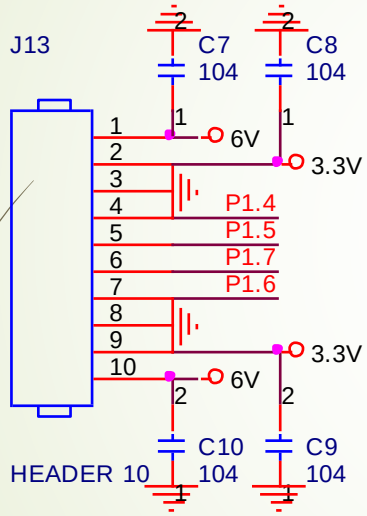
H-bridge circuit working principle:

3) Power Circuit: controlling DC motors

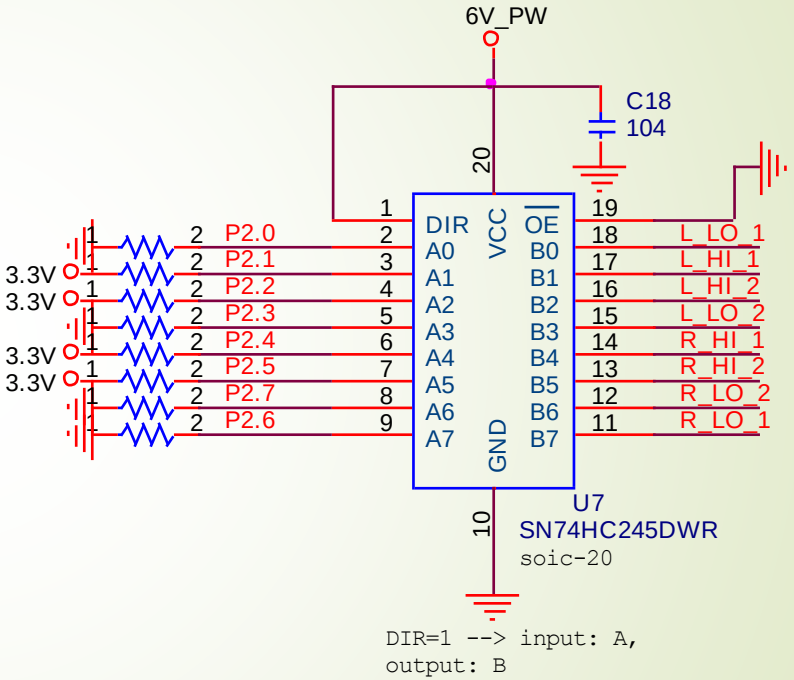
Main IC controlling the power circuit is the MSP430G2553



