

The Necessity of Project Management in Practical Robotics

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1 What is Project Management?

Project management is defined as “the application of knowledge, skills, tools, and techniques to project activities to meet project requirements”. Project management is needed to maximize the amount of progress one can make within a given amount of time. Regardless of whatever project it may be, management is highly important for its success.

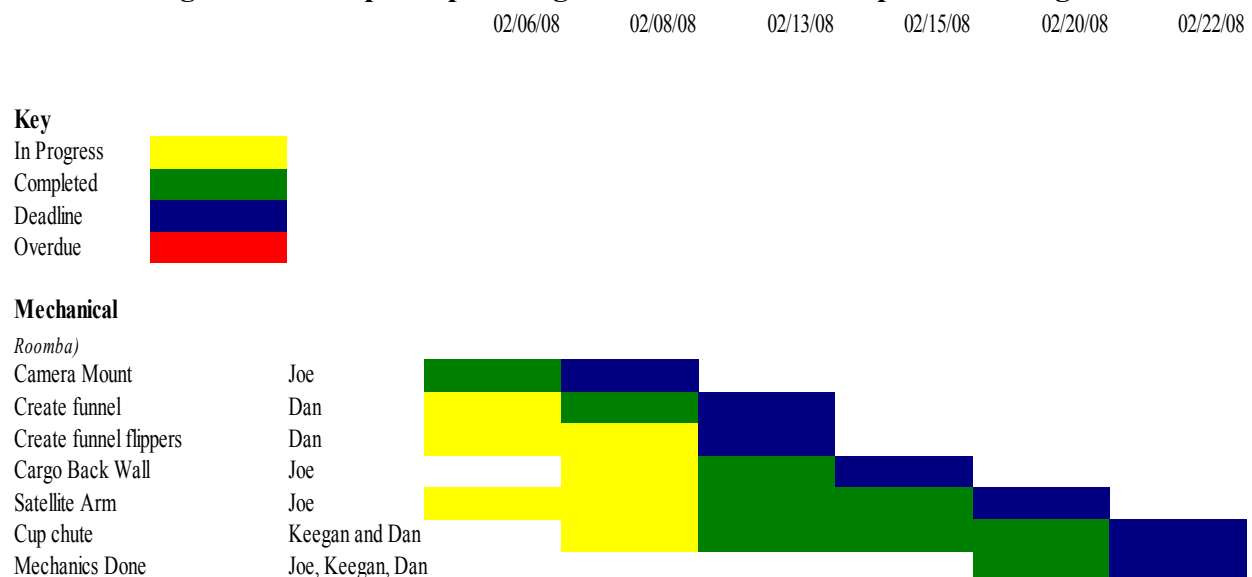
1.1 Project management in Practical Robotics

In developing robots, certain parts would need to be developed first in order to develop other aspects. For example, in order for one to develop an arm for a robot, one would need to design its base to know where and how the claw would be placed. Also, people may not be present, and others would have to take over in the development of their part. Managing how these will be done allows for greater progress in the development of a robot.

2 Planning

The best way in being well managed in a project is to plan out how one will make their progress. Setting how and when certain steps will be done would allow one to work efficiently. In addition to that, one can see the progress one made over a period of time. In planning for one of our robots, Trogdor, we determined who would develop certain parts and the deadlines for which they needed to be completed (Figure 1)

Figure 1: Example of planning the mechanical development of Trogdor



2.1 Periodic Updates

Not all plans tend to be followed the way they should be. In such a case when they are not, periodic updates are needed to resolve this offset. For example, if someone finishes a task later than expected, one would have to adjust accordingly to this occurrence.

3 Management in Development

Despite how straightforward development may be, management is still required to obtain utmost efficiency. People may forget how certain aspects in a robot worked, or others might not understand what someone else did to the robot. Managing development primarily requires proper note taking and commentary during the progress of development.

3.1 Commentary in Programming

Commentary in programming is not only important in practical robotics, but in anything that involves programming. It helps one understand how the program would work so that one could use it or make accurate changes to it. For example, here is a piece of code from Trogdor with the comments removed:

```
void driveToSatellite() {
    while(1) {
        if(analog(armIRLeft) < 180 || analog(armIRRight) < 180) {
            create_stop();
            break;
        }
        else {
            create_drive_straight(-200);
        }
    }
    create_stop();
}
```

It is rather hard to understand what Trogdor is doing during this subfunction. It drives to a satellite, apparently, but how? Now here is the same piece of code with the commentary added:

```

/// Drive forward until satellite enters IR
void driveToSatellite() {
    while(1) {
        // Satellite has entered arm
        if(analog(armIRLeft) < 180 || analog(armIRRight) < 180) {
            create_stop();
            break;
        }
        // Satellite not found, so drive straight
        else {
            create_drive_straight(-200);
        }
    }
    // Stop so we can pick up satellite
    create_stop();
}

```

One can now see that here, Trogdor drives to a satellite until the satellite enters its arm. Adding commentary is highly important in understanding how the program works, allowing for more efficient development

3.2 Notes in Mechanical Development

Despite how unimportant it may seem for practical robotics, taking notes in mechanical development is very important in order to observe what needs to be worked on. Along with that, it can provide information to one who has not been available during a period of time. Notes on the development of Trogdor (Figure 2) show its progress and the problems that were faced during its development.

Roomba funnel done Mon.
 Cargo bay started
 Arm built w/ 1 servo
 1 servo too weak
 Added servo to arm
 Funnel geartrain added
 Modified geartrain
 Worked on cup grabbing
 Funnel remade with 1 motor
 and one servo

Figure 2: Notes on mechanical development

By using notes, one can understand what should be done next in development faster than having to retest and observe everything.

3.4 Commitments

Generally, members of a project in practical robotics are most likely to have other commitments to dedicate themselves to. It could be periodic involvements to another activity, or even a planned event that takes place over a period of time. Members may not be available over certain periods of time. The worst that could happen is that they have a certain part to finish in the project while they are away. Therefore, in order to prevent disaster, proper management is required. For example, taking notes, as mentioned previously, can help other s understand one's progress made. Therefore, with these notes, someone can continue where someone else has left off efficiently. Also, having more than one person working on a specific section provides ease in the occurrence of absences. Absences can commonly occur, especially in schools when one has other commitments to make other than robotics. With project management, they can be well handled.

4 Importance of Project Management in Practical Robotics

In order for one to achieve the greatest amount of progress within a given amount of time, one would have to be well organized to become efficient. Project management is an important aspect to have in the development of a robot, as well as anything else.

- i “Project Management” *The Free On-line Dictionary of Computing*. Dennis Howe, 1993-2007
<dictionary.com <http://dictionary.reference.com/browse/project%20management> >