The Making of Micromouse

ENGINEERING WORKSHOP

SEM-3

TEAM

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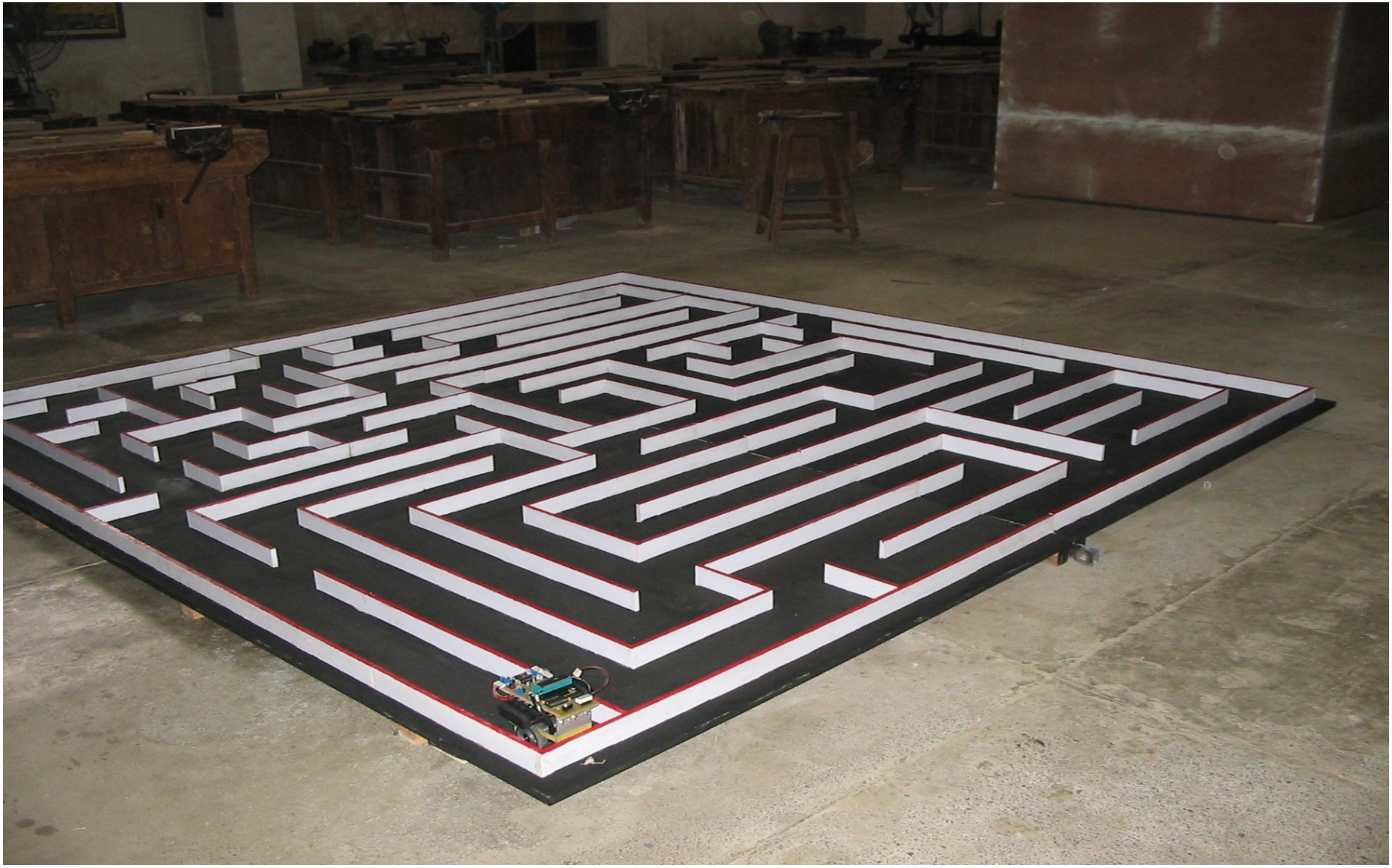
The Problem



Components

- Microcontroller
- Motor
- Sensors
- PCB
- Battery
- Chassis
- Software

Microcontroller

- ATMEL 89C52
  - Cheap & easy to use
  - 8KB of EEPROM and 256B of internal RAM
  - 64KB of external RAM
- Configuration
  - Port 0 and Port 2 to interface external RAM of 32K
  - Port 1 to drive both motors (4 coils each)
  - Port 3 for sensor control