3) Power Circuit: controlling DC motors



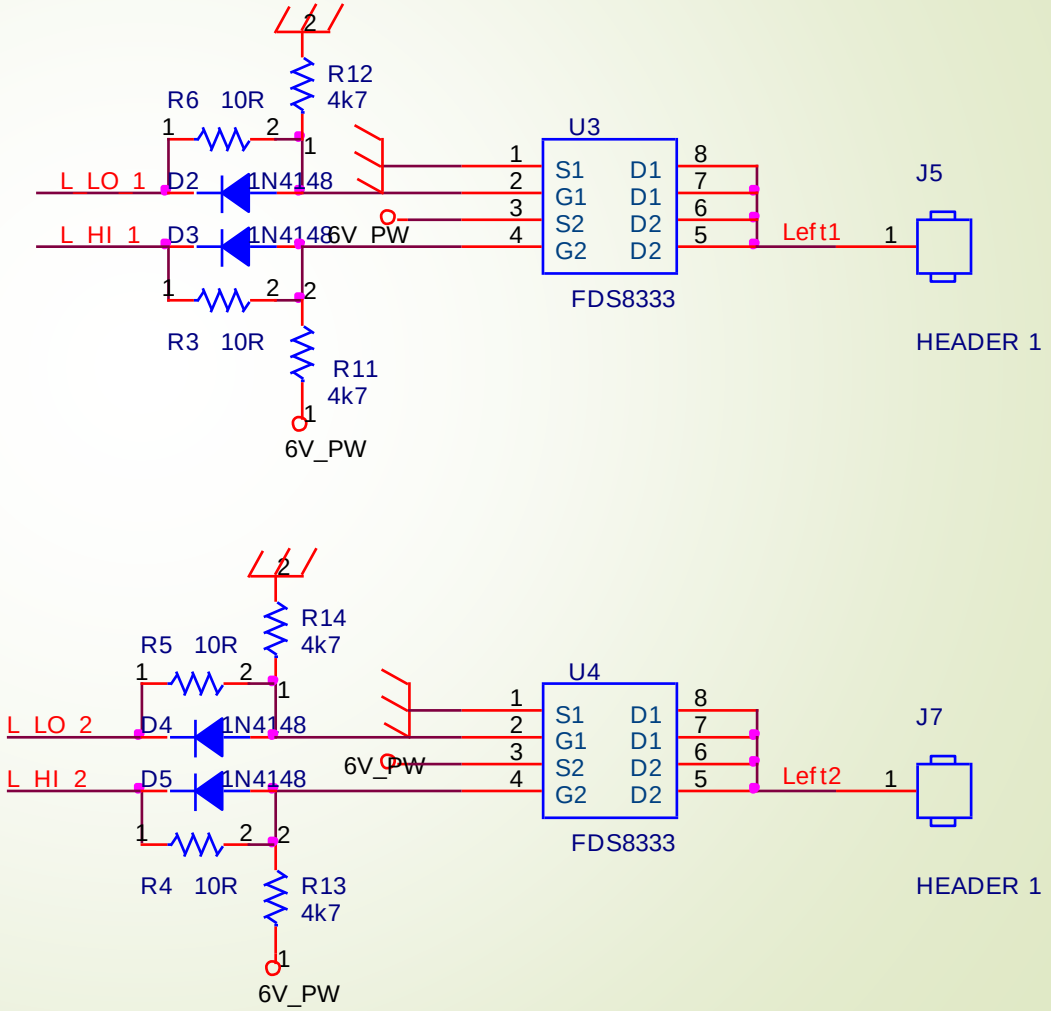
Connecting bus to main controller (MCU MSP430G2553 on top plate)



Level-shifting buffer circuit for signals from MCU to power components

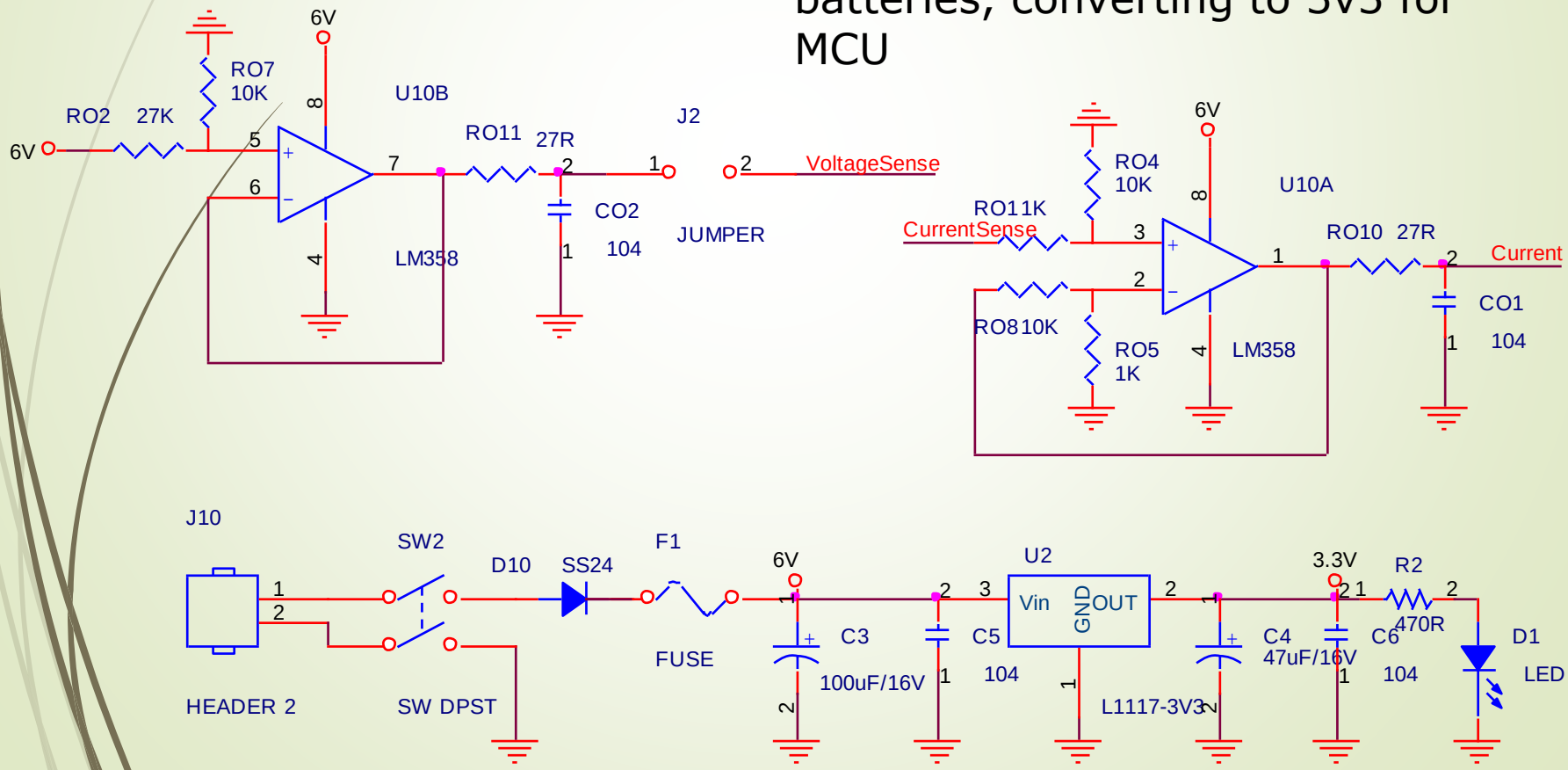
3) Power Circuit: controlling DC motors

H-Bridge circuit controls one motor (2 circuits for 2 motors)