Motor

- Choices
  - DC Motor
    - High torque
    - Low Power Consumption
    - Smaller size and lighter
    - Cheaper
    - Complex speed control
    - Difficult to achieve accurate movement
  - Stepper Motor
    - High holding torque
    - High Power Consumption
    - Bulky
    - Costlier
    - Easy to achieve accurate movement

Problem with Stepper Motor

- Limited choice available in market
- Data sheet and specification not easily available
- Difficult to judge suitability for micromouse

Sensors

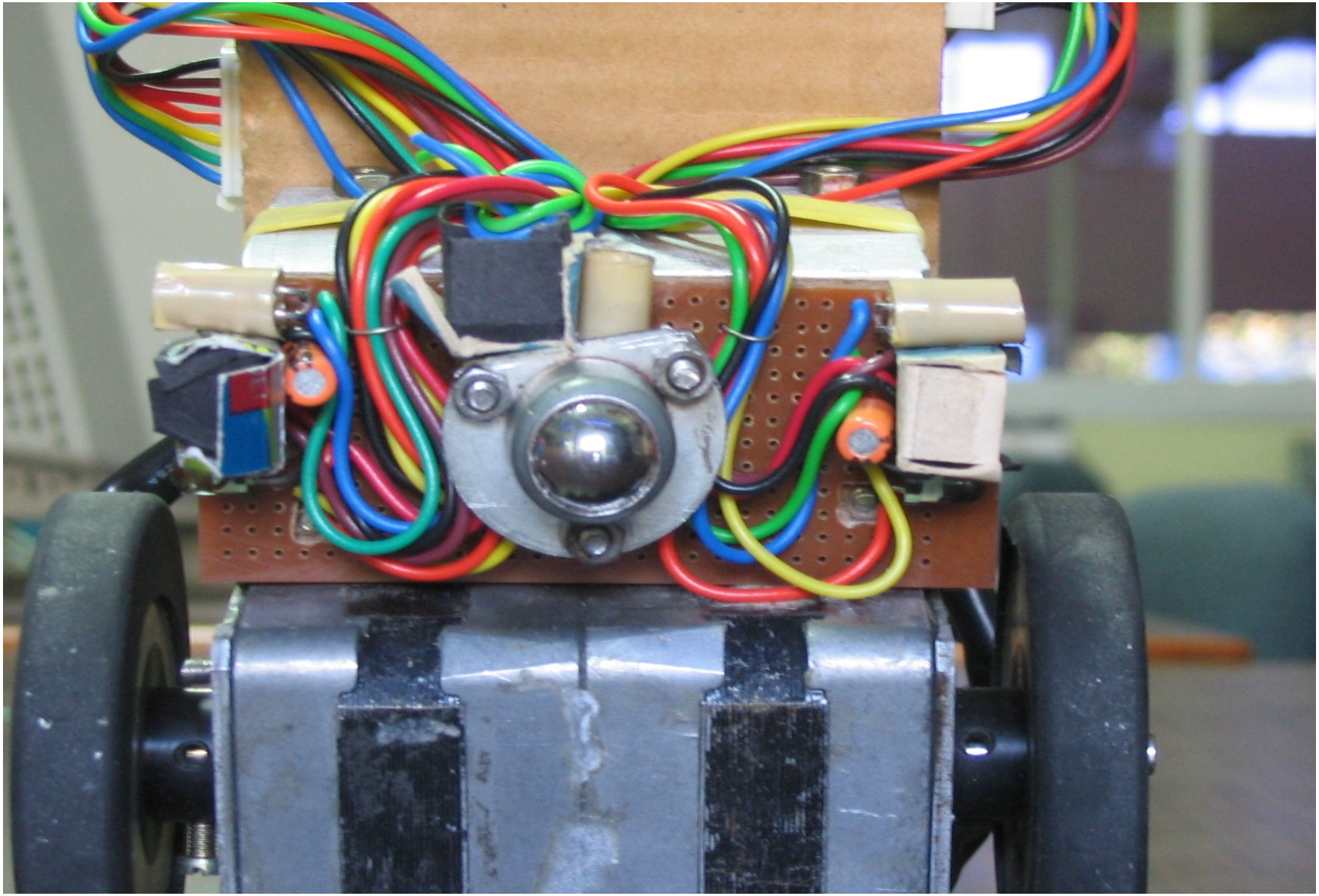
- Choices
  - Ultrasonic
  - InfraRed
  - Mechanical Sensor
- InfraRed
  - Need for modulation
  - TSOP – IR Receiver and filter package

Sensing Strategies

- Sideways and front looking distance measurement
- Sideways and front looking wall presence measurement
- Down looking wings sensors
- Combination of above

- Our Choice
  - Sideways and front looking wall presence measurement
  - Placement and no of sensors

Sensor and Motor



Battery

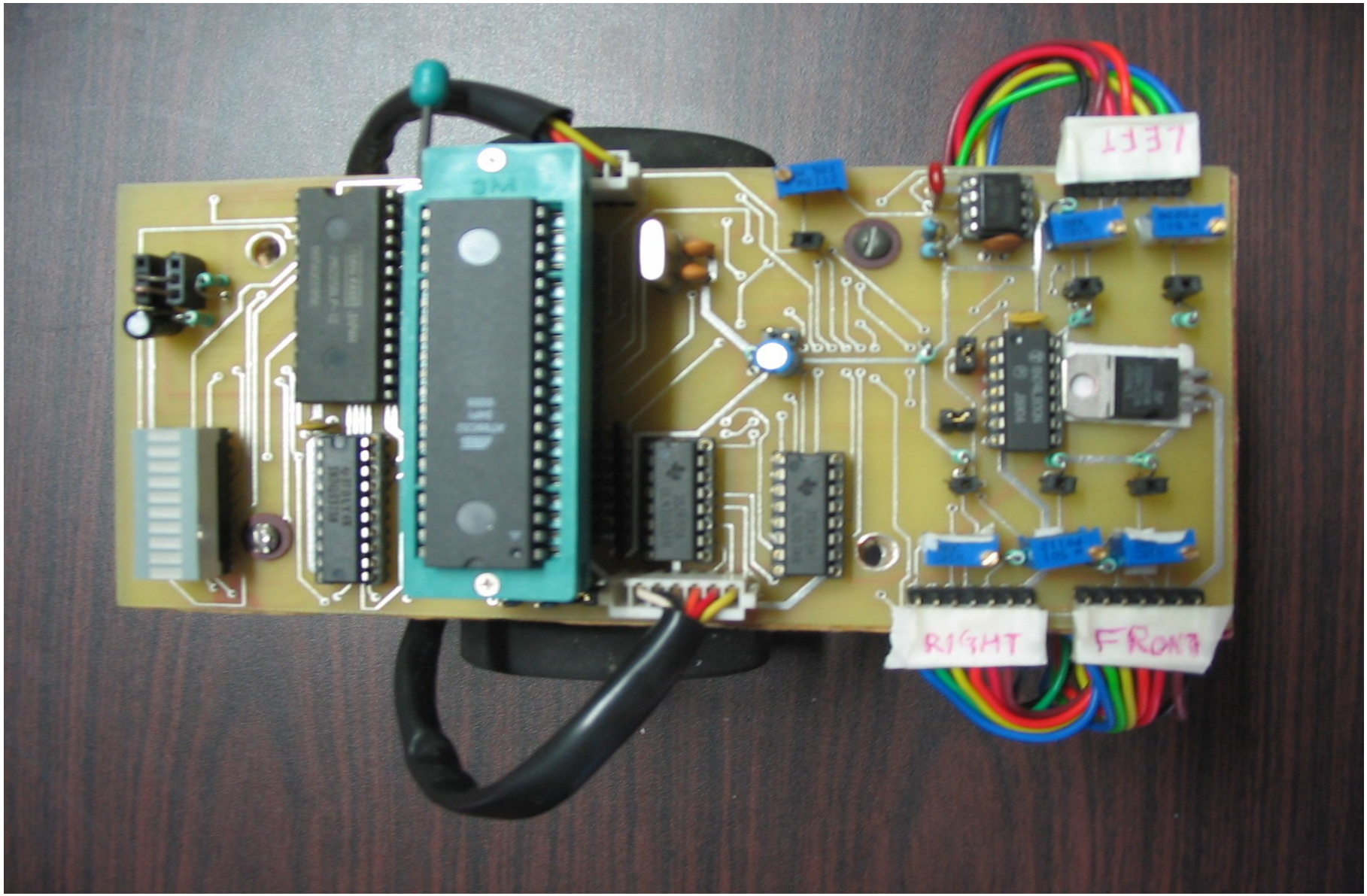
- Choices
  - Alkaline
  - NiMH – Nickel Metal Hydride
  - NiCd – Nickel Cadmium
  - Lead Acid

- Our Choice
  - Our requirement 12 V / 1.5 Amp
  - Lead Acid (12V / 1.6 AmpH)