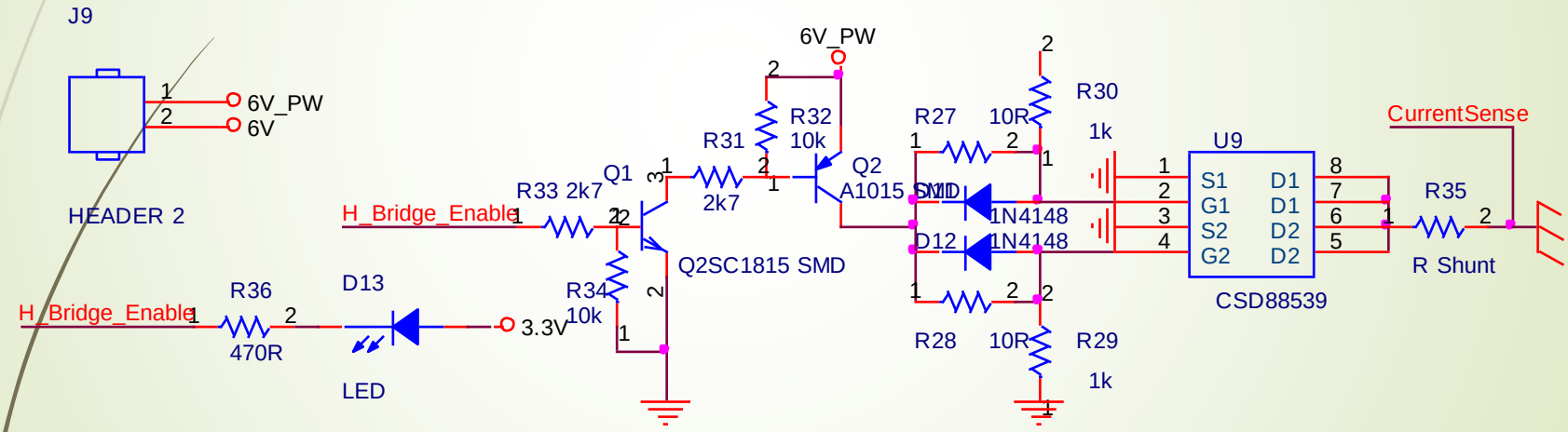
3) Power Circuit: controlling DC motors

a) Voltage measuring circuit
b) Load current measuring circuit
c) Power circuit: 6VDC input from batteries, converting to 3v3 for MCU