PCB

- Eagle software for design
- Points to consider
  - VCC and GND tracks should be thicker
  - Track width 0.3 mm minimum
  - Distance between two tracks 0.4 mm minimum
  - PCB manufacturing takes 3-4 days at least

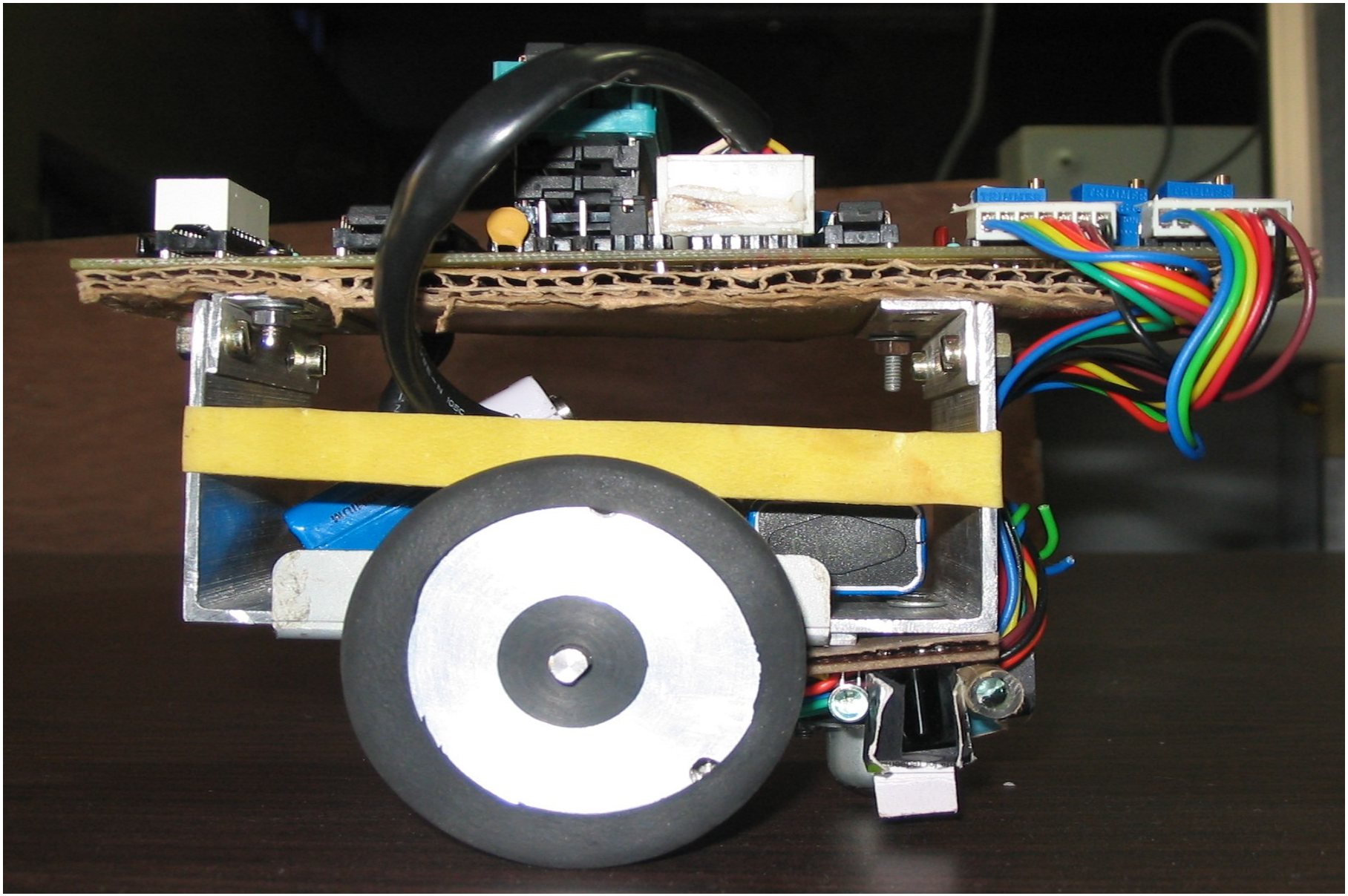
PCB



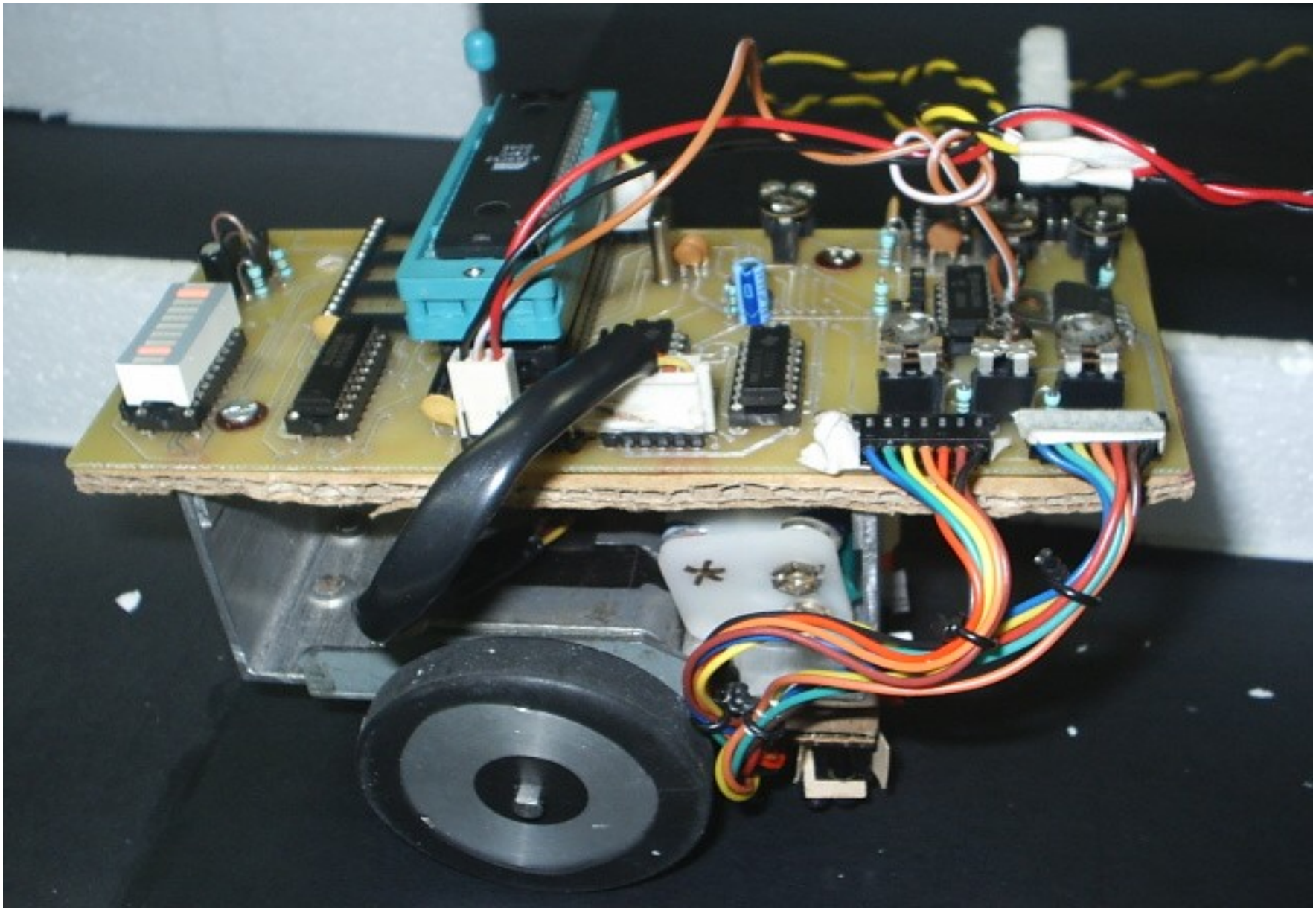
Chassis

- Wheel Design
  - 4/3/2 Wheels
- Our Choice
  - 2 wheels with castor
  - Easy to achieve accurate turns
  - Easy to design and make
  - Ball castor
- Points to consider
  - Center of gravity as low as possible.
  - Moment of inertia as small as possible
  - Balance of weight on wheels and castor
  - Light and Compact

Chassis



Chassis



Software

- Written in C, compiled using Keil
- Simple BFS algorithm (see simulator)
- Features
  - Guaranteed to reach the destination
  - Will eventually find the shortest route
  - Maintains limited history
  - Avoids jerky motion during exploration
- Correction Strategy
  - Both side walls present
  - One side wall present
  - Wall edge detected

Thank You.

- For more information check
  - www.it.iitb.ac.in/~nirav/umouse