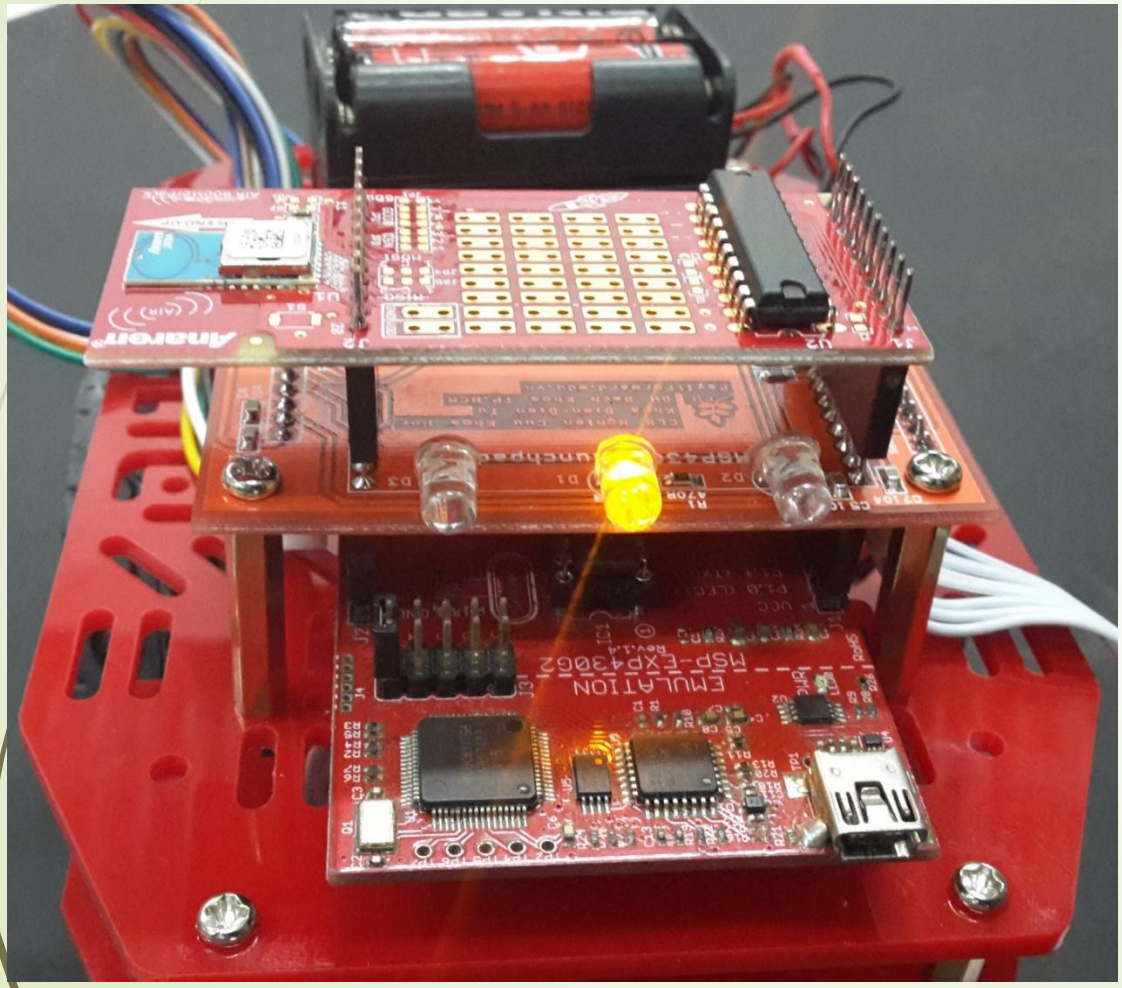


3) Power Circuit: controlling DC motors

Over-current protection circuit (checking signal from current measurement circuit)



4) Module CC110L RF BoosterPack



Texas Instrument's RF CC110L Module is placed on top, responsible for transmit wireless data through RF signal.

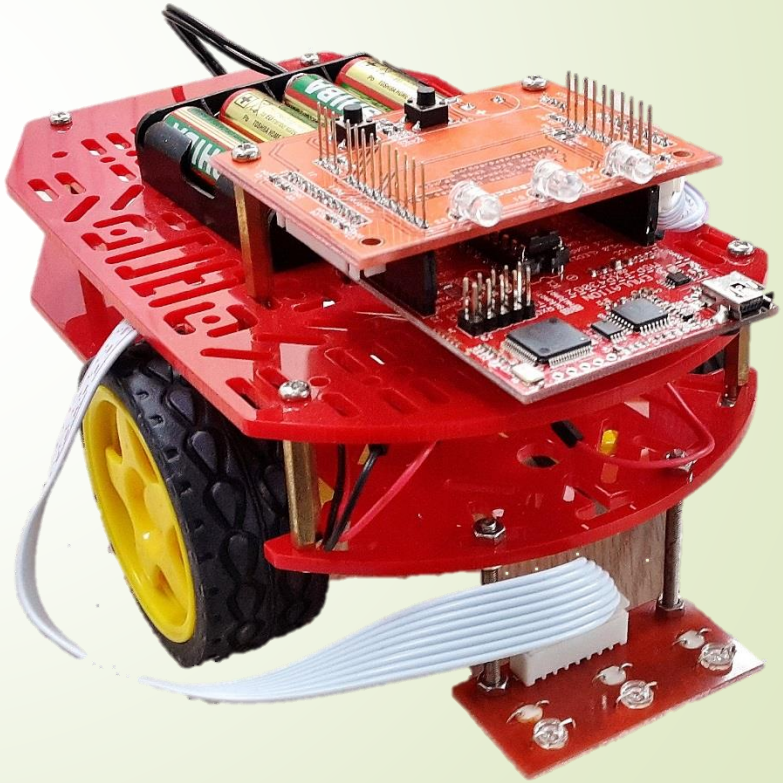
To be developed in 2015.

5) Robot Chassis

The robot chassis to be used is Magician Chassic from SparkFun Electronics (US).
Link: https://www.sparkfun.com/products/10825

Measurement: 110 x 174mm

Technical specifications:
- Maximum voltage for motor: 6VDC
- No-load speed: 90±10rpm
- No-load current: 190mA (max.250mA)
- Torque: 800gf.cm
- Stall Current: ~1A
- Wheel diameter: 65mm (30mm Wide)



5) Robot Chassis

Magician Chassis Kit's components: 2 DC Motor + Wheels + Encoder, omni wheel, 4 AA batteries package, acrylic plates and general mechanical items .

6) Robot Assembled!